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Özel, M.

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The Transition towards Becoming an Analytics-Driven Bank:

An Action Research Investigation into the Users' Perspective to the End of Enhancing the Adoption of Interactive Analysis Applications

Murat Özel

Student number: M00510819

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Abbreviations

AAAL	Ankara Atatürk Anadolu Lisesi (High-School)
ALM	Assets and Liabilities Management
AR	Action Research
ASQ	After Scenario Questionnaire
BA	Business Analytics
BAPUS	Business Analytics Platform Usefulness Scale
BI & A	Business Intelligence & Analytics
BO	SAP Business Objects
BSc	Bachelor of Science
CAQDAS	Computer-Assisted Qualitative Data Analysis Software
CBRT	The Central Bank of the Republic of Turkey
CDO	Chief Data Officer
CFI	Comparative Fit Index
CFO	Chief Financial Officer
CSUQ	Computer System Usability Questionnaire
COVID-19	Coronavirus Disease
DBA	Doctor of Business Administration
DM	Data Mart
DW	Data Warehouse
ESG	Environmental, Social, Governance
ExCo	Executive Committee
FTE	Full-Time Excel
GFI	Goodness-of-Fit Index
GLM	General Linear Models
GPA	Grade-Point Average

HR	Human Resources
IDEA	Identification, Description, Evaluation, Action
IDT	Innovation Diffusion Theory
ISO	International Organisation for Standardisation
IT	Information Technology
KPI	Key Performance Indicator
KYD	Know Your Data
MS	Microsoft
MSc	Master of Science
MT	Management Trainee
PAAR	Participatory and Appreciative Action and Reflection
PAR	Participatory Action Research
PGFI	Parsimony-based Goodness-of-Fit Index
POC	Proof of Concept
PSUQ	Poststudy System Usability Questionnaire
PVQ5X	Portrait Values Questionnaire 5X
QAA	The Quality Assurance Agency for Higher Education
QV	QlikView
RAL	Recognition and Accreditation of Learning
R&D	Research and Development
RM	Relationship Manager
RMSEA	Root Mean Square Error of Approximation
SDG	Sustainable Development Goal
SEM	Structural Equation Modelling
SME	Small and Medium-Sized Enterprise
SQL	Structured Query Language
SUMI	System Usability Measurement Inventory

UN	United Nations
UX	User Experience
VA	Visual Analytics
ZBBS	The Ziraat Bank Banking School

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Dedication

To my mum and dad, whose entire lives have always been centred on me as their only child, and still a child even if I am myself now a dad to my own teenage daughter. *Mum, Dad! I have now completed my doctorate as an international student in the UK, and words are insufficient now to describe how delightful I am to be able to share this outcome with you!*

Also, to my beloved wife, who has always lovingly stood beside me in whatever professional and academic endeavour I have engaged in, at times accepting new challenges in her own career, and to my beloved daughter, who has shared our family time with my research for years, and lovingly kept me in company while studying alongside me for days and nights.

Abstract

Digital transformation gaining pace across the globe and an increasing emphasis on evidence-based organisational decision making thanks to the generation and availability of vast amounts of data and the means for processing it have become two important features of the business world organisations are operating in. Against this backdrop, understanding how to successfully implement and manage the changes in relation to how data is exploited to support business decisions and actions has gained even more importance in organisations, including the one in which this research project has been undertaken. As such, this professional practice-based doctoral research project explores the management of organisational changes towards becoming an analytics-driven organisation, in the context of a mid-scale private Bank, which is a member of a major international financial services group, in Turkey. The focus of the exploration is on the changes related to the implementation and adoption of visual analytics applications as the new means of access to information and insights from data to support business decisions and actions.

The research has been conducted through a span of 4 years, from 2016 to 2020, as an insider research project by the researcher, who is a senior manager in the organisation. The research methodology employed for this research project is action research, bringing together change-oriented business actions and research through iterative action research cycles, aimed at generating new, professional practice-based knowledge as a contribution to the literature.

The research process has revealed that while target users were initially enthusiastic about the new means of information access and related changes, their openness to change concerning this change initiative was related to a number of factors, including their perceptions of the usability and usefulness of the new platforms. Contextual factors such as the organisational data environment and organisational culture also emerged as factors with an impact on the successful implementation of the changes, reflecting the tension between the Bank's traditionally more prudent, conservative genes on one hand, and its declared values and aspirations emphasising creativity and innovation on the other.

The research has been concluded with significant changes in the approach with which visual analytics applications are designed and developed in the organisation, the implementation and roll-out of a new visual analytics platform with enhanced mobile and self-service analytics capabilities, and a new model representing the approach for the successful management of the visual analytics-related organisational changes in the context of this research project.

CHAPTER 1. INTRODUCTION

This thesis is based on a research project undertaken in the context of a mid-scale private sector bank (i.e., the Bank) in Turkey. The Bank is a member of a large international finance group. The research focuses on bringing about and exploring the organisational changes related to the new initiatives and improvements concerning the data analytics and reporting activities across the Bank.

The Bank has entered a new era of significant change following a global takeover by its existing foreign shareholder, which led to the Bank's merger with another, similar-scale Bank. This meant roughly doubling the numbers of the Bank in many aspects such as the number of branches, number of staff, etc., including the volume and variety of its data used for business decision support. Against this organisational backdrop, the researcher and his team, led by their higher-level line managers, needed to find new solutions to be able to meet the needs of this new, merged Bank, leading to a significant change initiative concerning how data was used to derive information and insights for business decision support across the Bank. This new initiative would bring change not only in the technology and tools being used, but also in the way staff across the organisation interact with data to derive information, affecting how and on what level of supporting information their business decisions were taken. As such, this change initiative, which is a large-scale, ongoing, and open-ended workplace initiative managed by the researcher, has been positioned as the workplace project into which the researcher would perform a practice-based doctoral research project.

As a senior manager and an insider researcher, my aim in this research is to critically explore my own professional practice and to introduce some significant changes and/or improvements within my own organization (i.e. the Bank) concerning my own job function, while at the same time creating new practice-based knowledge to contribute to the literature (QAA 2014; QAA 2015; Bourner, Bowden & Laing 2001).

To this end, this thesis is structured in a way that could facilitate the understanding of respected readers by starting with a clear picture of:

- the Researcher (myself),
- the Bank (my organisation), as the research setting,
- and the research topic,

which will altogether lay the context of the research, which is given in Chapter 2. The reviews of the relevant literatures for the two main areas of the topic of this research, change management and

business analytics, have also been presented as part of Chapter 2, with smaller-scale, to-the-point reviews having been provided within the sections dedicated to action research cycles when required (e.g., Conceptualisations of Usability and Usefulness in Section 4.2.1 and Diffusion of Innovation in Section 4.3.4.4). This approach has been adopted as it is deemed suitable for professional doctorate research projects, for which an initial literature review can be given at the beginning, covering the main research topic, and/or the researcher's professional field, and/or the researcher's business context, with other partial reviews embedded in the research cycles (Shepherd 2015).

After the context, the text will continue with the research methodology in Chapter 3, and then with research plan and activities in Chapter 4, organised according to the research cycles. All the steps of all action research cycles have been explained in dedicated, numbered sub-sections, with more specific sub-topics discussed under titles within these sub-sections when required. This structure has enabled consistency throughout the flow of Chapter4, with a view to facilitating reading.

As Action Research is the methodology employed for this research project, structuring the thesis in-line with the progress of the actual research activities would be a facilitating method both for me in writing and for the readers in following the sequence of the events.

As the research focus will be on my own professional practice, the changes we (Me and my team at the Bank) have been delivering in the ways staff at various levels access information across the Bank, the reasons that warrant these changes and/or related improvements, their impacts on the people, and also our own assumptions, knowledge, approaches, and values that lead us to the way we do our job will be explored critically to generate knowledge and inform further actions throughout the process.

The main objectives of this research project are articulated as below, covering the personal, business, and academic aspects of the research, with a view to contributing to the management literature by generating new, practice-based knowledge:

- Understand the antecedents of organisational members' openness-to-change in the context of the Bank's implementation of visual analytics platforms for business decision support, and its potential impact on the users' job performance,
- Propose a new approach or model for the successful delivery of visual analytics-triggered organisational change and identify key points on how that could be applicable in practice in similar settings.

The stakeholders in this research project are, along with myself as the researcher:

- My line managers, who are the CDO (Chief Data Officer) and the CFO (Chief Financial Officer) of the Bank, as they are the higher-level managers who are accountable for the workplace project at hand and the success of visual analytics and data governance across the Bank in a more general sense,
- The Bank's top management as they are the ones who give the final approval to investment decisions in relation to data analytics and governance,
- My team members who will be collaborating with me throughout the project concerning mainly the business actions,
- The wider range of organisational members who are on the receiving side of our business actions and consequent changes,
- The University (i.e., Middlesex University, London) concerning the academic outcomes such as this thesis, potential publications, and other forms of knowledge dissemination.

The participants of this research project can be considered in two categories, one for my second-person research and one for my third person research. For second-person research, the participants are my colleagues in my own Department, all of whom are my direct reports, and my Director, to whom I report, as these are the people with whom I develop the research process together (Coghlan & Brannick 2014; Reason & Bradbury 2008), by critically exploring our own way of doing our work and deciding together on the business actions. For third-person research, there is a much wider audience, who are basically our internal clients within the Bank i.e., the users of our products (i.e., dashboard applications, reports, etc.).

CHAPTER 2. THE CONTEXT

This chapter will first describe the researcher, the organisation in which this research is undertaken, and the research topic so that the research context can be clarified. It will then continue with the literature reviews of two topic areas that form the two main pillars of this research project: Change management, which provides the theory through which the researcher's workplace project will be explored, and business analytics, which is the researcher's domain of professional practice. Finally, this chapter will conclude by presenting a detailed view of the research questions and objectives.

2.1. The Researcher (Myself)

I am a statistician with BSc and MSc degrees in Statistics, and I have been working in the banking sector in Turkey for over 20 years, having started with a wide-scoped, 1-year training period at the ZBBS (Ziraat Bank Banking School), the MT (Management Trainee) programme offered by my first employer, Ziraat Bank. My current role as a Business Analytics and Information Management Senior Manager at a private sector bank involves a number of subject areas in which I am expected to have developed –and to further develop- knowledge and skills. A brief outline of these subject areas is given below:

1) <u>Technical Knowledge and Skills</u>

1. A sound understanding and working knowledge of data types, visualisation, and analysis,
2. Knowledge on concepts relating to "storing data" such as data warehousing, data marts and modelling,
3. Knowledge and capability to write basic computer programming codes such as scripts, macros, and database query statements, and to set up relevant algorithms and loops as required,
4. Knowledge of data management.

2) <u>Business Knowledge and Skills</u>

1. Knowledge of banking business,
2. Knowledge and skills for managing a team, as a mid-level manager,
3. Knowledge of data governance,

4. Knowledge of managing change in an organisation,

5. Effective communication (including presentation), both in Turkish and in English.

2.2. The Organisation (The Bank)

The Bank is a mid-scale, private sector Bank in Turkey, which is a member of a major global financial services group, so it has a foreign shareholder. It has experienced a fast-paced growth in the previous decade, partly due to a merger with another similar-scale bank.

While having its roots in the early twentieth century, it has been a nationally known brand starting from the 1980s, and another step towards the expansion of branch network across the Country came in 2000s. When I joined the Bank in the year 2008, they were already in that fast-paced growth process.

As an originally smaller-scale, corporate banking-oriented Bank with relatively few number of branches for years, the new era, which was also triggered by the involvement of the foreign shareholder, apparently saw the Bank cope with a number of challenges in terms of corporate culture. With the recruitment of large numbers of staff from various competitors across the sector, a diverse mix of employees came together. Along with the new areas of banking that were then targeted, this meant that a new corporate culture would emerge with a new harmony for the new Bank.

With the intense efforts of HR (Human Resources) Group, supported by top management, this process of adopting a new corporate culture has been largely succeeded in, though the process is still ongoing. With an ambition of fast growth in the newly entered client segments, aggressive targets, and a declared desire for organisational change, some obvious tensions between the relatively stable, conservative genes of the Bank, which were generally represented by the senior staff with a long organisational tenure at the Bank (mostly at the Head Office), and the desire to become something different: a more aggressive, agile, innovative institution, functioning in every sub-segment of the banking sector i.e. Retail, SME (Small and Medium-Sized Enterprise), and Corporate Banking.

Even in the values newly identified for the new Bank, there were innovation and creativity, and passion for success at one hand, and stability and risk-conscious entrepreneurship on the other. The value risk-conscious entrepreneurship itself embodies two seemingly conflicting concepts: risk-consciousness and entrepreneurship, where entrepreneurship would require some level of risk appetite. Cambridge English Dictionary defines “-conscious” (i.e., the word “conscious” when jointly used with a noun or adverb before it), as "knowing about and worried about a particular thing", or

"thinking that something is important" (Cambridge English Dictionary n.d.). As such, it can be argued that the notion of risk-consciousness does not necessarily discourage risk-taking but promotes showing some level of prudence by raising awareness of the risks taken however, even the inclusion of this phrase in the value of entrepreneurship represents the conservative genes of the Bank.

Within this broader context of the entire Bank, my department, Business Analytics and Information Management Department, sits under the Finance Group, as a part of the CDO Office (Chief Data Officer's Office or Data Management Division, with its formal name). Our function can be summarized into two broad categories, both of which are related to working with data: Exploitation of data, and governance of data, with the latter having been included more recently (i.e., in the year 2016). Our aim is to provide decision support to all the business units and the upper management of the Bank regarding their strategic and tactical business decisions. We function along with two other departments within the same Division, namely the Business Intelligence Department, and the Personal Data Coordination Department. I am in charge of managing the Business Analytics and Information Management Department, whose responsibilities cover both data analytics and data governance. Regarding data analytics, our main focus is on visual analytics, with relatively smaller portion of our resources being utilised for advanced analytics techniques (i.e., statistical analysis and data mining) projects.

As can be inferred from the definition above, my department works with almost all the different functions of the Bank, from business lines to risk management to ALM (Assets and Liabilities Management), etc., with only the exception of Operations Group, which mainly requires operational reports.

Our main principles concerning our work are:

- Abide by the requirements of information security, which are dictated by the Information Security Department,
- Minimize the manual, labour-intensive, and error-prone data processing work on the business user side,
- Prevent the mass-extraction of data for external processing and/or manual distribution,
- Ensure standardised data definitions to avoid confusion and unnecessary comparison efforts among users.

In order to perform our duties in-line with these principles, what we need to deliver is an easy-to-use and high-performance analytics platform where users can access not the raw data but the

ready-to-consume information, along with the flexibility to interact with that platform with high speed to get on-demand answers to their queries. This means that we need to be innovative, search, find and adopt new means of interactive visual data analysis, and introduce these to the target users across the Bank so that they can be more efficient and effective both in how they exploit data to support their decisions and in how they work in a more general sense, potentially with an impact on their job performance.

In an evolving culture where the relatively conservative, prudent, risk-averse genes of the Bank coming from its roots are being mingled with a formally declared desire to be creative and innovative, as mentioned earlier, observing the tensions between these two cultural aspects and acting accordingly have been an important part of our business as a division. We need to be innovative, persuasive, but at the same time risk-aware, particularly regarding information security, and street-smart so that we can not only make or push for the right decisions but also communicate them the right way. In fact, this has been the approach financial services institutions have been operating with, in the broader picture of the industry, where banks operate in an environment subject to continuous changes of varying scales (Cegarra-Navarro, Jiménez-Jiménez & García-Pérez 2021). Particularly after the financial crisis in 2008, of which a major cause has been identified as shortcomings in banks' risk culture and governance (Bianchi, Carretta, Farina, et al. 2021), banks have faced both an increasing number of new regulations and closer scrutiny of compliance with those regulations to restore trust in the financial institutions (Nienaber, Hofeditz & H. Searle 2014), and a highly competitive, dynamic market thanks to an increasing number of new global players, both large global financial institutions and new financial technology start-ups (Das, Verburg, Verbraeck, et al. 2018). In such a turbulent industry which is also a highly regulated and conservative ecosystem (Kangas, Westerholm, Tainio, et al. 2019), banks have been relying on innovation not only to enhance the quality of their products and services but also to support stability (Das et al. 2018). Among these innovations are the data analytics-related initiatives (Kangas et al. 2019; Das et al. 2018); however, banks are experiencing difficulties in embedding innovation as a driver of new business initiatives thanks to a number of key barriers, among which is the "traditional risk-avoidance focus" (Das et al. 2018), where in fact one of the main drivers of innovation is a creativity-oriented corporate culture (Fiordelisi, Renneboog, Ricci, et al. 2019). Our organisational context, in this sense, looks more or less the same as that of the financial services industry in the broader picture, although with varying degrees of risk appetites and different corporate cultures across the players in the industry. Below is the Figure 2.1, which is an illustration of our current business model as the CDO Office, of which my department is also a part. As such, Figure 2.1 illustrates our actual positioning in the Bank's real business setting, focusing on the visual analytics services we provide.

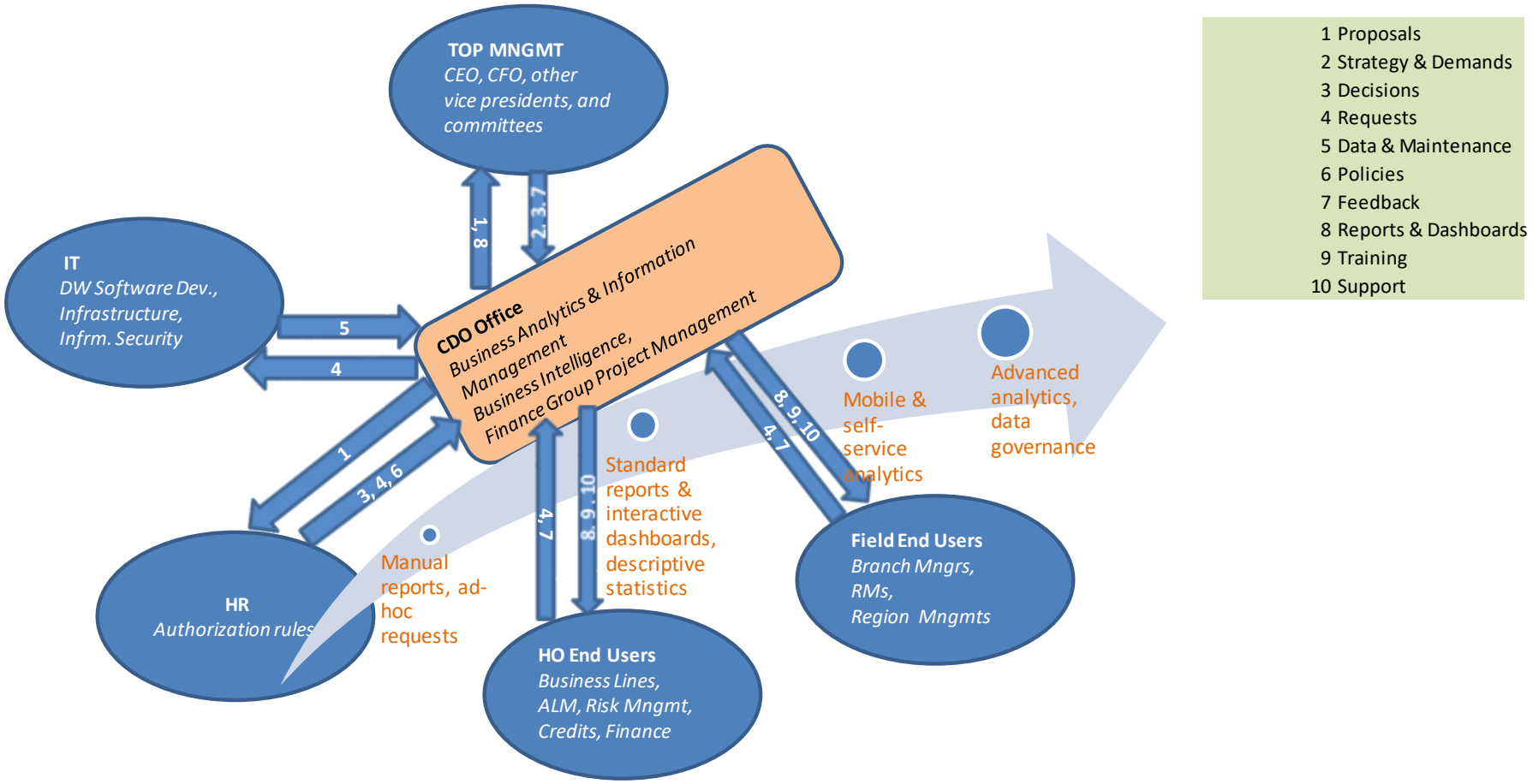

Figure 2.1. The business model of the CDO Office

Positioned centrally within the Bank's internal business relations, my department is in close and continuous communication with almost every business unit across the Bank. This includes an intermediary functionality between the business units and IT as well, regarding the business units' reporting and analytics requirements.

The primary focus of this research will be on the function of Business Analytics and Information Management Department, where a team of 6 staff works, including myself as the head of the department. The number of staff has reduced to 6 from 10 in the last 2 years due to the impact of overall budget constraints, as we were unable to fill the positions of outgoing team members with new recruits.

Below are the brief explanations of the business interactions between my department and the other parties that are included in Figure 2.1:

Top Management: We provide dashboard applications, standard and ad hoc reports to top management, and we formally contact top management for critical decisions such as new investments concerning our function. In return, members of top management define and communicate the strategy, including the data strategy, and their demands from us, decide on the issues we raise to them, and give us feedback on our work.

Field End Users & HO (Head Office) End Users: We provide our services to the end users across the Bank through our dashboard applications and reports, trainings and other forms of user support such as email exchanges, phone calls, and user manuals. In return, users communicate their requests and feedback to us.

HR: We communicate our requests of access authorisations to HR, either for us or for our internal clients. HR decides on these requests, implements general policies on authorisations and communicates to us, and can submit requests to us for HR-related topics.

IT: We request and receive services from the IT concerning our data and hardware requirements.

In continuous interaction with these parties, we perform our function while at the same time working towards advancing our business from manual reports and ad hoc data provisioning to more standard reports and interactive dashboard applications, to mobile and self-service analytics, and then to more advanced analytics and data governance.

In order to be able to meet the requirements of our role, we tend to develop a hybrid skill set, encompassing knowledge both on technical topics regarding data collection, analysis, and

management, and on banking business domain, as well as communication and presentation-related competencies. Even if this hybrid skill set is not always easy to be found or quickly developed at the individual level, we try to maintain this hybridity at the department level at least. Our team consists mostly of Statistics, Mathematics and MIS (Management Information Systems) graduates with varying levels of experience either in banking or in other areas of finance.

Almost all our efforts involve bringing significant changes in the way our colleagues generate, access, distribute, and use information derived from data, regarding either the exploitation or the governance of data. Data governance, which is "the exercise of authority and control (planning, monitoring, enforcement) over the management of data assets" (DAMA International 2017, p.105), is important in the banking sector, considering particularly the compliance requirements, which is among the organisational needs that data governance programmes aim to address in most organisations (DAMA International 2017), along with other requirements such as data strategy, standards, and quality, towards increasing the value generated from the data assets (DAMA International 2017). In order to be able to reap the benefits of exploiting data as a corporate asset, organisational culture needs to adapt to valuing data and data management activities. As such, data governance programmes, which implement new policies and procedures, and create new roles such as data owners and data stewards, engage in change management activities championing the benefits of data governance across the organisation, often entailing significant cultural change components (DAMA International 2017).

Along with the changes introduced with the implementation of our new interactive analytics platform, QV (QlikView), which is the main focus of this research, we have another programme, which consists of various inter-related projects, aimed at implementing a thorough data governance framework across the Bank. As this programme involves bringing significant changes in terms of data-related roles and responsibilities, and organisational structures as well as adopting a new culture named KYD (Know Your Data), this will also be an important aspect of the context of my research, since it is a closely related programme to our efforts on the data exploitation side, though not directly addressing all the data domain areas at the same time but rather progressing in phases.

At this point now, I have drawn an overall picture of the organizational setting in which the fieldwork of this practitioner research project is carried out. The next section will explain the research topic and provide the justification for my selection of the DBA programme.

2.3. Research Topic

This research project focuses on the organisational changes related to the implementation of new visual analytics applications[1]. These changes do include but are not limited to those directly on the visual analytics applications. The main focus is on the changes as experienced by the users of these applications in their workplaces, concerning the impact on their business decisions and actions.

The changes experienced by the users across Bank in this context will be explored in an iterative manner through research cycles, as will be explained in the following chapter, so that the ongoing visual analytics efforts will be informed by the outcomes of these iterations and further actions will be taken accordingly throughout the research process, which in turn will feed into further iterations.

The Status Quo:

Following a merger with another similar-scale bank, the size of the Bank grew significantly with total assets increasing by circa 60%, number of branches rising from circa 300 to over 600, and number of staff rising from circa 5.000 to circa 10.000. Consequently, the volume and variety of the data have also significantly increased, making it significantly difficult and ineffective, if not impossible to process data by using the Bank's existing tools and technologies at that time. These existing tools and technologies were comprised mainly of traditional querying and reporting platforms, spreadsheets, and some operational reporting menus in the core banking system, all aimed at generating static reports. SharePoint and email were the main means of report distribution. Information generation through data processing and analysis was performed through mostly manual, labour-intensive, and error-prone processes across the Bank.

Considering the expanding information requirements of the merged Bank, the expanding size of the data we had to deal with, and also the new technological developments in the field of Business Intelligence and Analytics, we decided to take a new initiative towards moving the Bank from this status quo to a more efficient and effective state where users would be able to access information in an interactive manner, with high performance and through much better visualizations. This was also a step within our broader vision of becoming an analytics-driven bank, with the employment of not only interactive analysis tools but also more advanced analytics solutions and a proper data governance framework, as has been illustrated in Figure 2.1, which shows the initiation of my

[1] The term "visual analytics applications" is used interchangeably with the terms "interactive dashboard applications" and "interactive dashboards" for the purposes of this research project.

department – and the CDO Office more broadly- by focusing on manual reports and ad hoc requests, then proceeding with standard reports, interactive dashboards, mobile and self-service analytics, advanced analytics, and data governance.

The Change:

Starting from early 2012, we have been delivering a significant change in the way people generate and/or access information to support their business decisions at the Bank, by implementing a new analytics platform and new principles such as minimizing manual report generation, minimizing ad-hoc report requests, promoting self-service information access via standard business intelligence and analytics tools, etc., and this endeavour is ongoing.

These technical novelties we have been introducing can be considered as one of the dimensions of the change this initiative has brought (i.e. systems and technology dimension), potentially leading to changes in some other dimensions such as the work, staffing, and timing, as defined by Lientz and Rea (2004). Triggered by the change in the means of data analysis, changes in the daily lives of staff across the Bank started to happen, as this new element started to become an integral part of their workplace activities. These changes were related to the aspects of their business activities such as:

- People were used to waiting for their daily, weekly, etc. status reports to be sent by relevant departments at the Head Office and/or the regional directorates. With the implementation of the new platform with a number of applications on it, all this information have become ready at their fingertips, automatically updated. As such, at least some of the previous reports have been discontinued, changing the way information was shared for business decision support (i.e., no more emails for what is readily available).

- Another legacy method of information retrieval was submitting queries through some dedicated menus (portlets) in the core banking system. These would run for variable time periods depending on the content of the desired report, from minutes to hours, and give a static report to the user, with no further interaction. When the user needed to delve deeper into the report, they would have to ask questions via telephone calls or -more frequently- via emails, which would then lead to more email correspondence between the parties and would take hours, days, or sometimes weeks for the user to get the answers. With the new platform, on the other hand, users started to have the capability to drill down to the granular-level details of their figures and/or further analyse them themselves multi-dimensionally within minutes if not seconds, whenever they wished to do so. This meant an opportunity to free up

valuable resources to focus on their core business activities instead of manual report production and ad-hoc email queries.

- Another aspect of this new means of information access has been improved visibility and transparency. Improved visibility, because granular-level details provided additional depth which used not to be accessible to most of the end users, and also additional breadth thanks to the wide range of content covered by the new platform, which simply was not possible due to the technical and resource-related limitations of the legacy environment. Improved transparency, because most of the end users started to be able to monitor not only their own figures but also that of the other branches and of the Bank in general -except for the customer-level details and beyond, where strict information security protocols apply-, which was not possible with the legacy system. This was a mixed blessing: This increased visibility and transparency both facilitated information access for business decision support and triggered more competition among the marketing and sales staff; however, it also significantly limited the escape routes or excuses such as “I can’t see my figures so I can’t act accordingly” or “These figures look incorrect. I asked for the details, but no one has replied yet”, etc.

Although we received positive feedback across the Bank since the very beginning of our change efforts, we have been also receiving some critical feedback and observed some adverse efforts and behaviours as well, particularly after the first two or three years. Part of this can be related to the way we have been delivering this significant change, which obviously had impacts on people’s everyday activities at the workplace, changing some parts of these activities significantly and even leaving some organisational duties and processes redundant.

Another factor could be the inherent culture and values of the Bank. Since the values included both a desire for innovation and creativity and passion for success on one hand, and stability and risk-conscious entrepreneurship on the other, the possible conflict may have been reflected also in the mixed feedback that we received.

With these in mind, the research questions and more elaboration on the research objectives will be formulated later in this chapter, informed by the review of the relevant literature, which is given in the following section.

2.4. Literature Review

This section will examine the existing literature in two main areas that this research project is focused on: Business Analytics and Change Management. Of these two main areas, business analytics is the area of the ongoing workplace project (or workplace activities) of the researcher, whereas change management is the area which provides the theory and perspective to critically explore the aforementioned workplace project, thus representing the main focus of this research project (Please refer to Section 3.4 for more details on the distinction of these two projects and their interrelation.).

2.4.1. Business Analytics (BA)

Business Analytics is a relatively new discipline for both professional practice and research, having become a popular term during the first decade of the 21st century, though having roots far back in decades, in essence (Watson 2011). In the literature, the term "business analytics" can be used interchangeably with the terms "analytics" and "business intelligence" (e.g. (Holsapple, Lee-Post & Pakath 2014; Watson 2011)).

In order to be able to better establish the field of Business Analytics, it could be a useful approach to provide a definition of this field of study at the first place. Holsapple et al. (2014) provide an overview of various definitions, representing different approaches to the discipline thus classified into six categories based on their similarities, according to the results of the Authors' "interpretive factor analysis" (Holsapple, Lee-Post & Pakath 2014, p.134). The following are examples of these followed by other definitions from the literature:

BA as a movement (Holsapple, Lee-Post & Pakath 2014):

> "… a culture where fact-based decision making is encouraged and rewarded" (Ramamurthy, Sen & Sinha 2008, p.981)
>
> "movement…. Driven by technically literate executives who make fact-based decisions, the availability of good data, a process orientation to running an enterprise, and improved software for data capture, processing, and analysis" (Liberatore & Luo 2010, p.323)

BA as a collection of practices and technologies (Holsapple, Lee-Post & Pakath 2014):

"a group of tools that are used in combination with one another to gain information, analyse that information, and predict outcomes of the problem solutions" (Bose 2009, p.156)

"a wide range of techniques and technologies that make it easier to get value, meaning from data."(Taylor 2010, p.74) (Stated as the purpose of Analytics.)

BA as a transformation process (Holsapple, Lee-Post & Pakath 2014):

"process of transforming data into actions through analysis and insights in the context of organizational decision making and problem solving" (Liberatore & Luo 2010, p.314)

"the scientific process of transforming data into insight for making better decisions" (INFORMS 2012)

There is also another definition that I would like to add here under this category:

"Converting data into knowledge that enhances (the organisation's) ability to make effective business decisions" (Tyagi 2003, p.12).

BA as a capability set (Holsapple, Lee-Post & Pakath 2014):

"extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions" (Davenport & Harris 2007, p.7)

"The use of data and related insights developed through applied analytics disciplines (for example, statistical, contextual quantitative, predictive, cognitive, and other models) to drive fact-based planning, decisions, execution, management, measurement and learning. Analytics may be descriptive, predictive or prescriptive." (Kiron, Shockley, Kruschwitz, et al. 2012, p.3)

BA as specific activities (Holsapple, Lee-Post & Pakath 2014):

"accessing, aggregating, and analysing large amounts of data from diverse sources to understand historical performance or behaviour, or to predict— or manage—outcomes" (Tyagi 2003, p.12)

"examine and manipulate data to drive positive business actions" (Rosenberger & Nash 2009)

BA as a decisional paradigm (Holsapple, Lee-Post & Pakath 2014):

"the part of decision management that involves logical analysis based on data to make better decisions" (Rosenberger & Nash 2009, p.ix)

Although the definitions above represent various approaches to what type of a concept Analytics is, almost all of them mention decisions and/or decision making, along with statements related to data and processing of data in one way or another.

In addition to these, Holsapple et al. (2014) offer their own definition as well: "evidence-based problem recognition and solving that happen in the context of business situations" (Holsapple et al. 2014, p. 134) As can be seen in the definition, they propose the term "evidence-based" to replace alternatives like "fact-based", "data-driven", etc. and "problem recognition and solving" to replace "decision making" and the likes. They argue that this terminology ensures a broader coverage of the actual meaning of Business Analytics (or Analytics).

It appears that the term "evidence-based" seems to be better capable of explaining what type of outcome is expected of BA. However, given their justification for this suggestion is that the term data and fact connote quantitative types of data generally, but BA can also deal with some qualitative input and output as well, the use of the terms data or fact are also appropriate, since data and facts may well be either quantitative or qualitative. This is clear in various resources about BA which mention text mining as an analysis technique within the scope of BA (e.g. (Bose 2009)).

As for their suggestion to use "problem recognition and solving" instead of "decision making", their supporting argument is that not every problem that BA seeks to help solve is a decision-making issue, but there are other issues like sense making or prediction. On the other hand, it could be argued that even if there is a need of sense-making or prediction, particularly in a business context, this will again be to come to a decision or action at the end of the day. My own professional experience supports this point: In my professional career since 1999, I have never seen a situation where businesspeople were trying to understand a phenomenon just for the sake of understanding it or where they were trying to make predictions just for the sake of making predictions. What I have seen is that these are all means to the same end i.e., making business decisions and taking business actions.

Following from these definitions representing various approaches and drawing on my own professional experience in the field as well as on my background in the science of Statistics, which is also about generating information from data, very simply put, a definition of BA could be made as below:

> *BA is the discipline focusing on generating information and insight from data to support business decisions and actions.*

It could be argued that the definition proposed by the researcher above may represent a relatively narrower perception of BA, defining the concept as a discipline thus leaving out some other

aspects of it as given in the definitions from the literature above, such as it being a movement. When the definitions classified into these categories by (Holsapple, Lee-Post & Pakath 2014) are examined more closely, though, it could also be argued that some of these definitions do not seem to read like an adequate definition of the concept itself. For example, the definition given by Ramamurthy, Sen and Sinha (2008, p.981), "…a culture where fact-based decision making is encouraged and rewarded", seems to define a cultural context in which business analytics is supported to flourish rather than the concept of BA itself. Furthermore, the existence and increase in number of degree programmes offered by universities in the field of business analytics and related fields (Pierson 2019; U.S.News 2022; QS 2022) also support the definition of the concept of BA as a discipline.

The Figure 2.2. below, given by Liberatore and Luo (2010), is useful to further clarify and elaborate on the definition above as it will help understand the journey from data to action and the types of questions BA aims to help in finding answers to. Considering the definition of BA as proposed by the researcher above, the endeavour of generating information and insight from data starts with the collection and preparation of data, reflected under the "Data" step of the continuum in Figure 2.2 (Liberatore & Luo 2010). Once the data has been made ready for the analysis, various techniques can be employed to derive information and insight from the data through the analysis process. As BA can be descriptive, predictive, or prescriptive in terms of its orientation (Holsapple, Lee-Post & Pakath 2014), the three broad types of analysis activities given under the "Analysis" step of the continuum in Figure 2.2 represents the activities related to these three orientations: "Visualisation" generally for descriptive analytics, "Predictive Modelling" for predictive analytics, and "Optimisation" for prescriptive analytics (Liberatore & Luo 2010). Following from here to the "Insight" and "Action" steps, "Visualisation" mostly enables the examination the data from different perspectives, helping understand problematic points as well as strengths and their root causes, supporting generally operational decisions. "Predictive modelling" helps reduce uncertainty through statistical estimation and forecasting, supporting decisions like process changes. Lastly, the remedies to reach the ideal or desired state can be analysed through "Optimisation", supporting strategic decisions (Liberatore & Luo 2010). Furthermore, it should be noted that these different categories of techniques complement each other and are usually used in combination to support business decisions and actions at various levels from operational decisions to tactical and strategic decisions (Liberatore & Luo 2010).

The Relevance of BA for Business

Implementing BA platforms in organisations can be considered as costly and complicated endeavours involving a high risk of failure (Yeoh & Popovič 2016); however, investments in this field attract significant attention from professionals and researchers alike, thanks to the importance given

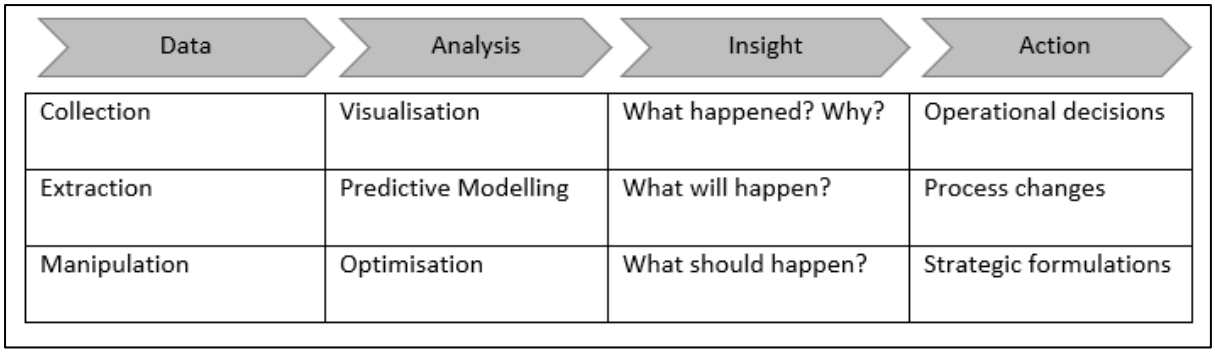

Figure 2.2. The journey from data to insight and to action (Liberatore & Luo 2010)

to deriving insights from data to inform business decisions (Yeoh & Popovič 2016; Chen, Chiang & Storey 2012). According to the results of joint research by Gartner and FEI (Financial Executives International), BA is among the top investment initiatives of financial executives, which is a consistent finding across years (Gartner 2016; Gartner 2015; Gartner 2014). Companies put this importance on BA initiatives to gain a competitive edge in their market, and this approach seems to be paying off. According to a research by Nucleus Research, a research company, analytics investments generated USD 13.01 for every dollar spent in 2014 (Nucleus Research 2014). Another study by Kiron et al. (2012) finds that companies that use analytics widely across the organisation to gain competitive advantage are 2.2 times more likely to outperform their rivals. In a more recent study, McKinsey estimates that improvements in the analytics efforts by banks can lead to higher annual earnings of up to USD 1 trillion globally in the banking industry (Naveira, Jacob, Rifai, et al. 2018).

In today's world where we have capabilities to produce, collect, store and analyse much larger amounts and many more varieties of data than ever before, it is not difficult to find many other resources, which, in one way or another, mention the criticality of BA for companies to make greater profits, to stay ahead in the competition, to improve business performance, or even to survive and/or how to proceed with BA initiatives in order to be able to realise these benefits (e.g. Ashrafi, Zare Ravasan, Trkman, et al. 2019; Aydiner, Tatoglu, Bayraktar, et al. 2019; Soldic Aleksic, Chroneos Krasavac & Karamata 2019; Seddon, Constantinidis, Tamm, et al. 2017; Holsapple, Lee-Post & Pakath 2014; Davenport 2006; Watson 2011; Tyagi 2003).

In addition to this focus on companies' financial performance, in today's world where organisations are also examined from the perspective of corporate social responsibility (Ketter, Padmanabhan, Pant, et al. 2020; Ketter 2014), analytics can obviously be helpful in addressing some of the most significant problems the society faces in the bigger picture at the individual, community, and economy levels (Ketter et al. 2020). Examples of these solutions can be searching answers to questions like how individuals make decisions to adopt sustainable energy sources, how pandemics

spread within and across communities, whether mandatory sharing of health data leads to improvements in health outcomes, and other various issues within the ESG (Environmental, Social, Governance) framework (Ketter et al. 2020). Consequently, with the availability of vast amount of relevant data and the technology to collect and store data, together with continuous improvements in the analytics capability (Ketter et al. 2020), analytics can certainly help in efforts towards achieving the SDGs (Sustainable Development Goals) for 2030, which have been declared by the UN (United Nations) (United Nations n.d.).

BA within the Context of This Research Project

Having established a concise description of BA as a field, and the relevance of the discipline for business, this sub-section will briefly lay out the status quo regarding BA in the organisation where this research is performed.

Back in 2009, when I started to work at the Management Reporting Division of the Bank, the most challenging and at the same time appealing feature of the work at this division for me was that they were working with significantly large amounts of data. The volume of the data was larger when compared to the data sets that I was used to working with as a statistician both during my years at the university and during my career to that date, which was mostly at the business side and not directly at a data-intensive function. Much of this data could not be handled by using standard office tools, for example, requiring significant slicing and dicing, running of hours-long macros, etc.

Another important point was that we were working on the entire data set most of the times, as this was a division under the finance group of a bank, and as such required as precise a consistency with the official financial figures as possible. Statistical analyses were almost non-existent, apart from the very common basic statistical representations such as calculation of means, weighted means, frequency-table-like tabular views, various types of charts, etc. In general, what was being carried out back then was reporting (i.e., preparation of standard reports by using standard office software, mostly spreadsheets with regular intervals) as well as responding to ad-hoc report demands and related questions. This was the status quo regarding the endeavour to generate information from data, as represented in the first point (from left) of the continuous arrow in Figure 2.1.

The immediate next step was starting to develop interactive dashboards with the tools and technology available -but not utilized- back then. At that stage, our efforts were mostly aimed at serving our internal clients for their regular information requirements and experimenting with this new means of data analysis. These efforts could be considered mainly as “specific activities” in terms of the classification given by Holsapple et al. (2014).

However, following the merger, which made every asset of the Bank roughly twofold, as a division we started to engage in some broader-scoped efforts, aimed at more fundamental changes and improvements in the data environment, such as giving the actual start to the new DW (Data Warehouse) project, trying to utilize existing BA tools to replace the standard office software for enterprise-wide solutions, efforts aimed at bringing some level of consistency and stability to data definitions particularly in areas like product hierarchy and client data, etc., some of which I will explore in more detail in the following chapters dedicated to my research cycles. From that point forward, starting from 2012, these efforts required and resulted in significant changes in this respect, and we needed to communicate this change across the organisation and gain support. From this perspective these BA efforts can be framed as a "movement" and "transformation" as well.

However, we do not tend to define this movement or transformation itself as BA, but rather we tend to consider these as endeavours towards the success of BA efforts. All of these together, the efforts towards generating information from data to support business decisions and actions and the movement or transformation this brings, clearly required specific capabilities to be developed (Holsapple, Lee-Post & Pakath 2014), as can be observed in the continuum in Figure 2.1.

As of today, considering our QV applications, which are the main focus of this research from the business perspective, we are mostly dealing with the "visualisation" function of the "analysis" step in Figure 2.2 above. A difference between what is given in Figure 2.2 and our actual situation is that our data visualisation solutions are used to support tactical and strategic level decisions as well, depending on the data scope and the design features.

In this sense, most of our BA activities, particularly those that form the focus of this research project, are also in the field of VA (Visual Analytics), which is an interdisciplinary field integrating knowledge from various other disciplines such as information visualisation, statistics, cognition science, etc. with the aim of bringing together the strengths of human reasoning and electronic data processing power through interactive visualisations for an effective understanding, reasoning, and decision making by exploiting large and complex data sets (Keim, Andrienko, Fekete, et al. 2008). For this purpose, we design and develop interactive dashboard applications (dashboards) on our QV platform and enable users across the Bank to access and use these applications in-line with their information access rights.

Dashboards have become popular tools to help users access important information in a way that is fast, convenient, and that does not overwhelm them (Bremser & Wagner 2013). In-parallel with the developments in the related technologies in the recent years, which enabled the creation of

dashboards on huge volumes of data with the capability of visual exploration even at a granular level (i.e., by drill-down & up functionality), we have been replacing most of our static reports with these newly developed dashboard applications. As our dashboard applications are aimed at addressing the requirements of thousands of users across the Bank at various levels, they serve multiple purposes such as performance management, identifying cross-selling opportunities, sector benchmarking, loss prevention (i.e., by monitoring defaulted loans), etc. However, since the majority of our internal users are from profit-centre business units such as business lines (marketing, sales, CRM), branches, regional directorates (marketing staff), and ALM, and decision makers at all levels seek to improve their own outcomes that contribute to the performance of the Bank, most of our dashboards serve performance management requirements of the Bank in one way or another. This can be in a way that directly puts some actual figures against the target figures for specific KPIs, or directly in the form of a balanced scorecard; or alternatively an application can present only actual figures, their trends in time, together with comparisons among peers for various measures such as the total number of active clients, cross-sell ratios, profit margins, transaction volumes, etc., which still aims to measure the performance of the related units, branches, or the Bank in one way or another, and to trigger actions for improvements. Even when one application focuses on monitoring the defaulted loans and collections thereof, this can still be taken as a performance management dashboard since it gives comparative information about the default rates and collection trends of various branches, business lines, or even lawyers the Bank works with so that necessary actions to increase the effectiveness of loss-prevention and collection efforts can be triggered. As such, our dashboards on the QV platform can include both strategic measures as would be expected of a balanced scorecard (Kaplan & Norton 1996) and diagnostic measures aimed at providing support to business decisions at a more tactical or operational level (Kaplan & Norton 1996).

Hence whether we call these applications dashboards or data dashboards (Smith 2013) or performance management dashboards (Eckerson 2010), it all boils down to presenting the most crucial information that decision makers at various levels require in an easy-to-consume manner by leveraging the visual perception of people (Bremser & Wagner 2013; Eckerson 2010; Smith 2013). In his seminal book on dashboards, Few (2006) defines dashboards as visual displays of the key information that is required to achieve one or more objectives, which is consolidated and arranged on a single screen, aiming at the monitoring of information at a glance. Building further on this definition, Yigitbasioglu and Velcu (2012) offer a more comprehensive definition, considering the additional capabilities arriving with the recent technological advances. They define “dashboard” as “visual and interactive performance management tool that displays on a single screen the most important information to achieve one or several individual and/or organizational objectives, allowing the user to

identify, explore, and communicate problem areas that need corrective action" (Yigitbasioglu & Velcu 2012, p.44).

Continuing from this point, dashboards can be defined as tools that present information to decision makers with the aim that it could be understood at-a-glance, usually by utilising related computer technology such as BA platforms from various vendors and involving additional capabilities such as drill-down to detail and multi-dimensional exploration.

Some important concepts related to this research are emphasized in relation to dashboards in the various studies that were mentioned above. These are:

- The dashboard phenomenon and an organisation's strategy, objectives, and performance (Bremser & Wagner 2013; Power 2010; Smith 2013; Eckerson 2010),
- Dashboards being tools for visual presentation of information thus leveraging visual perception of people (Few 2006; Smith 2013), so being related to human cognition and information processing (Yigitbasioglu & Velcu 2012),
- Common design principles and common pitfalls (Few 2006; Power 2010; Bremser & Wagner 2013),
- Connection of visual design of a dashboard with the concepts of usability and user experience (Hursman 2010; Few 2006; Smith 2013),
- The change in the organisations that comes with the implementation of dashboards and the role of organisational culture in their adoption, and the dashboards themselves being agents of organisational change (Eckerson 2010).

Change Management is the perspective from which I explore my own workplace activities in the field of BA throughout this research project. As explained above, these activities inherently involve bringing change at varying scales across the Bank, both through the actions that could be triggered by using the information we deliver in the form of dashboard applications, and through the implementations of these dashboards themselves since this per se significantly changes the way people access and/or generate information aimed at managerial decision support.

2.4.2. Change Management

Organisational change, and the management of that, are frequently discussed in the business world. Just a quick look at the various professional and academic publications would be adequate to

see how widely-covered a topic organisational change is. A Google search with the keywords “change management” in quotation marks returns over 60m results. Academics and professionals alike have been working hard to formulate how to best implement changes in an organisational context for long, yet there seems to be little agreement on the topic because there are varying definitions of similar concepts, such as readiness for change, across in the literature (Stevens 2013). There are, though, widely acknowledged approaches and common elements across various models developed for this purpose.

Although not all the resources about change provide an explicit definition for the concept, some of them do, and it is not hard to discern a definition from many others through the elements of the models they propose. To start with the basics, one of the definitions given for the word “change” by Cambridge English Dictionary is “to make or become different” (Cambridge English Dictionary n.d.). The approaches of many authors to change management imply an agreement to this definition, basically, in that they also focus on bringing about something new or different from the existing situation-or status quo- and ensuring the sustainability of this new situation in an organisational context. A few examples for this can be the highly cited three-step model by Lewin (1947a), the critical points in the change process (i.e. from the old status-quo to the new status-quo) by Weinberg (1997), the focus on the institutionalisation of an implemented change by Armenakis, Harris and Feild (2000), etc. As for the management of change in this context, Lientz and Rea (2004, p. 9) define change management as “the approach to plan, design, implement, manage, measure, and sustain changes in business processes and work” and consider this as a marathon i.e. a long-term effort.

Considering my readings so far on the topic and my own experience of various changes in a business context, among which are two mergers and various organisational re-structuring implementations, I can explore change efforts in two broad levels for the purposes of this research: the organisational level, and the individual level (Cameron & Green 2009). The authors (ibid) also explore the management of change at another level in between the aforementioned two levels, which is the team level. For the purposes of this research project, though, the focus will be on the organisational level and individual level changes. This is because the actions leading to organisational change cover all the organisation all at once with immediate impact on many teams across the Bank. On the other hand, the changes in my team’s approaches to our workplace activities will be mentioned throughout the thesis where relevant.

In addition to this, the nature of the change (i.e., the change being a one-off, large-scale effort or an incremental, continuous one) (Cameron & Green 2009; Lientz & Rea 2004; Bouckenooghe 2010;

Abrahamson 2000) could be another dimension to be considered throughout the exploration of the change effort which is the focus of this research.

Organisational Level Analysis of Change:

Organisational level analyses investigate how to implement change in organisations successfully so that the new state is accepted as the new status quo and the risk of a revert-back has been eliminated. Whether we call it "homeostasis" (Cameron & Green 2009) or "reversion" (Lientz & Rea 2004) or "regression" (Kotter 2007) or use any other term that would be suitable for the purpose, it seems that the models developed with this approach have a common, ultimate aim of avoiding the collapse of change efforts after the implementation and ensuring the sustainability (or permanence) of the new state thereof. This means that the responsibility of the change agent does not come to an end with the successful completion of the implementation, but this extends beyond the post-implementation phase. Many studies take a rather structured approach when exploring this phenomenon, proposing different versions of phase-based or even step-by-step change models. Probably one of the most frequently cited ones is the three-step model by (Lewin 1947a). Kurt Lewin introduced the sequential **unfreezing, moving**, and **freezing** phases with this model. According to this model, the unfreezing step represents the introduction of the change idea and/or the planning phase, the moving step represents the phase during which action is taken to implement the change, and the freezing step represents the post-implementation phase, during which efforts would be aimed at making change permanent (i.e., the new state to be acknowledged as the new status-quo).

Many researchers seem to have developed models similar to or building upon this three-step model. Among these are:

- The Four-Phase Model by Bullock and Batten (1985),
- The Model for Institutionalising Change by Armenakis et al. (2000),
- The Method for Change Management given by Lientz and Rea (2004, p. 73),
- Eight Steps to Transforming Your Organisation by Kotter (2007),
- The three-state approach by Beckhard & Harris (1987),
- Critical Points in the Change Process by Weinberg (1997),
- Another three-phase model i.e. the Endings-The Neutral Zone-The New Beginnings model by Bridges (2009),

- The Cycle of Change by Cameron and Green (2009).

I have presented in Table 2.1 my understanding of how different phases or steps of the aforementioned models or approaches correspond to each other so that any further analysis of my own experience vis-à-vis one or more of these models can be easily extendable for interpretation in comparison with the other models in the table.

In addition to this relatively more structured and linear approach to change, where we mostly talk about an initial state, an end-state, and sequentially ordered phases on the way from the former to the latter, there is another approach which considers change as something that cannot be managed at all, but rather as something that emerges and happens itself, sometimes out of a chaotic situation. This approach is deemed suitable for changes that are complex in nature (Cameron & Green 2009), with the definition of complex change given as the change in which a large number of individuals, activity layers, and focus areas are involved, and in which there are so many factors that cannot be pre-thought. Examples for this type of change can be re-structuring efforts, mergers and acquisitions, cultural change initiatives, etc.

The main difference of this type of change efforts for managers when compared to the more structured approach summarised above is that the traditional role of a manager which involves activities like detailed planning and goal setting does not fit well to this type of change initiatives. Rather, what is expected from managers regarding complex change efforts is to act as participants and facilitators, highlighting the gaps and contradictions emerging throughout the process (Cameron & Green 2009). In this context, Shaw (2002) differentiates her approach to organisational change by referring to the mainstream approach as one involving "conceiving a future different in some way from a conception of the past and taking action to realize the change" (Shaw 2002, p. 171), and stating that what she explores instead is how to participate in change through collaborative sense-making, rather than try to define and manage it (i.e., as leaders), and develop our leadership competences as co-narrators, joint authors, and co-improvisers throughout the process.

Not every change effort can be considered with a one-size-fits-all approach, so a suitable approach to manage change efforts would be required for changes of different natures, and even for different phases of a single change initiative.

One very important point for me to take into account has been the issue of organisational politics, concerning the success of change initiatives. Considering organisational politics as the activities carried out by people to achieve their desired outcome in a situation where there are uncertainties and disagreements through gaining control of power and other resources (Costley,

Elliott & Gibbs 2010), it seems to me no surprise that organisational politics is a highly relevant concept in the context of change initiatives where one would normally expect many examples of such uncertainties and disagreements throughout the process. More precisely, Lientz and Rea (2004) define politics as the science of guiding and influencing policies and the way work is performed in an organisation, and state that change leaders must be able to exploit political factors and use them for the purposes of the change effort. As such, I have observed -and mentioned when relevant- the aspects of organisational politics regarding the progress of the workplace project at hand, in relation to this research project.

Individual Level Analysis of Change:

When it comes to the analysis of organisational change at the individual level, the focus of many studies in this field are, in one way or another, concerned with exploring the perceptions of individuals about the upcoming, happening, or already experienced changes, their thoughts, feelings, attitudes, and behaviours in relation to the change efforts. This is due to the widely acknowledged view by various researchers that for any organisational change effort to be successfully implemented; individuals', or the employees', in the context of an organisation, support, participation, and buy-in for that change effort would be essential (e.g. Devos, Buelens and Bouckenooghe, 2007; Ertürk, 2008; Walker, Armenakis and Bernerth, 2007).

There are a number of concepts aimed at evaluating the employees' either positive or negative feelings and attitudes about organisational change. On the positive side there are: readiness-for-change, openness-to-change, and commitment-to-change as examples of these concepts, and on the negative side there are: resistance-to-change and cynicism.

Particularly for the concepts that are used to define the positive feelings and attitudes towards organisational change, there is some level of confusion concerning the definitions of these concepts among the researchers working on the topic, or at least it is not always easy to draw clear boundaries between these terms. Stevens (2013) suggests that the number of the definitions of the concept of change readiness is almost as high as the number of researchers working on this topic. He considers the various terms used to describe the positive feelings and attitudes towards change (e.g. readiness, openness, commitment, receptivity, etc.) under the same umbrella concept of change readiness (Stevens 2013). Considering the presence of some ambiguity and/or confusion in the conceptualisation in this context, it could be helpful to go over these briefly, and then discern and/or adopt an approach for the conceptualisation of these terms that can be useful for the following chapters of this thesis.

Readiness-for-Change:

A comprehensive definition of readiness-for-change is given by Choi (2011) in her literature review on employees' attitudes towards organisational change: organizational members' beliefs, feelings, and intentions concerning whether the changes are really needed and to what extent, and concerning whether the organisation is capable of implementing the change successfully. This definition continues by stating that readiness-for-change can be seen as a predictor of employees' behaviours of either resistance to or support for a change effort. Similarly, Neves (2009) states that managers should focus on creating employee readiness for change by reducing resistance, while at the same time developing a change message aimed at prompting positive reactions to change by employees. He also considers readiness-for-change as a precursor to employees' reactions to change, proposing a model where he puts his three components of readiness-for-change, namely change-appropriateness, self-efficacy, and personal valence, as factors which are expected to have an impact on the employees' specific behaviours towards change i.e., the level of individual change and turnover intentions. It is also worth noting that Neves (2009) considers personal valence as a synonym for affective commitment to change. The three components used by Neves (2009) constitute a subset of the five components of a change message, as given by Armenakis, Harris and Feild (2000). These five components are listed below (Armenakis, Harris & Feild 2000):

- Discrepancy: Explanation of the gap between the organization's current state and the desired state.
- Appropriateness: Explanation of how the proposed change initiative will ensure that the organization addresses the gap explained in the "discrepancy" component.
- Efficacy: Building confidence in the organization's and/or the individuals' ability to implement the proposed change successfully.
- Principal Support: Providing proof that the organization's management has full support to implement and institutionalize the proposed change (i.e., not to make it kind of "programme of the month", which will not be a permanent initiative).
- Personal Valence: Explaining the benefits of the proposed change to the employees.

Table 2.1. An overview of the change management models

The Three-step Model Lewin (1947a)	The Four-phase Model Bullock & Button (1985)	The Model for Institutionalising Change Armenakis, Harris & Field (2000)	The Method for Change Management Lientz & Rea (2004)	Eight Steps to Transforming Your Organisation Kotter (2007)	The Three-step Approach Beckhard & Harris (1987)	Critical Points in the Change Process Weinberg (1997)	Three-phase Model Bridges (2009)	Cycle of Change Cameron & Green (2009)
Unfreezing	Exploration Planning	Readiness	Assess business planning factors Develop the change objectives and change strategy Establish executive change steering committee Appoint the change management leaders Form strike forces for the potential areas of change Create operational change steering committee Form the change management team Establish the change management framework Conduct change familiarisation sessions with strike forces Present change management framework to change steering committees	Establishing a sense of urgency Forming a powerful guiding coalition Creating a vision Communicating the vision	The Present State (Determining the need for change & defining the future state)	Old status quo	Ending, losing, letting go	Establishing the need for change Building the change team Creating vision and values
Moving	Action	Adoption Commitment	Identify and select your areas of change Collect detailed work information Define your long-term change and quick hits Determine your change implementation strategy Develop your change management implementation project plan Implement quick hits Measure results Undertake major changes	Empowering others to act on the vision Planning for and creating short-term wins	Managing the transition	Foreign element introduced Try to reject foreign element Try to accommodate foreign element in old model Try to transform old model to receive foreign element Try to integrate	Ending, losing, letting go The neutral zone	Communicating and engaging Empowering others
Freezing	Integration	Institutionalisation	Build momentum for change and prevent reversion	Consolidating improvements and producing still more change Institutionalising new approaches	The future state (where the organisation wants to go)	Practice to master transformed model New status quo	The new beginning	Noticing improvements and energising Consolidating

Armenakis, Harris and Feild (2000) define these as the components of a change message which would be aimed at creating a commitment-to-change, and not as components of readiness-for-change, which they consider as a prior stage. In their three-stage model of organisational change, which has four stages with one representing the conditions to reach the last stage, they give the stages of organisational change as readiness, adoption, and institutionalisation, where there is another step named "commitment" between the second and the third, meaning that there should be a sense of commitment to the change effort across the organisation so that the transition from the adoption stage to the institutionalisation stage can be realised.

In more recent studies; Endrejat, Klonek, Müller-Frommeyer, et al. (2021), Bagrationi & Thurner (2020), and Arnéguy, Ohana & Stinglhamber (2022) also treat readiness for change as a critical factor for the success of organisational change initiatives and emphasise the importance of communication about all aspects of the change initiative with the recipients of the change for the success of the initiative. Endrejat et al. (2021) further elaborates on the styles of communication that can be adopted by the change agents and their impact on the employees' readiness for change, concluding that autonomy-restrictive communication has a negative impact on change readiness, so this type of communication behaviour should be avoided by the change agents.

Commitment-to-Change:

Commitment-to-change is another positive attitude towards organisational change, and can be defined as the thoughts or judgements that lead an employee to take a specific type of action that would be required for the successful implementation of an organisational change (Herscovitch & Meyer 2002). Herscovitch and Meyer (2002) have hypothesised and found that commitment to change was a distinguishable construct on its own, being different from organisational commitment, and that it was a three-dimensional construct, comprising affective commitment, continuance commitment, and normative commitment. These three dimensions-or sub-constructs- represent a desire to support change based on trust in its usefulness, an awareness of the costs of not supporting the change, and a feeling of obligation to support change, respectively. This definition and conceptualisation has been shared and/or used fully or partially also by various other researchers (e.g. Helpap 2016; Helpap and Bekmeier-Feuerhahn 2016; Walker, Armenakis and Bernerth 2007; Bernerth, Armenakis, Feild, et al. 2007). In a somewhat different but still similar approach, Armenakis, Harris and Feild (2000) also consider commitment-to-change in three sub-constructs, which are compliance commitment, identification commitment, and internalisation commitment. Here in this

approach, too, the different types of commitment to change basically represent the motives behind the employees' commitment to change (i.e., whether it is a sense of obligation, or a sense of belonging to or sympathy towards a specific group within the organisation, or a genuine belief in the virtues of the change effort).

Openness-to-Change:

Openness to change, concerning an organisational change effort, can be defined as the employees' support for change, and their positive affection regarding the potential outcomes thereof, and as such, is considered as a pre-condition for the successful implementation of change (Miller, Johnson & Grau 1994). Miller, Johnson and Grau (1994) use a few other different terms such as "willingness to participate in change" and "willingness to accept change" as synonyms for openness-to-change. This also contributes to the previously mentioned unclear boundaries between different but related terms in this context, which may also be perceived to be converging in meaning to commitment-to-change. In another study focusing on the factors affecting employees' openness to change and the work-related outcomes affected by their openness to change, Wanberg and Banas (2000) take one step further on this conceptualisation of openness-to-change, finding that it is a two-dimensional construct with the two dimensions being change acceptance and positive view of the changes. Following from this finding, it seems that the two dimensions can be analysed together or separately, depending on the aims of the research and the research topic. Axtell, Wall, Stride, et al. (2002) for example, take only the second dimension i.e., change acceptance for their study, as they consider openness-to-change as a dependent variable and aim to measure the potential impact of exposure to a specific change, in their case introduction of a new technology, on the employees' overall openness to the changes of the same kind.

Cynicism about Organisational Change:

Cynicism about organisational change is considered as a specific category within the more general concept of organisational cynicism (Choi 2011), which comprises three dimensions:

"1. A belief that the organisation lacks integrity,

2. Negative affect toward the organisation,

3. Tendencies to disparaging and critical behaviours toward the organisation that are consistent with these beliefs and affect." (Dean, Brandes & Dharwadkar 1998)

Cynicism about organisational change, as a form of organisational cynicism with a narrowed-down focus (i.e., the focus on organisational change), with its origins in the broader concept of

organisational cynicism, can be defined as a pessimistic view that the change effort will be unsuccessful due to the incompetence and/or inadequate motivation of those who are responsible for bringing about the change (Choi 2011; Wanous, Reichers & Austin 2000; Wanous, Reichers & Austin 2004).

Resistance to Change:

Resistance to change can be defined as either active or passive opposition to the change and the management of it (Lientz & Rea 2004). Similarly, Coetsee (1999) defines resistance-to-change as "opposed or blocking energies and power directed at impeding, redirecting, rejecting or stopping change" (Coetsee 1999, p. 209).

Generally, resistance-to-change is considered as a negative attitude or behaviour towards change along with cynicism, and many researchers investigate the phenomenon to offer methods or models to overcome this issue and achieve positive attitudes towards change such as commitment-to-change, openness-to-change, etc. (e.g. Herscovitch & Meyer 2002; Chawla and Kevin Kelloway 2004; Ertürk 2008; Miller, Johnson and Grau 1994; Lientz & Rea 2004; Cameron & Green 2009). In this context, dealing with and overcoming resistance to change is viewed as a main component of change management (Coetsee 1999). However, there is also a more positive view of the phenomenon of resistance-to-change, which considers resistance as an opportunity for the change agents to receive feedback and through this feedback to re-think or re-evaluate the envisioned change and the way it is promoted so that the prospect of successful implementation of the change initiative could be significantly improved (Simoes & Esposito 2014; Ford & Ford 2009).

Choi (2011) notes that such attitudes of employees towards change should be considered as states rather than personality traits, since these are susceptible to the content, context and process related factors mostly, rather than being the employees' permanent characteristics. In a more recent study, Yue, Men and Ferguson (2019), focusing on openness-to-change of employees, also adopts the same stance, treating openness-to-change as a state rather than a trait therefore being determined by the situational variables in the context of specific organisational change initiatives and reflecting the employees' perceptions, evaluations, and experiences in the face of those specific changes. This approach looks justified as various studies have found significant relationships between the employees' positive attitudes towards change and their perceptions of specific organisational change experiences. As such, extant research has established factors like the sharing and quality of information, change-related self-efficacy, and the perceived appropriateness of change as the antecedents of positive attitudes towards change such as openness-to-change and commitment-to-

change (e.g. Wanberg & Banas 2000; Neves 2009; Miller, Johnson & Grau 1994). This perspective also looks in line with the approach to employees' affective reactions at the workplace in the Affective Events Theory, which emphasises that employees' reactions develop with the impact of the events they experience at the workplace and their perceptions thereof (Boulter & Boddy 2021; Weiss & Cropanzano 1996). Furthermore, although there are some studies which have found significant relationships between some personality variables and employees' attitudes towards change (e.g. Brown & Cregan 2008; Chen & Wang 2007; Wanberg & Banas 2000), their findings have not been confirmed by other studies (e.g. Devos, Buelens & Bouckenooghe 2007; Wanous, Reichers & Austin 2000), so the link between the two remains unclear (Choi 2011).

Following from these findings in extant research, employees' openness-to-change is considered as a value state rather than a value trait also for the purposes of this research project. This will enable the researcher to explore and identify the potential factors on the change recipients' (our internal users') attitudes and behaviours towards the changes delivered through the specific organisational change initiative which is the focus of this research project, and then plan and take business actions accordingly with a view to supporting the change recipients' positive attitudes and behaviours towards these changes.

As such, information will be collected on our internal users' perceptions of and attitudes towards the changes we have been introducing through our new BA platform, and then this information will feed into the decisions on the workplace interventions. In doing so, actions will be taken with a view to eliciting our internal users' positive attitudes towards change so that we can proceed towards achieving an even better adoption of the new situation and generating new, practice-based knowledge (e.g., a model and/or practical guidance) on how to successfully deliver organisational change through visual analytics.

2.5. Research Questions & Objectives

Informed by the research context and the literature review, which were given in the previous sections in this chapter, the research questions and research objectives for this research project have been formulated as presented in Table 2.2 below, elaborating on the main objectives given in the previous chapter.

As mentioned earlier, this research project focuses on the visual analytics activities across the Bank as a means to the end of delivering significant changes in the way staff at all levels use data and information in their decisions and actions. This means:

- Changes in daily workplace activities and resource allocation
    - Spending less time on manual report generation and more time on analyses to find insights into business opportunities and/or risks,
    - Interacting with the required data anytime, instead of waiting for periodic static reports or starting email correspondence to ask for what is not included in the reports,
    - Spending less time trying to access information and more time on action (marketing & sales, risk management, etc.),
    - Spending less time working to resolve inconsistencies across multiple reports,
    - Related to the first three points above, potential organizational re-structuring decisions (out of the researcher's personal authority for the whole Bank),
- Changes in attitudes and culture
    - Becoming more proactive and not only reactive, as one no longer has to wait to receive a static report,
    - Becoming more aware of the current status as what was once invisible has become visible,
    - Becoming more able to inform the decisions and actions by exploiting relevant data and less reliant on gut feeling,
    - Becoming more accountable for one's decisions, actions, and performance thanks to the increased transparency.

It is important to emphasise that the adoption of the new means of information access (i.e., the new BA platforms and new dashboard applications) is only important to the extent that it serves as an effective means towards the realisation of the desired changes outlined above, for the purposes of this research project. The more widely, frequently, and effectively it is used, the more confidence one can have in the consequent changes being realised. The research design and activities, as will be explained in the following chapters, are performed in accordance with this approach.

Table 2.2. Research questions and research objectives

#	Research Questions	Research Objectives	Research Main Objectives
1	What are the factors affecting the users' attitudes towards the changes they are experiencing with the implementation of interactive dashboards?	Understand the underlying factors to be focused on for further actions towards supporting the adoption of the new means of information access (i.e., the interactive dashboard applications) Investigate whether a meaningful model could be developed between the potential factors and attitudes towards change in the context of this research.	Develop my own understanding of change management. Develop my own understanding of action research and insider research. Spot points for further improvements and/or significant changes within the Bank regarding my job function (i.e., data analytics and governance) and act accordingly. Propose a contribution to the literature with new practice-based knowledge that could be helpful to other professionals and researchers in my field.
2	How have users' decision-making processes changed as a result of our business interventions?	Understand whether the implementation of new means of information access has had an impact on the users' decision-making processes, and if it has, what has changed.	
3	How have users' job performances changed as a result of our business interventions?	Understand whether the implementation of new means of information access has had an impact on the users' job performances, and if it has, what has changed.	
4	Which approach or approaches to change reflect our way of bringing change so far?	Understand the change management concept and approaches in the literature. Critically evaluate our business interventions in relation to the approaches in the literature.	
5	Can I find a more suitable model or approach for our situation, potentially applicable to other similar contexts?	Investigate whether a new model or approach could be developed for the management of change in the context of this research and potentially in other similar contexts.	

CHAPTER 3. THE RESEARCH METHODOLOGY

This chapter provides information on the methodology employed for this research project, the reasoning and considerations behind that choice, and the ethical considerations related to this research project.

It starts by establishing the common definitions of some basic concepts like research approaches and research designs in Section 3.1, then continues by providing justification for the selected research methodology in Section 3.2. Following from that point, the selected methodology is explained: First, an overview of the methodology is provided in Section 3.3, and then the application of the selected methodology for the purposes of this research project is explained in Section 3.4. Finally, this chapter concludes with a detailed evaluation of this research project from a research ethics perspective, which is provided in Section 3.5.

3.1. Definitions of Some Basic Concepts

There is little agreement on what is called a research approach/design/methodology/paradigm, what the hierarchical relation between these terms is, if any, and what sub-categories are involved for each of them. The only clear point is perhaps the difference between research methodology and research methods, with the methodology representing a more general approach to research, covering the philosophical, conceptual, and contextual perspectives regarding the research project, whereas the research methods can be defined as the tools and techniques mainly for data collection and analysis (Costley, Elliott & Gibbs 2010).

Different authors could use the terms methodology / approach / design / paradigm to define different-but related concepts or in place of one another. For example, Costley, Elliott, and Gibbs (2010) define methodologies as general approach to research, covering the philosophical, conceptual, and contextual perspectives regarding the research project, listing the most common methodologies for WBL (Work-Based Learning) research projects as Phenomenological Approaches, Grounded Theory, Hermeneutics, Action Research, etc. As for the higher-level underpinnings of these methodologies, they use the term “research paradigms” and mention five major research paradigms as Positivism, Post-Positivism, Constructivism, Critical Theory, and Participatory Paradigms, also providing summaries for each. Detailed explanations of these five paradigms are given by Lincoln, Lynham, and Guba (2011). Along with this, they also provide another alternative framework for social science approaches, which comprises four major research paradigms, which are Radical Humanism,

Radical Structuralism, Interpretive Sociology, and Functionalist Sociology, representing the two-dimensional approach of Burrell and Morgan (1979).

Creswell (2014), on the other hand, defines the term "research approaches" as general plans and procedures about the research that cover areas from the broad assumptions to detailed methods of data collection, analysis and interpretation and mentions three research approaches as Qualitative, Quantitative, and Mixed Methods. These approaches are informed by the philosophical worldviews, the research design, and the research methods, along with the nature of the research problem, the personal experience of the researcher, and the profile of the audiences for the study. The term "philosophical worldviews" in this sense, for which examples are listed as Post-Positivism, Constructivism, Transformative, and Pragmatism, correspond to the term "Research Paradigms" as defined by Costley, Elliott, and Gibbs (2010). Creswell (2014) also acknowledges that different authors may use different terms for what he calls "worldviews", giving examples for the usage of "paradigms" or "epistemologies and ontologies" for the same concept (Creswell 2014, p.37). In the same study, different Research Designs are listed for each of the approaches (i.e., Qualitative, Quantitative, and Mixed Methods) such as Experimental /Non-Experimental Designs (Quantitative), Phenomenology, Grounded Theory, etc. (Qualitative), Convergent, Exploratory Sequential, etc. (Mixed Methods). (Creswell 2014). These research designs correspond to the research methodologies as given by Costley, Elliott, and Gibbs (2010), though the items listed are not exactly the same but do have common elements.

As it can be seen in the examples above, similar variations between the usage of terminology regarding these research approaches, paradigms, etc. exist in the literature. In order for both myself to have a clear mind about these and also to follow a consistent path throughout my research, brief descriptions of these terms used throughout this thesis are given below:

Research Paradigm: The general philosophical orientation of the researcher to the world and to the research topic, entailing an ontological and epistemological position and a set of values that one bases his/her actions on. Examples are Post-Positivism, Constructivism, Pragmatism, etc. (Costley, Elliott & Gibbs 2010; Creswell 2014).

Research Approach: The broad categories of research methodologies representing how the researcher handles the research in a general sense. There are mainly three of these: Quantitative Research, Qualitative Research, and Mixed Methods Research (Creswell 2014).

Research Methodology: This is a more operational level definition of the way the researcher approaches the research at hand, when compared to research paradigms. Research

methodology includes but is not limited to the detailed set of methods for data collection, analysis, and interpretation, entailing the philosophical, contextual, and conceptual perspectives as well. Examples are Phenomenology, Grounded Theory, Action Research, Ethnography, etc. (Costley, Elliott & Gibbs 2010).

Research Methods: These are the tools and techniques used for data collection and analysis. Examples are questionnaires, interviews, coding, statistical data analysis methods, etc. (Costley, Elliott & Gibbs 2010).

Underlying all of the above concepts can be considered as the researcher's stance on each of the four subjective vs. objective spectrums given by Burrell and Morgan (1979), each anchored by two extremes from subjective to objective, respectively:

Ontology : From nominalism to realism

Epistemology : From anti-positivism to positivism

Human Nature : From voluntarism to determinism

Methodology : From ideographic to nomothetic

For example, a researcher positioning himself/herself on the nominalist and anti-positivist ends of the ontology and epistemology spectrums respectively could be expected to adopt a more qualitative research approach, whereas a researcher positioning himself/herself on the realist and positivist ends could be expected to adopt a more quantitative approach. Obviously, there is a wide range of alternative positions for researchers in between these extremes across the spectrum, with different suitable combinations of research approaches and methodologies to be adopted.

3.2. Adopting a Research Methodology

Action Research, which is one of the most common methodologies in WBL or professional practice-based research, and which is also stated as the default research methodology for the DBA programme at the Middlesex University Business School (Shepherd 2015), has been chosen as the research methodology for this research project.

Why Action Research?

The general purpose of this research project is to explore and find ways to ensure even better adoption of our interactive dashboard applications and by this way to continuously increase the effectiveness and efficiency of the decision support we provide to our internal clients across the Bank.

This would then expectedly lead to wider-scoped changes across the Bank in areas such as resource allocation and organisation, and possibly to requests for more advanced analytics solutions. As can be derived from these statements, this research project would require us to work towards improving and/or significantly changing our ways of doing our job (i.e., to make improvements and/or significant changes in our professional practice.).

Following from this requirement, I would first need to make an investigation into the current situation so that I can have a better understanding of the points on which we would make improvements and how to prioritize among these points. This would not necessarily mean needing to find something faulty or missing in our service, as improvement does not always require something to be fixed but it can be seen as a continuous endeavour of change for the better (McNiff & Whitehead 2009). This approach brings an element of open-mindedness to this research project, as I will need to investigate and decide on what to focus on or what to improve, as well as what data to analyse, as the research progresses.

Though having a broad idea about the aims and objectives of my research at the beginning and some initial research questions, this research is expected to develop and evolve overtime, possibly leading to new questions as the research progresses and/or to the need of different types of data and methods for different phases. Of course, these should all develop into a consistent whole as a project, with all the emerging components on the way feeding into and/or being fed by each other, forming the entire project. I consider this as the normal way of doing research for a professional doctorate (i.e., the DBA) which would be different from more traditional forms of research in the type of knowledge to be generated, the research activities to be undertaken, and the general approach to research.

Along with the nature of the research project at hand, another factor in adopting a research methodology would be my personal stance towards both my work and my research in general, since my own experience would also have an impact on the way I approach my research project, as is also stated by Creswell (2014). Similarly, Costley, Elliott, and Gibbs (2010) state that an insider researcher's methodology needs to be formulated as a combined outcome of the researcher's position in his/her own organisation, his/her professional and organisational context, practicalities, ethics, and the purpose of the research. The authors also advise insider researchers to explain in detail the reasons for undertaking that specific research and the approach adopted for that research, including the explanations on the researcher's values and judgements as well as theoretical and practical grounds (Costley, Elliott & Gibbs 2010).

Along with the terminology and explanations regarding research paradigm and research methodology and the underlying concepts like ontology and epistemology, my own position as an insider researcher is also based on my personal values, which indicate a personal focus with self-enhancement as the most emphasised value, and openness-to-change the emphasised one in the openness-to-change vs. conservation axis (Schwartz, Cieciuch, Vecchione, et al. 2012) (Please see Appendix 1. My Personal Values for details). The reflection of these into a research context can be summarised as below:

- A general tendency to take full responsibility for one's own learning and to act autonomously,
- Desire not only to learn by exploring what others have done but also by doing myself (i.e., having my own experience),
- Willingness to try every possible means to the end of achieving success so long as it is ethical, legal, and legitimate,
- Appetite for influence through achievement.

These together both necessitate and enable a research approach where the most suitable combination of tools can be used as per the requirements and objectives of a research project throughout the entire research process.

Combining my background in statistics and finance, which have led to a mostly quantitative profile, with my more recent studies in the social science literature, the new balance point for me has been somewhere between the two extreme ends of the ontology and epistemology spectrums explained above. Perhaps this can be summarised with the help of a famous phrase by the American sociologist William Bruce Cameron:

> "Not everything that can be counted counts. Not everything that counts can be counted." (Cameron 1963, p. 13)

This seems also in-line with the advice given by Silverman (2010) that a researcher could become much more effective by focusing not on the strict categorizations of methodology but on the research topic and questions at first, then employing suitable methodology and methods when they are needed i.e. "horses for courses" (Silverman 2010, p.25).

Following from these, the research paradigm adopted for this research project can be identified as pragmatism, which would mean a focus on real-world practice and consequences of

actions, and a flexibility to decide on and use whatever methods are suitable for the purpose and requirements of the research project (Creswell 2014; Mertens 2012). Consequently, the research proceeds with a mixed methods approach, which is the approach underpinned by the paradigm of pragmatism, allowing the researcher space to employ qualitative and/or quantitative research methods depending on the purpose and type of data throughout the project.

In light of the explanations above, Action Research has been the research methodology employed for this research project, which is one of the most common methodologies in WBL or professional practice-based research, and which is also stated as the default research methodology for the DBA programme at the Middlesex University Business School (Shepherd 2015).

3.3. Action Research

Action Research is a research methodology which is suitable for the type of research that is aimed at making a real impact on practice and at the same time creating new knowledge through the critical exploration of practice; so, we can consider Action Research as research within practice, as well as research on or about practice, the latter of which may also be the case for an applied PhD. With the possibility of using both qualitative and quantitative data (Kumar 2013; Coghlan & Brannick 2014), it gives the researcher flexibility in choosing the research methods to be applied through its research cycles, and thus also involves a relatively high degree of uncertainty concerning the methods, progress, and even the aim of the research project.

For example, Reason and Bradbury (2008) define Action Research as an emergent, living process which changes and develops as the researchers gain a better understanding of the issues to be focused on, hence the structures of the cycles can be clarified following the first cycle, as some findings may emerge from the first cycle. They even go further to say that there can never be one right way of doing action research, encouraging the researchers to be open to the all the range of different perspectives concerning Action Research (Reason & Bradbury 2008). Similarly, Coghlan and Brannick (2014) state that the process of identifying issues to inquire (i.e., in Action Research) is deemed to be fluid, dynamic, and emergent. Here “fluid” means that it is difficult to establish precise boundaries of these issues, or even when there are boundaries, they are subject to change in time. “Dynamic” means that the core focus is subject to change as the understanding deepens. “Emergent” means that new issues may arise over time.

One of the most distinguishing features of Action Research is that it comprises two main components: action and research (Coghlan & Brannick 2014; McNiff & Whitehead 2009; Somekh

2006). Action aspect is about improving practice, whereas research aspect is creating knowledge about practice (McNiff & Whitehead 2009). When the action researcher implements a change (i.e., makes an intervention on the practice), this implementation would constitute the "action" that is aimed at improving practice. When, through reflection and research, the action researcher offers explanation on the outcome of the intervention (i.e., how and why the outcome turned out to be as it is), this would constitute knowledge generation. This knowledge can be either objective or subjective or both (McNiff & Whitehead 2009).

Action research is collaborative and interventionist by nature, and requires a reflexive approach (Coghlan & Brannick 2014). That said, when an action research project involves the purpose of academic accreditation (e.g., an academic degree), it is important to note the differentiation between the core action research project, which is aimed at bringing about change or improvements in practice, and the thesis action research project, which is aimed at fulfilling the requirements of the academic aspect. Of these closely-related but different projects, the former is a collaborative effort to be carried out through the collaboration of the researchers and other relevant organisational members, whereas the latter is the researcher's individual effort (Coghlan & Brannick 2014).

Another very important -and very challenging- feature of Action Research is that it is inherently political (McNiff & Whitehead 2009; Coghlan & Brannick 2014), as is the management of change (Lientz & Rea 2004; Cameron & Green 2009).

3.4. My Action Research Investigation & Myself as an Insider Researcher

I have undertaken the role of an insider action researcher for the purposes of my DBA research project.

As the focus of my work-based research would be on bringing about changes or improvements to my own professional practice (Costley, Elliott & Gibbs 2010; McNiff & Whitehead 2009) as well as improving my learning and contributing to relevant theory through the critical exploration of my professional practice (Shepherd 2014a), I have been exploring and intervening in a major existing project that I am in charge of in my organisation.

The Workplace Project

The workplace project, which is the focus of the "core action research project" as distinguished from the "thesis action research project" by Coghlan and Brannick (2014) as explained above, is the implementation and maintenance of interactive dashboard applications on our new

enterprise business analytics platform. The aim is to provide decision support to all the internal users across the Bank through the enablement of visual analytics. This constitutes a significant component of my team's responsibilities, contributing significantly to the journey towards a higher data and analytics maturity across the Bank, as given in Figure 2.1.

In-line with the recommendation by Shepherd (2014a), this workplace project is an existing, ongoing, and open-ended activity, for which I have a management responsibility together with my Director, to whom I report.

We started to implement interactive dashboard applications in 2012 and opened to all the target users in 2013, with a view to minimising manual data processing efforts and improving the efficiency and effectiveness of information generation through data analysis to provide better decision support. With this implementation, we have been delivering significant changes since then in how people use data to support their decisions. These changes include rendering some manual reports and ad-hoc requests redundant, enabling people to get answers to their questions with just a few clicks instead of days -if not weeks- long email correspondence, providing the capability to make simulations, etc., as explained in Section 2.5.

Implementation of new technology can be counted among the major types and/or triggers of change in organisations, being investigated and/or mentioned by various researchers (e.g. Lientz and Rea 2004; Cameron and Green 2009; Beckhard and Harris 1987; Axtell et al. 2002). Consequently, change management is an important component in the success of BI (Business Intelligence) initiatives (Busick 2015).

With these points in mind, I have been exploring our efforts from a change management perspective, planning and making interventions -through the collaboration of others, where relevant- so that we (i.e., myself and the team) can continuously improve the decision support we provide. In its entirety, the work activity which is the focus of my investigation and the actions I take within the scope of this research project can be viewed as efforts towards achieving a kind of "dynamic stability", which Abrahamson (2000, p. 3) defines as "a process of continual but relatively small change efforts that involve the reconfiguration of existing practices and business models rather than the creation of new ones." Additionally, dynamic stability also involves what Abrahamson (2000) calls "pacing" , which can be defined as alternating big and small change efforts with the right intervals. In this sense, it could be argued that this approach also combines the two Japanese improvement methods, Kaizen and Kaikaku. Of these two methods, the former is a process-oriented improvement method focusing

on continuous, incremental changes, whereas the latter focuses on bringing about one-off, radical changes (Ma, Lin & Lau 2017).

Guided by the explanations above, and considering that Action Research methodology aims at bringing change into organizations (Costley, Elliott & Gibbs 2010) and integrates research and action through a number of flexible cycles (Somekh 2006), I have been performing my action research activities in a way that is organised as iterative AR (Action Research) cycles, as conceptualised in Figure 3.1, a model adapted from the models given by Shepherd (2015), Velasco (2013), and Coghlan and Brannick (2014).

While I use the term "iterative" for these cycles, not all the steps of different cycles necessarily take place sequentially in time, but instead I have had different steps of two cycles taking place simultaneously at times. This seems in-line with Somekh (2006)'s view that action research is a process of flexible cycles integrating research and action in a holistic manner rather than in the form of sequential steps.

The conceptual model given in Figure 3.1 also reflects the two main dimensions of an action research project (i.e., the professional and academic dimensions) and the important differentiation thereof between the core action research project and the thesis action research project (Coghlan & Brannick 2014). This is achieved by making cycles visible not only for the core action research project, but also for the thesis action research project.

It should be noted here that the continuous efforts on the academic dimension are represented in the continuous line in the research realm in Figure 3.1, with the cycles of the thesis action research project representing the research-oriented interventions into the workplace activities. These interventions represent the occasions or periods where my researcher-self engages relatively more deeply with the workplace activities of my professional-self and my team, throughout the process of "swimming in the flow" as an insider researcher (Shepherd 2014a).

To be able to focus on the points for improvement concerning our ongoing efforts aimed at even better adoption of our interactive dashboard applications, the users were given a say on how we were doing and how we could improve. This constitutes the start of the first intervention as part of this research project into the ongoing workplace project.

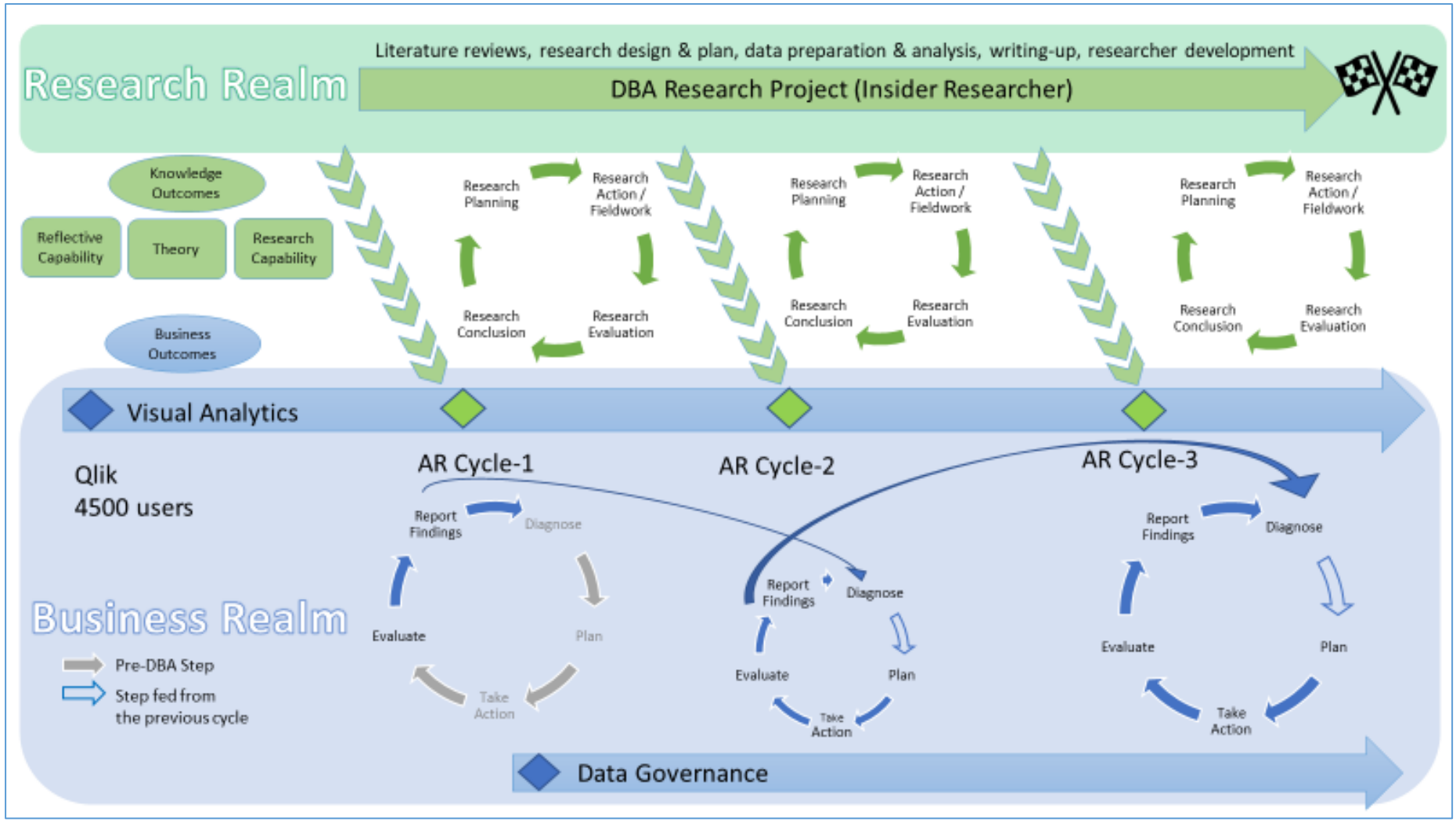

Figure 3.1. AR Cycles - Conception

Proceeding with the research activities in this context, mostly quantitative research methods were used in the first action research cycle, followed by mostly qualitative research methods in the second and third action research cycles, so a mixed-methods approach has been adopted throughout the research project. More details about the research methods used in each action research cycle will be provided in the dedicated sections of the next chapter (At this stage, please see Appendix 2. Action Research Cycles GANTT Chart for the planning details of the research cycles.).

3.5. Ethical Considerations

As an insider-researcher conducting research aimed at bringing change to my own professional practice in my own organization, I have been aware of that the responsibility of addressing the ethical issues that may arise due to my position in this context lies with myself as the insider-researcher (Costley, Elliott & Gibbs 2010). I have always been considering my activities within the scope of this research project from an ethical perspective since the role duality I have been experiencing could lead to ethical issues to be addressed.

Gelling and Munn-Giddings (2011) explain the distinct characteristics of AR in the context of research ethics and offer 7 principles according to which an AR project could be evaluated from an ethical point of view. These 7 principles are: Value, scientific validity, fair participant selection, favourable risk-benefit ratio, independent review, informed consent, respect for enrolled participants (Gelling & Munn-Giddings 2011).

3.5.1. Value

The scarcity of the resources combined with the high emphasis on efficiency at the workplace raises the value of an AR project as an ethical issue to be considered. An insider researcher needs to ensure that the proposed research project is worth doing, considering whether it has the true potential to bring about significant positive change in the organisation it will be performed in, and to contribute to the knowledge and understanding on the research topic. This means that the AR project should be one that is right for the researcher, for the organisation, and for the university (Costley, Elliott & Gibbs 2010; Gelling & Munn-Giddings 2011).

Looking through this lens, this research project is focused on an ongoing and continuous workplace initiative being managed by myself, helping me better understand and steer our efforts on one of the two main functions of my department, which is providing business decision support through visual analytics. As we serve the entire Bank for this purpose, we have a large number of internal users

across the Bank at various levels of the organisational hierarchy. Moreover, the Bank has invested significant amounts of money into visual analytics and is still open to ideas that would require further investment provided the potential benefits can justify the cost. Considering this importance that the Bank gives to data analytics, in-line with its strategy towards digitalisation to the extent possible, I am confident that this research project has the potential to bring significant changes and/or improvements to the way data is exploited across the Bank.

From a personal development perspective, this research project helps me equip myself with doctoral level research capabilities, reflective practice capabilities, and with a sound understanding of organisational change management. As a business analytics professional with a quantitative background, these capabilities prepare me both for higher-level professional / managerial roles and for a possible step towards academia, be that with a full-time or a part-time role.

As for the research being right for the university, focusing on one of the prominent topics of business studies, business analytics, to explore from a change management perspective with an AR approach, looks a good fit concerning the research interests of a business school, particularly for a professional doctorate programme. The fact that my research proposal has been accepted also supports this view.

In light of my explanations above, it could be confidently argued that this research project is compliant with research ethics from the "Value" point of view.

3.5.2. Scientific Validity

Scientific validity as a research ethics principle has two dimensions to explore: The first one is whether the research project has a real possibility of benefits or a potential of wasting valuable resources. The second one is whether the most appropriate research methods are used with the required rigour (Gelling & Munn-Giddings 2011).

As the first dimension is closely related to the Value principle, which is discussed above, this research project looks without any issues in that respect. Concerning the second dimension (i.e., rigorous application of appropriate research methods), this research project is carried out with a mixed methods approach, underpinned by a pragmatist worldview in this context. In order to proceed this way, I put maximum effort into learning and getting familiar with research methods which are new to me such as the qualitative data analysis methods, and I also put extra effort into refreshing my existing knowledge on quantitative research methods and learning relatively new ones when required.

For the purposes of AR Cycle-1, an online questionnaire has been used as the method of data collection. The questionnaire has been prepared by adhering to the general principles of questionnaire design as provided by Brace (2008). Additionally, established scales from the literature have been used where possible to measure the constructs to be analysed, such as the Openness to Change (Miller, Johnson & Grau 1994), and SUS (the System Usability Scale) (Brooke 1996; Brooke 2013). Relevant literature has been consulted when preparing self-generated questionnaire items as well, adapting items from the literature where possible. Concerning the analysis of the structured data generated through the questionnaire, suitable statistical data analysis techniques have been employed by consulting the relevant sources from the literature (e.g., Field 2017; Hayes 2013). More information on the preparation of the questionnaire and the statistical analysis techniques employed have been provided in Section 4.1.4.2 and Section 4.1.4.4, respectively.

Similarly, advice from the literature have been followed in collecting and analysing the qualitative data through semi-structured interviews and anonymised emails for the purposes of AR Cycle-2 and AR Cycle-3, by consulting relevant sources (e.g., Creswell 2014; Gibbs 2013; Schreier 2013).

In this sense, the research methods used in this research project have been determined on the basis of their appropriateness for the purposes of the research and the research context, and not according to what the researcher finds convenient, so this research has progressed with utmost care of ethical principles from the viewpoint of "scientific validity".

3.5.3. Fair Participant Selection

An important distinction of AR from more traditional forms of research is that the participants will probably be among those who will be affected by the research in one way or another. Additionally, they can also be acting as co-researchers (Gelling & Munn-Giddings 2011), or they may be the researcher's colleagues, be them superiors or direct reports or peers (Costley, Elliott & Gibbs 2010). These bring a specific sensitivity to selection of the participants in the case of an AR project.

In this research project the participants have been selected as per the requirements of each research cycle and the research method to be applied thereof. It is worth noting that the participants are selected solely according to the needs of the research cycle and without any bias due to the researcher's professional relationships with any of them. Another important point is that all the participants have been informed about the research project prior to their participation and that they

participate on a voluntary basis, having necessary information about how their data will be used, stored, and that their privacy will be respected.

3.5.4. Favourable Risk Benefit Ratio

Action research involves organisational politics by nature (McNiff & Whitehead 2009; Coghlan & Brannick 2014), not least because it aims to challenge and bring change into an organisation's existing way of working, with the potential of making some of the organisation's members feel vulnerable or threatened (Gelling & Munn-Giddings 2011). In the case of an insider researcher, such as myself, this leads to issues concerning the researcher's familiarity with the research context and the micro-politics of the organisation in which the research is carried out (Costley, Elliott & Gibbs 2010).

When conducting this research project, I have been acting with a high awareness and transparency about any potential conflicts of interest (e.g., between my academic and professional interests and interests of the organisation), to the extent possible. I have shown my best effort to ensure that the potential benefits not only for me but also the organisation and the university justify the risks taken, if any. Throughout this thesis, I have been transparent about my subjective evaluations and their justifications and have kept an open mind on conflicting points of view so that this subjectivity, which is an unavoidable element in AR, does not hinder the quality and integrity of my research.

For example, an important issue was to gain access to a wide range of potential participants to have them complete a questionnaire for the first AR cycle. Given that I had made an initial presentation to the CFO (Chief Financial Officer) and my Director about my doctoral research and gained their support, I did not expect to face a big challenge at this point; however, I still needed to explain in detail my purpose to my colleagues in the Responsible Department (I do not mention the actual name of the department for privacy reasons), with whom I performed the survey in collaboration, and to address their doubts about whether this survey was solely for the purposes of my doctorate or it was also a part of our workplace activities. They agreed to collaborate only after they had become clear about that this was a dual-purpose project, with both business and academic purposes.

Another issue that I consider in relation to this perspective was about my relations with my team members and my Director in the first place, who were collaborators of my research project. I would need the support of my team members, who are my direct reports, to conduct and follow up

surveys, help in data analysis, discuss and interpret the findings, decide on and take actions. Although they would be doing this as a part of their own workplace activities since this was not a decoupled but instead an integrated research activity into our own workplace activities, I made it clear to them that these contributions would also be useful for my doctoral research project and that I would make the necessary acknowledgements in my thesis, also respecting confidentiality, unless otherwise was requested. A similar issue was also true for me and my Director, so I ensured that he clearly understood and approved that some of my workplace activities during the research process would also be towards the completion of my doctoral research project.

3.5.5. Independent Review

Independent review means that the research project is judged against some rigorous scientific criteria by at least one expert who does not have any affiliation with the project itself. Here, the term scientific is used in the broader sense, covering all aspects of a research process from planning to undertaking and to reporting (Gelling & Munn-Giddings 2011).

As a doctoral research project, this project is being conducted under the guidance of my academic advisor and is subject to occasional reviews by the programme leader. In addition to this, this research and the thesis will be subject to formal assessment by a panel including external examiner(s), as is the typical case for doctoral theses. Therefore, I believe that this research is fully compliant with the ethical principle of independent review.

3.5.6. Informed Consent & Respect for the Enrolled Participants

I will cover the last 2 principles in this one sub-section as they are closely related to each other. Informed consent means that the researcher ensures that the participants are fully informed about the purposes, potential benefits, and risks, etc. of the research project and decide whether to participate or not voluntarily, in light of that information (Gelling & Munn-Giddings 2011). They must also clearly know to whom and what they give consent, as role ambiguities (e.g., the researcher being a colleague or a superior at the same time, in the case of an insider research) may lead to confusions.

Respect for the enrolled participants, similarly, requires the researcher to ensure that participants are informed about all the possible risks and benefits, they know that they can withdraw from the research at any time, their safety and well-being are observed and their privacy is respected, and the research findings are shared with them (Gelling & Munn-Giddings 2011).

From this perspective, I ensure that participants are fully informed as explained above by writing in detail the focus and purposes of my research project in whatever means I use to communicate the invitation to participate (i.e., the online questionnaire invitation for the first cycle, the calendar invitations for the interviews for the 2nd and 3rd cycles.) and let them know that participation is voluntary.

As a matter of principle, the data throughout this research project is always used for research purposes in such a way that identities of the participants are unidentifiable in the data set, excluding the interviews. Even in the case of interviews, any information that can lead to the participant being identified in the analysis results and in the quotations made is avoided. Similarly, concerning the use of secondary data, to which I have access due to my professional role as a member of the organisation, the data is prepared as a first step so that any information that could make a person identifiable is removed, and then stored and used in my researcher role for the purposes of my research so that identities are not identifiable, at least not without specific endeavour and support, even by myself.

The research process itself does not expose participants' safety and wellbeing to unnecessary risks as I conduct the fieldwork of this research within my organisation's premises and online, with privacy measures explained above in place (Here I exclude the potential positive or negative impacts of the outcome of the research, as it has already been discussed above, under another principle.)

The findings of this research and the consequent actions -planned or taken- are presented at suitable levels of details to various layers of the organisation, for example, to ExCo (Executive Committee) with a presentation and to all our internal users as highlights in emails.

In light of the explanations above, I believe that this research project is fully compliant with the informed consent and respect for the enrolled participants principles.

To conclude, considering the evaluations regarding the principles above and the fact that I have followed the requirements of my programme regarding research ethics from the beginning of my research activities (Please see Appendix 3. Email Correspondence with the Research Ethics Support Team), I am confident that this research project is fully compliant with the research ethics principles.

CHAPTER 4. ACTION RESEARCH CYCLES

This chapter explains the action research activities as per each of the three action research cycles throughout the research process. Exploring the workplace project (i.e., focus of the core action research project, as explained in the previous chapter) from a change management perspective through the eyes of the insider researcher, the focus is on the significant changes in the way people across the Bank access and use data and analytics, consequently -or potentially-having a wider impact in their overall workplace activities (e.g., on their decision making processes, job performance, resource allocations, further information requirements, etc.)

Part of the efforts concerning my workplace activities within the scope of this research project took place prior to the initiation of my DBA programme (Please see Appendix_2_Action_Research_Cycles GANTT Chart). This could be considered a natural consequence of the fact that the focus of the core action research project, which is an ongoing and open-ended workplace project, had already started and progressed to some extent when this research project was initiated. The workplace activities performed during this early stage will be mentioned as the "pre-DBA" steps henceforth.

Sections 4.1.1 to 4.1.3 below, which are about the Diagnosis, Planning, and Taking Action steps of the first AR cycle, will explain these pre-DBA activities; however, these sections have been kept as brief as possible, considering their retrospective nature, so that the main focus remains on the action research activities performed throughout this research project.

4.1. Action Research Cycle – I

4.1.1. Diagnosis

As explained in section 3.4, the workplace project (or activity) that forms the basis of this research project is an existing, open-ended, and ongoing activity for which I have a management responsibility. The start of this workplace activity dates back to 2012, to the aftermath of a merger the Bank experienced with another similar-scale private bank, as a consequence of a global takeover (Hence the pre-DBA steps in AR Cycle -1, as given in Figure 3.1. Please refer to Appendix 2. Action Research Cycles GANTT Chart for the time plan). The merged bank continued to operate as the same legal entity as the Bank and with the same brand name.

On the other hand, not only the number of branches and staff but also the volume and variety of the data at hand were roughly doubled as a result of the merger. Some points for improvement regarding reporting and analysis environment that had been under consideration even prior to the merger then became urgent. There was significantly higher volumes and varieties of data, coming mostly from the Bank's data warehouse but also from external sources, and we had roughly twice as many internal clients to serve as we had had prior to the merger.

The merger process explained above was taking place against a data and analytics backdrop where a new-generation of business analytics tools were spreading across the market, representing the fast advancements in the data-related technology. These new-generation platforms had some promising capabilities such as powerful data visualisation features, high-performance end-user interactions, the ability to drill-down to increasingly granular levels of detail, to make simulations, and to perform some statistical computations. Most of these tools came with the argument that business users, at least those in data-related functions if not all casual business users, would be able to design, develop, and even distribute their own dashboard applications, which could mean a significant increase in efficiency due to the expected decrease in the dependence of business units on IT resources.

The Bank's own existing reporting tools included standard software packages and in-house-built modules within the Bank's operating system, and the ubiquitous spreadsheets. Various business units at the Head Office, including us, were preparing some standard, periodic reports by using these tools and distributing these via email or through the Bank's internal portal. The Bank was among the relatively capable ones when it came to data processing capabilities and tools, so these were informative reports, but still with their strict limitations and drawbacks. These included: Labour-intensive and error-prone report generation processes due to manual efforts, limited interaction on the user side, inconsistency problems due to multiple parties using different data sources and/or assumptions for similar reports, intensive email and telephone conversations concerning the explanations of the presented figures and/or the relative increases or decreases thereof, and a limited capability for trend views.

On the user side, people across the Bank needed a platform with which they could analyse their figures, be it their performance indicators or cross-sales opportunities or any other relevant figure to support their decisions and actions, and with which they could get immediate answers to their questions without having to make lengthy email correspondences or telephone calls for explanations.

On the analytics and reporting functions side, people needed to minimise manual efforts and to have a single, trusted source of data and information[2] with high performance so that they would be able to dedicate their resources to higher-value-added tasks such as the analysis of the information and to their core businesses instead of labour-intensively working on report generation, cross-checking, and distribution. This was the feedback we received during various meetings with business units, field visits, and meetings with the members of the senior management (before the commencement of this research project).

In addition to these, one of the reasons for why many people were busy with labour-intensive cross-checking efforts was the perhaps over-flexible report generation approach across the Head Office, thanks to which almost every business user had the authorisation to extract data and generate reports according to their own line manager's self-declared requirements. This almost limitless flexibility was a given in the Bank's culture when it came to reporting. Almost every manager, whether he/she is a mid-level manager or an executive, would have his/her own desired report set prepared in his/her own desired format, in some cases even with his/her own calculation rules and assumptions. Moreover, there was only little, if any, alignment of the required skill sets with this approach. We needed to address this point, too, when working towards better enablement of our internal users, so that we could have a properly regulated BA environment where users would be able to interact with our dashboards through a guided platform.

At the same time, we were also monitoring the latest developments in the area of business analytics, particularly in the technologies aimed at visual analytics, by attending conferences, arranging visits to other banks or companies, meeting with vendors, and exploring online resources. We needed to give visibility to our existing data by producing ready-to-consume information and enable the users to interact with it to generate insight.

4.1.2. Planning

In order to be able to successfully start and continue with a new initiative to implement a new BA platform, there was a need for proper planning without compromising the pace of progress. This was because there was an urgent need to be able to properly exploit the data at hand, as explained in the previous section; however, we would not be able to gain management approval for an investment

[2] Data are the facts or details from which information is derived (https://www.diffen.com/difference/Data_vs_Information).

of that scale solely on the basis of urgency. Moreover, we could not afford an ineffective solution given the limited resources in terms of both financials and time.

POC (Proof of Concept) examinations were conducted with different vendors in a couple of months during the first quarter of 2012. Along with these POCs we were also examining benchmark reports comparing BA platform vendors with each other so that we could support our final decision not only with the results of our own POCs but also with benchmarking information published by reputable agencies.

After a few months of serious exploration of the alternative platforms and POC efforts, we decided on QV as the platform of our choice in May 2012. Our plan was then to proceed with the set-up of the platform and dashboard developments to complete the implementation by the end of 2012 (Please see Appendix 2. Action Research Cycles GANTT Chart for the time plan).

4.1.3. Taking Action

The cores of the very first two dashboard applications had already been developed by the end of the POC. The issue was that we would envisage an enterprise-wide implementation so that all of our internal clients would be enabled to interact with data in a much more effective and efficient manner; however, this would not be possible with one quick decision. This was due to two main reasons:

First, a formal approval from the top management would be required for an investment of this scale, and -normally- they would need adequate justification to be convinced into making such an investment.

Second, an implementation of enterprise-scale would require additional resources such as suitable hardware, IT support, and our own organisation, along with the procurement of the software, which meant that we needed careful planning.

In addition to these, there were other points to be considered. For example, although almost everyone was dissatisfied and complaining about the existing reporting practices and capabilities, there was the issue of people whose job functions consisted of or included manual report generation and distribution. This partially included my team members.

Another point was the limitless flexibility given to our internal users, particularly to those working at the Head Office, on the legacy reporting platforms and spreadsheets, as mentioned above. Although their capabilities were limited in technical terms due to the technical capabilities of the tools

at hand, the widespread access to legacy querying tools across the Head Office meant that there was a significant extent of autonomy in the way reports were prepared. If this approach was to continue even after the implementation of QV as the enterprise BA platform, then we would not be able to achieve anything in terms of addressing the inefficiency arising from the inconsistencies between the figures of different business units, and even we could lead to a dramatic increase in such inconsistencies since there would be much more and diverse information available at dramatically higher speeds.

Under these circumstances, bringing a significant change into the way people used information to support their decisions and actions would not be easy, notwithstanding the obvious dissatisfaction of users with the existing analysis and reporting practices. Hence, a decision was made to go step by step as summarised below:

- Design and development of the first two dashboard applications, one for daily status figures and the other for performance management figures, which were -and still are- the most frequently monitored information.

- Purchase of an initial set of 100 user licenses so that we could make our very first 2 dashboard applications available to a limited set of internal users at the Head Office.

- Receiving user feedback, doing the required revisions and gaining support from the group heads of these initial set of internal users.

- Making a presentation to the ExCo with live demonstration of these very first dashboard applications and asking for budget to proceed with the implementation to cover all the target users (i.e., 4500 users, including the branch managers, and marketing and sales staff at the regional directorates and branches).

- Proceeding with the implementation to cover all the target users, following the ExCo approval.

The first two steps would not require any additional hardware investment, as our existing single server would be adequate for an initial implementation of this scale. When we completed the purchase of this initial set of licences and made our very first two dashboard applications available to the specified users from the Head Office business units, the first reaction on the user side was great excitement and praise.

At the same time, we were receiving many questions like whether the “field” (i.e., users from branches and regional directorates) would be able to use these dashboard applications, whether the Head Office staff other than our team would be able to design and develop dashboard applications or

to make changes on the ones we design and develop, what the roll-out plan was, etc. IT was also quite supportive, with both the software development and infrastructure teams assigning the required resources and providing responses on time, considering that part of their resources could be freed up for more core-banking-oriented projects thanks to the reduced dependence on IT with the capabilities of this new platform and the new method of interacting with data on the business side. (We would experience tensions with IT though, later in the process, regarding who would undertake which tasks in the dashboard application design and development process, as these new dashboards would eventually lead to some existing ones, which were developed by IT, become redundant.)

Having gained significant support from the users across various business units at the Head Office, we proceeded by making a presentation to the ExCo, which was chaired by the CEO (Chief Executive Officer) and whose members included other C-level executives[3], the heads of the business lines and ALM among them. The presentation started by briefly going over the known pain points of our existing reporting and analysis capabilities, then set out the requirements, and then we opened one of the two dashboard applications that we had recently made available to a limited number of users. Immediately after this point, the first question from one of our executives was whether those in the field (i.e., staff from the branches and regional directorates) were also using that dashboard. I gave the only answer possible, saying that not at that point, and that additional budget was needed to make the necessary investment so that a wider range of users across the Bank could be covered.

That we had already developed two dashboard applications and made it available to the users, although to a limited set of users, was of great help at that point as there was a tangible initial outcome even before any investment decision.

The aforementioned ExCo meeting was followed by multi-party discussions on alternative implementation scenarios, taking into account the number of users to be covered and the associated pricing information. Focus was on the three alternatives below:

1. Limited Scenario: Around 400 users, which would cover the target users at the head office and the regional directorates.

2. Branch Scenario: Around 1.000 users, which would cover branch managers (only managers, not the other branch staff) in addition to those who would already be covered under scenario 1.

[3] C-level executives: Assistant General Managers, who are also members of the ExCo.

3. Enterprise Scenario: Around 3.000 users, which would cover all the target users, including the relationship managers at the branches.

Following a few weeks of discussions on the topic after that meeting, the decision was made to proceed with the enterprise scenario and purchase the required licences of our new BA platform that would enable us to serve all the target users across the Bank. Following from this decision, a new opportunity emerged partly due to our significant investment and partly due to the marketing and pricing strategy of the vendor: We were offered to purchase 4.500 licenses instead of 3.000 by paying only a slightly higher fee, which meant 50% more licences for only a slightly higher cost. In the end, we purchased 4.500 licences, considering the potential growth of the Bank in the coming years and the possibility of extending the coverage beyond the initial set of target users across the Bank.

The following process was a process of "democratisation of data", which can be defined as all the relevant users becoming enabled to access and interact with data to derive actionable insights through interactive visual applications or any other suitable means (Díaz, Rowshankish & Saleh 2018; Fassnacht 2007). In our case, the means (or the platform) to be used for this purpose was QV, our selection as the enterprise business analytics platform. It could be argued that the strict authorisation rules in place could have limited the materialisation of democratisation process in that not every user across the organisation was given access to the same data with the same access privileges. However, considering that data democratisation does not necessarily mean enabling access to all the data for everyone (HICKS 2020) and that effective data democratisation involves effective data governance, which includes regulations on access rights to ensure ethical and compliant usage of data (HICKS 2020; Collibra 2020), this process was still democratising data as users were given access to data commensurate with their authorisations through a suitable visual analytics platform, both of which (i.e., the access to data and the platform as the means of analysis) simply did not exist before. This was even a more significant step towards the democratisation of data when considered in the context of the banking industry, a highly regulated industry across the world, and the increasing regulations on the collection and processing of data globally, particularly for personal data.

Considering my previous explanations above in this section, it can also be thought that data had already been democratised across our organisation (i.e., the Bank) as I mentioned an almost limitless flexibility in terms of report designs and assumptions; however, for the majority of users, this used to be done by submitting various report requests and requests for the explanations of discrepancies from specified business units at the Head Office and not by users directly interacting with data. Additionally, those Head Office staff who were hands-on working with data were struggling to access the data they required due to the limited capabilities of the existing tools back then.

Therefore, this new platform (i.e., the QV) has been an initiative of truly democratising data across the organisation, enabling the users to interact with data with high performance and through a variety of visualisations. This has particularly been so for the thousands of users at the branches and regional directorates as they did not have access to the means for analysing even the data they were authorised to access, apart from the static reports either generated via in-house core banking system or sent to them via emails or shared on the Bank's SharePoint. As such, QV provided thousands of such users with the means for multi-dimensional, on-demand, and high-speed interactive visual analysis of data to derive insights for business decision support. The users also responded well by using the applications on the platform actively, as is evidenced by the number of users and the number of clicks on the platform, based on the usage log data (Figure 4.1).

To this end, we proceeded in two more steps: Just after a few months, during which we completed the procurements of licences and additional servers, and improved our dashboard applications, we opened the platform to the regional directorates.

In a contemporaneous effort, we visited every one of our regional directorates together with my Director and a team member, introduced the new platform and our first two dashboard applications to our colleagues there. Whenever we were asked when they would be able to have access to this platform, we would answer "right now, and hereafter". Moreover, we explained that branches would also be able to use the same platform shortly, and that we would expect their (i.e., the regional directorates') contributions in assisting the branch staff in their introduction to the platform.

Similar to our experience with the initial set of users at the Head Office, again this initiative was met with great excitement and praise in general, although we heard some worries as well: how would users adapt to this new platform; what would happen to the existing reports; would they be able to learn how to use this new platform properly; etc., points related to the users' readiness for change, particularly from self-efficacy (Neves 2009; Wanberg & Banas 2000) and social support (Wanberg & Banas 2000) perspectives.

A few months later, with the start of the new year (i.e., 2013), the platform was made available to all the target users, including our colleagues from the branches. By that time, two additional dashboard applications had been developed as well. Of course, every user was given access to the dashboard application which would be relevant for them, and with the necessary authorisation rules in place so that every user had access to what he/she needed and had the right to see.

Starting from that point, we would continuously design and develop new dashboard applications to cover a wide range of subject areas such as performance management, customer analytics, risk management, industry benchmarking, cash management, etc., and improve our existing dashboards according to the incoming feedback. We would also provide user support through our dedicated email inbox, phone calls, face-to-face training sessions, and e-learning modules. In parallel, usage statistics were being monitored through a dashboard application that we developed on the same platform. Over the following years, these activities would remain at the core of our efforts to provide our users with decision support.

The new platform had become a part of people's daily lives at the workplace in a few months following the rollout in January 2013. The usage statistics were in an upwards trend both in terms of the number of users and the number of clicks (Figure 4.1), and our dedicated email inbox was also actively used.

Along with this, we would receive mostly positive feedback from our internal users, particularly in the first two years. We were also praised by the top management, as the winners of two internal innovation awards within the Bank in 2013. Part of this more than warm initial welcome was most probably due to the inherent nature of the new means of data access and the changes it delivered: A relief from some labour-intensive, error-prone, and ineffective legacy means of information access, which were mentioned in more detail earlier, with the capability to access ready-to-consume, automatically updated information whenever they needed, and further capabilities to interact with data for more detailed analyses, which would save significant time and effort for the users, which is named as the "relative advantage" characteristic of an innovation (Rogers 2003). Together with that, the warm welcome can also be partly due to the way we communicated change across the organisation, visiting physically all the regional directorates and holding meetings with staff working there and some branches, perhaps leading the users to appreciate the effort and feel thankful to some extent. A partial factor can also be an aspect of organisational politics in that some people might have adopted an attitude that they thought could be the socially desirable one to avoid unnecessary attention from their peers and/or superiors.

However, there were also worries and warnings, particularly from some of the executive-level managers, concerning the risk of turning this new platform into another chaotic environment where there would be tens of versions of any figure, various visuals showing by and large the same information in slightly different formats, where users would struggle to find the information they needed even if it was there. This was because they knew well about the new requests flowing to us, and the almost unlimited flexibility of reporting preferences across the Bank, which was mentioned

earlier in this section. From another perspective, it could be argued that behind these worries could lie other reasons such as preserving their and their own teams' privileges in terms of access to the data and the means for analysing it and avoiding the question of what would need to happen next if the new visual analytics platform became widely available across the organisation. With the benefit of an insider's view, though, even if both of these can be true at the same time, the former was a legitimate concern based on the experience with legacy platforms, although almost completely confined to the HO.

As time passed, the usage statistics became relatively stable, and feedback started to be more mixed, with some users complaining about various issues such as: complexity, information overload, and lower-than-expected levels of freshness of some of the information, which partially realised the risks foreseen in the earlier phases. Figure_4_1 shows the trend of usage statistics of our new BA platform and our (myself & team) perception of the users' feedback[4].

In this context, I started to approach this workplace project as an insider researcher for the purposes of my DBA research project, from January 2016 onwards. As I started to perform research activities from within and into this workplace project, I, together with my team, decided that we needed to delve deeper into the users' perspectives to better understand how they experienced the changes coming with this new platform and at which points we would potentially need to make new interventions.

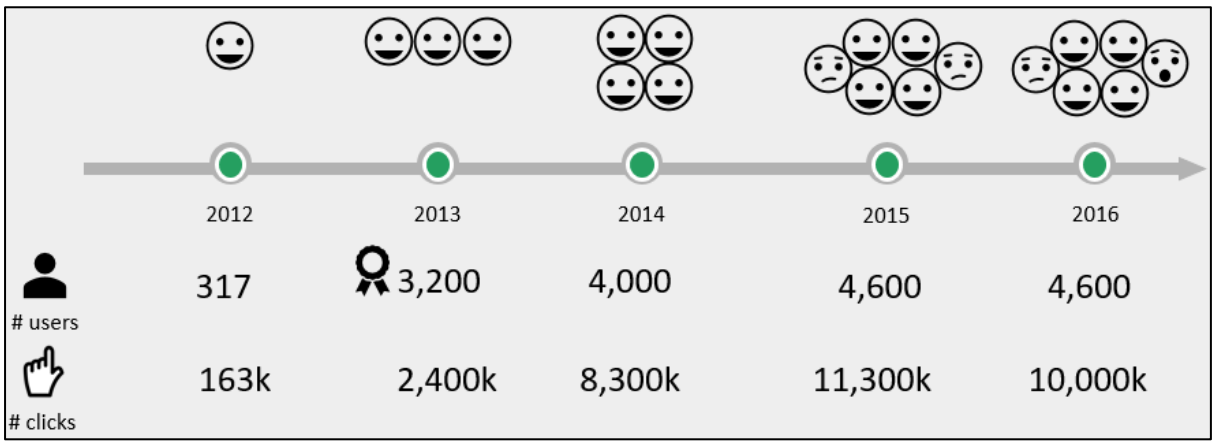

Figure 4.1. QV usage statistics and our perceptions of the users' feedback[5]

[4] This perception is based solely on the feedback we received through our business-as-usual interaction with our users and not through any systematic research effort, as this is yet part of the pre-DBA steps. The glyphs on Figure 4.1. should be taken simply as a visual expression of our subjective perceptions in this context.
[5] The rosette in Figure 4.1 represents the in-Bank awards that we received in 2013 with this workplace project.

4.1.4. Evaluating

4.1.4.1. A Reflective Account of What Happened

From the very beginning, this new platform triggered some significant changes across the Bank as mentioned by various researchers (e.g. Lientz & Rea 2004; Cameron & Green 2009; Beckhard & Harris 1987; Axtell et al. 2002). With the implementation of the new BA platform and a number of dashboard applications on that platform, it could be normally expected to see many manually prepared reports become redundant.

Another important change would be that many people would be able to monitor and interactively analyse in seconds significantly large amounts of information most of which used to be invisible to them. This would lead to minimised if not totally abandoned email and telephone traffic with the aim of getting insights and explanations or cross-checking. This would make room for more intense questioning of the figures and the possibility of new, more advanced questions and requests leading to more advanced capabilities in turn. In light of these conclusions, it could be seen that this was a project requiring to be managed very consciously as an organisational change initiative, as is also mentioned for new BI projects by Busick (2015).

With the benefit of hindsight, some of these expectations and concerns have proven to be true, but some did not; however, this is an ongoing initiative, and we continue to make developments and take actions aimed at better realisation of the expected benefits. Hence, as a first step, it could be helpful to examine the process and approach through which we have been implementing and rolling out the new platform and the dashboard applications (Figure 4.2.).

What kind of a change initiative has this been so far? Is that an example of complex change or a more structured one? How can our approach to this implementation be explained? In light of the questions like these, the progression of our workplace project is explored against the highly cited three-step change model by Lewin (1947a), as visualised in Figure 4.2. In this figure, the corresponding phases from Lewin's three-step model have been projected onto our own actual approach. According to this examination, the three steps in Lewin (1947a)'s model are identifiable in our approach; however, we did not hitherto have an awareness of such kind of conceptualisation.

Lewin (1947a) states that in order for a change effort to be successful, permanency of the after-change situation or the new status quo (Cameron & Green 2009; Weinberg 1997) should be included in the objectives from the beginning, as well as a pre-supposed period for this permanency.

Similarly, Armenakis et al. (2000) uses the term “institutionalisation” for the permanency of a change effort, which they say is reflected in the resistance to deviate from -or the commitment to- the new state. They suggest that success rate of organisational change efforts can be significantly improved by giving those responsible for the success of the change a better appreciation of the institutionalising phase of those change efforts. Some other researchers explore the same point (i.e. permanency) from the opposite perspective, focusing on avoiding the organisation reverting back to pre-change state, for which they use the concepts of homeostastasis (Lewin 1947a; Cameron & Green 2009) and reversion (Lientz & Rea 2004).

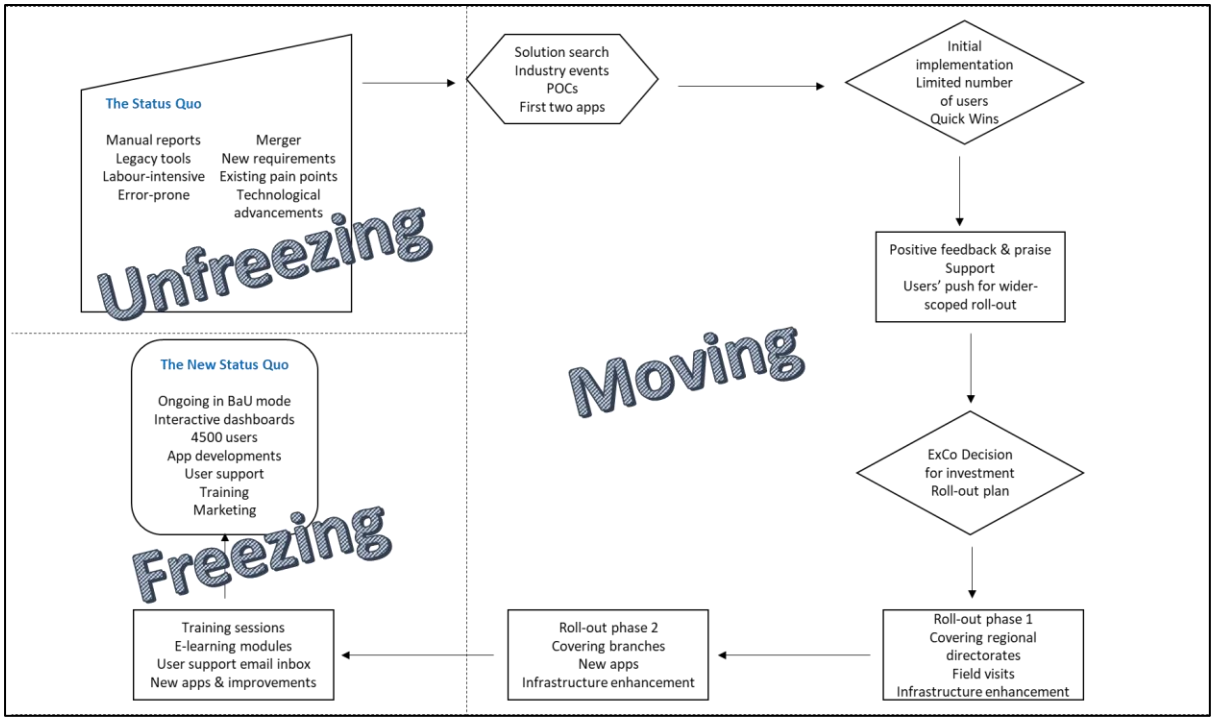

Figure 4.2. Lewin’s Three-Step Model onto our implementation approach

We did have this objective (i.e., making change permanent) from the beginning, although without a pre-defined period; however, the question remains whether we have been doing enough and doing it the right way to ensure such permanency.

The issue with change initiative (i.e. the workplace project) so far has been that it has been integrated into the target users’ daily workplace activities, as can be derived from the usage statistics (Please see Figure 4.1 for usage statistics); however, it has not been able to achieve the status of the single authoritative source as desired from the start, and we could not succeed fully in eliminating the

more traditional methods of processing data (e.g. manual data extraction, data processing on spreadsheets, etc.).

In relation to this situation, we have been continuously observing the risk of reversion, even if it may not be a full-scaled but perhaps a partial reversion. We have not purposefully collected data on these issues prior to this action research project; however, these were evident in the continuance of some of the manual reporting processes across the Bank, most of the times along with the corresponding interactive dashboards on the same topics, and from our formal and informal discussions with our colleagues.[6] There are reasons for this, which are related partially to the underlying organisational culture and values of the Bank and partially to our methods and approaches in bringing about this change, as well as, as we suspected, the extent to which our internal users across the Bank were open to the changes that have been coming to their lives with the implementation of QV as the new means of exploiting data. These, considered together, have been the main drivers for us to start a research project into this ongoing change initiative, and the points I have used to gain support from my line managers, the CDO and the CFO to conduct this research so that we could steer this ongoing workplace change effort in a way that would be informed by the research findings.

The Values of the Bank

Values are the concepts or beliefs that guide our attitudes, behaviours, and desires. They are independent from specific situations and can be ordered with regards to relative importance (Schwartz 1992; Schwartz et al. 2012). Values can help us identify the characteristics of groups and societies as well as individuals, and examine their change over time (Schwartz 2012).

According to Schwartz's theoretical model of relations among motivational value types, higher order value types, and bipolar value dimensions, which is the most widely used values model in psychological research (Skimina, Cieciuch, Schwartz, et al. 2019), a total of 19 values lay in a circular continuum. This circular continuum is categorised into four higher-order values, forming two axes according to the negatively related pairs of these higher order values. These axes and the corresponding higher-order values forming the poles of the axes are (Schwartz et al. 2012):

- Openness to Change vs. Conservation
- Self-transcendence vs. Self-enhancement.

[6] Later in the research process, in response to one of our business-oriented items in the AR Cycle-1 questionnaire, circa 56% of the respondents mentioned QV as their primary source of information. Similarly, circa 57% responded that they were receiving fewer manual reports when compared to pre-QV status-quo.

As can be discerned from definition above, values are expected to have an influence on behaviour (Skimina et al. 2019); however, this influence is observable only to the extent the values in question are relevant in the context and important for the person in that context (Schwartz 2012). Although this may seem in conflict with the statement that values are independent from specific situations, Schwartz's elaboration on the topic mentions that one can hold opposing values but not in a single occasion; rather, this could be possible at different times and in different settings, implicitly acknowledging the possibility of opposing values being held by one person (Schwartz 2012).

In another study, (Skimina et al. 2019) help further clarify this point through the concepts of "value traits" and "value states". They argue that value traits, similar to personality traits, are the overall long-term patterns of behaviour aggregated over time and in different occasions; however, they are not necessarily activated and expressed on every occasion. Their activation is related to the context-specific stimuli. For example, if a person holds benevolence highly as a value, this does not necessarily mean that he/she will behave benevolently on every occasion. Rather, he/she is considered to be more sensitive to the triggers of benevolence. Value states, on the other hand, define the expression of values on specific occasions, depending on the contextual stimuli (Skimina et al. 2019).

In parallel with this approach, Seppala, Lipponen, Bardi, et al. (2012) argue that when the context is an organisational setting, employees' change-oriented organisational citizenship behaviour has a relation with their values, with the relative importance they give to openness-to-change values being among the factors that have an influence on their behaviour in organisational change situations. They establish that this is not a direct influence but rather through interaction with other factors (i.e., work unit identification and sense of power); employees express their openness-to-change only when they identify highly with the organisation they are part of and feel that they have the power to have an impact (Seppala et al. 2012) .

In order to bring the theory summarised above into the context in which this research has been undertaken, the declared values of the Bank will be examined with this lens in the next a few paragraphs below.

Among the declared values of the Bank are "innovation and creativity" and "risk-conscious entrepreneurship". Based on my over-ten-year-long experience with the Bank, the latter reflects the more prudent, risk-averse genes of the Bank, coming from its roots as a smaller, corporate-banking focused entity with only a handful of branches -an era which lasted for decades until the partnership with a big multinational group. The reason I think this way is that even when articulating a value

supposedly to support entrepreneurship, the wording cannot escape this prudence, thus adding the "risk-conscious" at the beginning of it.

Existence of this conflict (or tension) between these two declared values can also be supported from the perspective of the values theory mentioned above. Of these two, the declared value of innovation and creativity is associated with the openness-to-change values, which promote readiness and desire for new ideas, challenges, and experiences. The other declared value, risk-conscious entrepreneurship, on the other hand, looks a bit more complicated. If the "entrepreneurship" component is considered alone, it would again be associated with the openness-to-change values, which include the values of self-direction-action and self-direction-thought (Schwartz et al. 2012), which are the qualities that can be aligned well with the concept of entrepreneurship. However, the "risk-consciousness" component, unlike entrepreneurship, looks to be more related with the conservation values, which lay at the opposite end of the openness-to-change vs. conservation axis, as these values emphasise safety, stability, and anxiety-avoidance (Schwartz et al. 2012).

It could be argued that the same conflict can be an important factor behind our struggles towards achieving the desired state where the expected benefits could be realised in full, in terms of the changes stemming from the implementation of the new means of information access (i.e., the interactive dashboard applications); a process which is ongoing even with the widespread adoption by 4500 users across the Bank.

On one hand, almost everyone was very willing, even enthusiastic, to start to interact with this new means of information access. However, when it came to changing existing habits, dropping legacy systems and manual processes, most of the same people were firmly holding their ground not to take a step towards the full realisation of changes. Almost everyone was paying lip service to how important and beneficial the changes would be, but when it came to actually changing something in their own activities and approaches, hardly anyone was wilfully moving. In this sense, "conservation" was observable at its peak, in such an "innovative" workplace.

Along with the tensions stemming from conflicting values, politics could also be another aspect to be considered as a factor in the progress of the workplace project at hand. As discussed earlier (i.e., in Section 2.4.2), politics is considered to be a fact of life in organisations (Costley, Elliott & Gibbs 2010). As such, the impact of politics in the context of the organisational change was also observable in our experience.

For example, when a manual report being sent via email was becoming redundant, the receiver side would not explicitly say so, and the sender side would find a way to prove that how different in fact the manual report was from the already automated dashboard application (e.g., by adding another column to an existing table, no matter whether it would bring added value or not.). Most probably, this was due to the fact that the question of what would happen next if the report(s) prepared by someone becomes redundant had not been addressed properly and explicitly from the beginning.

At all levels, people would explicitly say that they experienced great efficiency and effectiveness with the new BA platform, but still hardly anyone would decommission any legacy report, nor would they go for any type of re-organisation for a better allocation of the resources. In a nutshell, the new BA platform has been successful in becoming an integral part of the organisational architecture and an essential tool for decision support; however, this happened without it replacing most of the legacy reporting processes and methods but being positioned to exist along with them. This, apart from some manual reports and some menus on the core banking system that we ourselves decommissioned.

Perceptions of threat to job security, worries regarding the capability to learn how to use a new system, and even worries concerning greater scrutiny thanks to significantly increased visibility of data and insights, among others, can be the underlying factors of such political behaviours, as explained by Lientz and Rea (2004).

Having discussed the progress of the workplace project as an organisational change initiative from the values perspective above, the next sub-section will continue with an exploration of the foregoing initiative in relation with the relevant literature.

An Evaluation of Our Initial Approach and Methods

This sub-section will proceed by exploring our completed and ongoing implementations vis-à-vis the model given by Lientz and Rea (2004). This seems particularly relevant as the foregoing authors focus mainly on the IT-related change management, and our change initiative, which is the focus of this research project, also has a significant technical component (i.e., the new BA Platform), although this is not a technical IT project but rather a hybrid one, requiring both technically focused efforts and business efforts. Following from this point, it will also be possible to have an understanding of our change implementation from the lenses of other models mentioned in Section 2.4.2, as a summary table presenting the corresponding phases or steps of these models in relation to each other has been provided (Please see Table 2.1 for details).

Lientz and Rea (2004) offer a framework for the management of IT-related change efforts, an example of which can be the implementation of a new software or system (Please see Table 2.1 for details). In their framework, they propose a three-layer governance structure for the management of change, along with a supporting component which consists of a number of templates aimed at identifying lessons learned, handling the issue management and project management.

The governance structure comprises three levels; at the top there are the executive and operational steering committees, at the middle level there is the change management team, and at the bottom level there are multiple strike forces according to the groups of activities (Lientz & Rea 2004). With this framework, a multiple-step method for the management of change is given. In the Table 4.1 below, our activities and approaches during the implementation and ongoing adoption of our new BA platform have been matched onto the steps given by Lientz and Rea (2004). A categorical (ordinal) self-evaluation has also been included, in an effort to facilitate interpretation. The categories from 0 to 2 may not be quantitative data in its true sense, since they represent the quantification of my subjective evaluations; however, they can still be helpful in spotting the points where we tend to have acted closer to the model and the points where we have deviated from the model.

Having a look at the Table 4.1, it seems that our efforts to initiate the planned change (i.e., pre-implementation efforts) were limited when compared to the steps proposed by Lientz and Rea (2004). We did not form strike forces, which would be typical of a more participatory approach, we did not set up the proposed steering committees or the change team, at least not under the name of change management, formally. This is because the workplace project at hand had not been formally designed as a change management initiative in the first place, back in 2012. Although there was awareness regarding the significant changes that were expected and even desired, the focus was mostly on the technical implementation and roll-out rather than the management of change, and not even on the overall UX. This notwithstanding, we were performing at least some of these change-related tasks in practice, but this was kind of business-as-usual, taking place along with workplace activities.

Regarding the actual implementation of the change (i.e., the actions mentioned in Part 2 of Table 4.1), it seems that our actions were relatively closer to the actions outlined by Lientz and Rea (2004), though still with significant gaps.

In hindsight, it could be argued that the corporate culture we work in has had a role in this partial realisation of the benefits of our change effort so far. The results-oriented approach in our professional life might have led to an over-emphasis on short-term gains. Due to significant pressure

Table 4.1. Change management steps vs. our activities (Lientz & Rea 2004)

Change Management Method Steps		Our Project Activities	Self-Evaluation[7]
1	**Establish change management infrastructure**		**0.80**
Phase I	Assess business planning factors	This was performed during our usual discussions in meetings aimed at establishing an implementation plan.	2
	Develop the change objectives and change strategy	Change objectives were outlined as: Minimising manual effort (i.e., minimising FTE - Full Time Excel's), minimising operational error risk, enabling better resource enablement, ensuring better and faster decision support. This is basically how we presented to ExCo. On the other hand, not a complete vision of the future state was being presented or discussed explicitly i.e., in terms of possible re-structuring of some reporting-related departments, allocation of resources to higher-value-added tasks through the elimination of some manual efforts, etc.	1
Phase II	Establish executive change steering committee	No such committee was established. We presented the initiative to ExCo and Investment Committee to get the required approvals; however, no formal monitoring of the change effort took place at a dedicated executive committee.	0
	Appoint the change management leaders	The de-facto leader was the CFO, to whom we report. At more tactical and operational levels, myself, my project management head colleague, and our director were in charge of managing this initiative.	2
Phase III	Form strike forces for the potential areas of change	We did not form any such strike forces.	0
	Create operational change steering committee	We did not form an operational steering committee formally. On the other hand, it was a group composed of myself, my project management head colleague and our director who steered the efforts at tactical and operational levels, though not formally named as the steering committee.	1
	Form the change management team	There was a team responsible for designing and developing the new dashboards, communicating with users, and providing training and support. This team consisted of my team and myself, with IT support when required. We were also supported by my project management head colleague and our director, particularly for the "marketing" of the change. However, similar to the case for the steering committee above, this team was not formally organised as the "change management team", either. In a nutshell, doing the job and managing the change were not separated; they were handled together, by the same people.	1
Phase IV	Establish the change management framework	No such framework existed.	0
	Conduct change familiarisation sessions with strike forces	As there were no strike forces, there were no sessions under this name; however, we would hold frequent meetings with participants from all relevant business units, and we would visit every regional directorate to come together with colleagues there as well. This can be considered a similar activity.	1
	Present change management framework to change steering committees	As there was no such framework, there was no such presentation. This, apart from our project presentations to ExCo.	0

[7] 0: No practice to meet this item, 1: Some practice to meet this item; 2: Our practice meets this item.

2	**Change Management Work**		**1.33**
	Identify and select your areas of change	This has been partly clear. The aim was to replace, to the extent possible, existing manual and error-prone reporting processes with interactive visual analytics. This would go well beyond replacement as well, since we would be making visible large amounts of information, which had previously been invisible. On the other hand, whether there would be consequent organisational re-structuring as a result of efficiency was never clear, or not even explicitly discussed.	1
	Collect detailed work information	At the very beginning, we assumed that we already had this information as we had already been in close contact with our internal clients. Additionally, we also prepared a detailed report inventory in the second year, to see what type of requirements we may have already met. On the other hand, we did not make user observations to have deeper insights into what people were actually doing.	1
	Define your long-term change and quick hits	We did exactly the same. As a quick hit, we had already developed the very first versions of the first two dashboards during the POCs and had made them accessible to a limited set of users. For the long term, the aim was to position the new platform as the single authoritative source of information for decision support, along with achieving a more efficient way of data analysis.	1
	Determine your change implementation strategy	Actually, our strategy was based on an important principle: Do first, then present not what is to be done but what has already been done, then ask for funding and approval for scope extension. In doing so, we very consciously communicated with both rank-and-file staff and middle-management, and in-parallel with the top management. This strategy helped us establish a sense of urgency and enthusiasm.	2
	Develop your change management implementation project plan	There was a clear project plan, specifying which topics and levels of users would be covered when, together with the extension of technical infrastructure in three phases; however, this was hardly a change management plan beyond a regular project plan.	1
	Implement quick hits	This was what we had done by developing the very first two dashboards during the POC.	2
	Measure results	We have been monitoring the number of active users and number of clicks since the beginning. This information can be analysed according to a number of dimensions such as business units, branches, dashboard applications, time, etc.	2
	Undertake major changes	I can consider the implementation of various dashboards to cover all the target users (circa 4,500), and the closure of some very frequently used manual reports and system menus in due course, as major changes. On the other hand, a wider-scoped realisation of the desired changes across the entire organisation has not yet been completed.	1
	Build momentum for change and prevent reversion	We have been continuously designing and developing new applications and improving the existing ones, and communicating with our internal clients; however, we continue to observe usage of legacy reports or manual reporting processes, as well as some criticism towards our standards, delivery times, visuals, etc. This issue is high on our agenda.	1

on us to start and finalise the implementation as fast as possible, most of the attention was on the avoidance of serious technical problems. Many people, including some members of the upper-level management, would think that it was only this way that we would be able to justify the investment that had been made in the eyes of the executive-level managers and our internal clients. This was one of the factors behind the very limited time and effort put into the change management infrastructure.

Another possible culprit in this type of approach was the business politics which prevailed across the organisation, as also discussed in the previous sub-section. Most people understood that change was coming with all that myriad of insights becoming visible, and myriad of manual efforts becoming redundant. However, "what next?" was the sensitive question, or the "elephant in the room". This was very astutely discussed at all times, mentioning the re-allocation of FTEs (Full-Time-Excel resources, in this context, i.e., the teams generating ad-hoc and standard reports manually) to their higher added-value core businesses in their respective peripheries, but no clarification was made or intended on how this would be done exactly, when, and what exactly their higher-added-value tasks would be. Consequently, parts of the change plan (i.e., those parts apart from the technical aspects mostly) were left vague.

In light of the explanations above, our implementation of the new dashboard applications on our new BA platform was at a relatively mature state when we decided to embark on this research project into the ongoing workplace project towards:

- The completion of our unfinished business (i.e., better adoption of this new way of information access thus helping trigger real change in people's decision-making processes and daily workplace activities, with an impact on their resource allocations),
- Taking new initiatives aimed at providing continuously better decision support against a backdrop of evolving requirements and technological advances.

This could be supported through various new, potential initiatives that could be informed by the findings throughout this research project such as:

- Improvements on the existing platform,
- Positioning of a new, additional platform to address the kind of user needs that were not yet addressed,
- Any other new initiative that could be informed by the findings of this research project,

- Improvements in our communications with our internal clients, concrete proposals for some organisational re-structuring efforts, etc.

In order to be able to make informed decisions regarding our future actions, the first step was decided to be soliciting contribution from our internal users.

The following subsections (i.e., those from Section 4.1.4.2 to Section 4.1.4.5) explain the research actions, which constitute the first cycle of the thesis action research project, as embedded into this "evaluating" step of the core action research project (Please see Figure 3.1 for an overview of the research cycles), as part of which the contributions of internal users have also been taken.

4.1.4.2. Research Planning

Having considered alternative research methods to be employed such as face-to-face interviews, focus groups, and a questionnaire, with my contribution to the team discussions in my researcher role along with my professional role, a decision has been made to proceed with a comprehensive questionnaire. This decision was made considering that the purpose at this first step of the first action research cycle was "to have a general, high level understanding of the points we do well and the points we need improvement with our services in relation to the changes experienced by our internal users, and the general perception of our internal users regarding our services" (Özel n.d.).

As the importance of employees' participation for the success of an organisational change effort has been mentioned and/or emphasised by various researchers (e.g., Lientz and Rea 2004; Dean, Brandes, and Dharwadkar 1998; Devos, Buelens and Bouckenooghe 2007), and surveys have been mentioned as one of the ways to enable employees to have their voice heard in this context (e.g., Wanous, Reichers and Austin 2000; Armenakis, Harris and Feild 2000; Coghlan and Brannick 2014) an online questionnaire could be a suitable method of wide-spread data generation for the purpose of this research project as well, considering -among other things- the large number and geographically disperse locations of our internal users, who were working at the regional directorates and at the branches as well as at the Head Office.

One important advantage of this method would be the feelings of privacy by the respondents, as they would be able to give their answers on their own, without the presence of an interviewer (Brace 2008). Another advantage would be that they would have flexibility in the time they would choose to complete the questionnaire so long as they did so before the announced deadline.

Our plan was to distribute the online questionnaire to the users in early 2016 and collect data in 1 or 2 weeks, depending on the response ratio.

4.1.4.3. Research Action / Fieldwork

As various constructs would be investigated through this questionnaire to serve the purposes of this research project from both academic and business perspectives, there was a need to prepare more than a few items (i.e., questions) categorised in accordance with these requirements. Accordingly, a questionnaire of 69 items has been prepared in collaboration with the Responsible Department (the actual name of the department is not mentioned for privacy reasons).

When preparing these items, I consulted the literature concerning the overall design of the questionnaire and more specifically concerning the constructs that I would analyse so that I could use well-established standard scales from the relevant literature where possible. I also kept close contact with my academic advisor so that all the items were prepared under proper academic guidance and agreed on.

All of the scales used to measure the constructs which are focused on for the purposes of this research project are in the form of 5-point Likert scales, the scales where respondents are asked to mention their level of agreement or disagreement with the statement in the question, on a five-point scale (Brace 2008).

Some general principles to be considered in developing a questionnaire were observed throughout this process, as listed below (Brace 2008):

- Keeping the maximum amount of time required to complete the questionnaire as 30 minutes,
- Asking more general items before more specific items,
- Not placing sensitive sections at the beginning,
- Placing classification questions (such as demographics) at the end,
- Avoiding ambiguity in the item wordings,
- Awareness of the four points below:
    - Order Effect (Tendency to select the option(s) on the left),

- Acquiescence (Tendency to agree, also known as the yea bias),
- Central Tendency (Tendency to avoid the extremes),
- Pattern Answering (Following a pattern of ticking boxes, such as diagonal, usually due to fatigue or boredom).

Table 4.2 below represents the distribution of the questionnaire items according to the constructs they are aimed to measure. Brief explanations on each of these constructs in relation with the research questions and the aims of this first action research cycle are provided in the following paragraphs. An item-by-item account of the aims of the items chosen and related references, if any, are also provided in Appendix 4. AR Cycle-1 Questionnaire Items with Details. The highlighted constructs below are the ones that have been analysed for the purposes of academic as well as business outcomes of this doctoral research project, whereas the remaining categories consist of the items that would be relevant mostly from a business perspective. This notwithstanding, I have still made use of the results of these business-focused items as well, where suitable, to enrich the results of the analyses.

Table 4.2. Distribution of questionnaire items into constructs

#	Construct (or Category)	Number of Items
1	Categorical (not related to any specific construct)	7
2	Change (Openness-to-Change)	6
3	Change (Outcomes)	3
4	Information, Participation, Trust	5
5	Job Performance	3
6	Open-ended response (not related to any specific construct)	1
7	Performance	2
8	Purpose	3
9	Support	5
10	Training	7
11	Usability (Specific)	7
12	Usability (SUS)	10
13	Usefulness	10
	Grand Total	**69**

1. Categorical (not related to a specific construct):

These are the items aimed at having a better understanding of the respondents' profiles such as age, education, experience, etc. Following advice from various literature pieces (e.g. Brace 2008; Lietz 2010), these items have been placed at the end of the questionnaire to mitigate the risk of respondents being affected by privacy concerns prior to giving their answers to the construct-related items.

2. Change (Openness-to-Change):

One of the main focus areas of this research project is to identify the ways towards a better adoption of the new means of information access (i.e., our dashboard applications on QV platform) across the Bank, eventually leading to wider-scoped changes in the ways of working and decision making, as discussed earlier, in Section 2.5.

The adoption -or better adoption- entails further changes in the users' attitudes and behaviours in terms of how they access and use data. As discussed in Section 4.1.4.1, the existing theory on values has that although there are universal value traits that lay on a circular continuum (Schwartz 1992; Schwartz et al. 2012), people need situational stimuli to express their values with their behaviours as explained through the concept of value states (Skimina et al. 2019).

In light of the explanations above, our internal clients' openness to change, which is one of the four higher order values in Schwartz's model (Schwartz 1992; Schwartz 2012), has emerged as an important construct to be analysed. Through this analysis, both potential factors with an impact on the internal clients' openness-to-change could be identified and acted on, and the potential impact of openness-to-change on one or more of the desired outcomes of the workplace project could be analysed.

As mentioned in Section 2.4.2, there are different but related concepts in analysis of individual level change. Having examined the relevant literature, including the item-level details of various constructs which were summarised in Section 2.4.2, also considering the state of our workplace project (i.e. the QV implementation) and the attitudes and behaviours of our internal clients as perceived by myself in this context, I decided to adapt and use the Openness-to-Change scale (Miller, Johnson & Grau 1994; Susskind, Miller & Johnson 1998). One example item from this scale is: "I would consider myself open to the changes that the implementation of QlikView brought to my method of information access.".

One important issue concerning this scale was the translation of the items into Turkish, as the questionnaire would be in Turkish. Considering that I know my business setting well as an insider researcher and have the language skills to translate the questions to Turkish in a way that would best serve the target audience, I made the translation myself as a first step. Then, with the help of one of my colleagues in my department, a translation back to English was made from my Turkish translation, following the best practice of back-to-back translation employed by various researchers such as Ertürk (2008) and Yavuz (2009). The results were assuring in that they either reflected the true meaning in English in slightly different words or even with the exact wording, or simply with more common words instead of more advanced ones.

In adapting the scale items to the purposes of this research project from the original items given by Susskind et al. (1998), the wording was adjusted to make it clear for the respondents that the focus was on the changes occurring or expected to occur in their workplace activities and their ways of information access with the implementation of our QV dashboard applications. Also, in-line with this approach, one item from the original scale (the second item from the end) has been dropped, as we collaboratively decided with my colleagues from the Responsible Department that two similar, negatively worded items would be confusing for the respondents in our context. Additionally, we needed to keep the number of items as small as possible since, according to their experience with in-Bank surveys, the longer the questionnaire the less willing the respondents would be to complete it.

3) Change (Outcomes):

The three items in this category are aimed at obtaining information from our internal clients regarding the business impact and outcomes of our new BA platform (i.e., QV) implementation, so these are mainly relevant from a business perspective. With these questions, the aim is to see to what extent the manual reports prepared by or shared with our internal clients could be replaced with our new dashboard applications, and what the primary choice of our internal users for information access is. An example item in this category is: “Please indicate your top three choices for the method of information access regarding your reporting & analysis needs. (Please write 1 in the box over your first choice, 2 in the box over your second choice, and 3 in the box over your third choice.)”

4) IPT (Information, Participation, Trust):

This is a five-item scale aimed to measure the extent to which our internal clients think that they have been able to participate in and they have been informed about the process of the change being introduced with the implementation of our new BA platform, as well as to what extent they trust the team behind this implementation.

This construct is an essential component in the analysis of our users' approaches to the changes in this context, as all three of these (i.e., information, participation, and trust) are considered among the factors to be analysed in various studies concerning the attitudes towards change (e.g. Lientz & Rea 2004; Devos, Buelens & Bouckenooghe 2007; Simoes & Esposito 2014; Wanberg & Banas 2000; Ertürk 2008; Chawla & Kevin Kelloway 2004; Fuchs & Prouska 2014; Dean, Brandes & Dharwadkar 1998; Cameron & Green 2009; van den Heuvel, Schalk & van Assen 2015).

In preparing the items of this scale, selected items from Wanberg and Banas (2000), Simoes and Esposito (2014), and Devos et al. (2007) were adapted. An example item in this scale is: "I think that I have been adequately informed about the implementation of QlikView applications."

5) <u>Job Performance:</u>

The three items in this category are aimed to compute a scale to measure the impact of our new BA platform on our internal users' job performances. The evaluation will naturally be based on the results of the users' self-reports, as these items are included in the questionnaire. This construct has been included in the survey upon my academic advisor's advice, considering that the impact of the changes in how people interact with data on people's job performances would be an important aspect for us to analyse in terms of business impact of the organisational change that we have been implementing.

The first item of this scale, JPIS (Job Performance Impact Scale), is a self-generated one, while the remaining two are the ones adapted from the study by Williams and Anderson (1991). An example item in this scale is: "I think that QlikView applications have been helpful for me to improve my job performance."

6) <u>Open-ended Response:</u>

This is a very straightforward item, asking for our internal users' free-text feedback. The aim is to use the qualitative data produced by this item vis a vis the quantitative analysis of the rest of the questionnaire data.

7) <u>Performance:</u>

The two items in this category are aimed to elicit feedback from our internal users concerning the usage performance of our QV dashboard applications. The first item asks for general feedback, whereas the second item asks for dashboard-application-specific feedback. These two items are business-oriented items which can guide us in deciding on which areas to focus on for improvement; however, these are not included in the data analyses for the purposes of this research project.

8) Purpose:

All of the three items in this category are to learn the main purposes for which our internal users use the QV dashboard applications. These are, again, mostly business-oriented items, so are not included in the analysis of the questionnaire data within the context of organisational change.

9) Support:

There are 5 items under this category, the first two of which are used to compute a two-item scale. This two-item scale is aimed to derive information about our internal users' perception concerning the user support we provide. As the role of organisational support is considered among the potential factors with an impact on the success of organisational change initiatives (Wanberg & Banas 2000), this scale is included in the questionnaire to be considered as a potential factor for the success of our QV implementation (i.e., the workplace project which is the focus of this research project) as an organisational change initiative. An example item in this scale is: "I can get adequate support regarding my questions about QlikView usage, by e-mail from the QlikViewDestek inbox or by contacting the Business Analytics / Business Intelligence teams."

The remaining three items in this category are more business-oriented items, seeking information to guide us in our workplace activities.

10) Training

There are 7 items in this category (items from 37 to 43). These items are aimed at gathering information from our internal users to guide our workplace actions, so these are business-oriented items. All the items in this category are self-generated items. An example item in this category is "I think that I have had adequate training to be able to use the QlikView applications easily and effectively."

11) Usability (Specific)

There are 7 items in this category (items from 22 to 28). The aim is to gather some feature-specific or application-specific information on the usability of our QV dashboard applications. These items are not aimed to compute a scale, but rather to provide us with information about which specific aspects of our dashboard applications are perceived well by the users and which aspects need improvement. Thus, these are mostly business-oriented items as well. Of these 7 items, 4 items are self-generated, straightforward items, whereas 3 items have been adapted from similar items given by Lewis (1995) and Chin, Diehl and Norman (1988). An example item in this category is: "The buttons that enable adding and removing columns to tabular views facilitate usage."

12) Usability (SUS)

This is a 10-item scale to measure the construct of usability. A well-established usability scale from the literature, SUS (Brooke 1996), has been used to measure the perceived usability of our dashboard applications on our new BA platform. As usability (or ease of use, user-friendliness, etc.) is a highly emphasized point in dashboard design in various resources (e.g. Few 2006; Bremser & Wagner 2013; Hursman 2010) to ensure those designing and developing dashboards come up with really consumable information products, the aim is to include this construct in the analysis of our users' openness to change as a potential factor.

This construct, along with Usefulness, is one of the two main pillars of our design and development efforts to serve our internal clients better, through successfully implementing the change we have been introducing. In deciding on SUS for this purpose, various other well-established scales from the literature have also been considered, such as ASQ (After Scenario Questionnaire), CSUQ (Computer System Usability Questionnaire), PSSUQ (Poststudy System Usability Questionnaire) (Bangor, Kortum & Miller 2008; Lewis 1995; Lewis 2002; Erdinç & Lewis 2013; Erdinç 2014), and SUMI (System Usability Measurement Inventory) (Bangor, Kortum & Miller 2008; Kirakowski & Corbett 1993; Kirakowski 1994).

Of these alternatives, ASQ was suitable for laboratory settings only, so was not a viable alternative for this research project.

PSSUQ and CSSUQ, the same scales with the latter being an adjusted version of the former for a more general-purpose usage in real-life settings rather than specific usability test settings, included a higher number of items than SUS. As I would be embedding the usability scale into a wider-scoped, already lengthy questionnaire, the number of items was an important criterion in the decision. Moreover, though only "usability" being apparent in its name, actually the CSUQ score measures three constructs, as its factor structure suggests (Lewis 1995). These three constructs are measured by the results of the three corresponding sub-scales, all of which constitute the entire CSUQ scale. These three constructs are: System Usefulness (SYSUSE), Information Quality (INFOQUAL), and Interface Quality (INTERQUAL). As I planned to collect information on usefulness with a separate scale considering my business context, SUS seemed to be a better alternative for this research from this perspective as well.

As for the SUMI, this scale also included too many items (sixty items) to be included in an already lengthy questionnaire, and it was not freely available. Considering these points, and the

widespread usage of SUS for this purpose, SUS has been decided on to continue with as the measure of usability for the purposes of this research project.

As the original scale was in English, a Turkish translation was required. One translation was ready on the website of the UXservices (UXservices n.d.), which is a well-known consultancy company working on usability. Considering that my programme is a professional doctorate, which is studied through professional-practice-based research, I decided to use that translation since I thought it would have already been applied in many cases. However, when I examined in detail, I spotted some points where a revised translation could be prepared to better convey the meaning fit for my purposes. This led me to take the ready-made translation as a basis and do some adjustments. After completing the translation myself, I sought help from one of my colleagues, the same colleague from whom I sought help for the Openness-to-Change Scale as well, again for the back-to-back translation. As the results were consistent with the English original of the scale, I decided to proceed with the translation I made.

Prior to the distribution of the survey, I needed to revise the 9th item following the feedback from my colleagues to whom I had distributed the questionnaire for pilot phase purposes. The need to revise the wording of this item emerged as a common feedback of the pilot survey participants, so I took that into account and revised the wording accordingly. The revision I made and agreed with my colleagues was to simply re-structure the item by writing in Turkish the equivalent of "I trust myself highly when using QlikView applications" instead of "I feel very confident when using QlikView applications", as "feeling confident" was found to sound kind of awkward (i.e., in Turkish and in the context of my questionnaire) by all of my pilot survey participants. An example item in this scale is: "I think that I would like to use the QlikView applications frequently."

13) <u>Usefulness</u>

There are 10 items in this category, which are aimed to measure the extent to which our users find the dashboard applications on our new BA platform useful. As usefulness is one of the two main components of an overall UX (User Experience) along with usability, which is an area that we pay close attention to so that it can support the success of our change initiative, this construct has been included in the questionnaire to analyse its potential impact on the users' openness to change.

As for the 9 items which are used to compute the usefulness scale, BAPUS (the Business Analytics Platform Usefulness Scale) as I name it, all but two items are self-generated, high-face-value items based on our experience with our users' expectations in our context, and the two items were adapted from the study by Larcker and Lessig (1980). The last item, on the other hand, asks for users' evaluation of usefulness for each of the specified dashboard applications, so it is solely aimed to guide

our business actions and has not been used for the purposes of this research project. An example item in this scale is: “In general, I can say that QlikView applications have been very useful for me to access the information I need.”

Appendix 4. AR Cycle-1 Questionnaire Items with Details

The target population for the questionnaire has been identified in collaboration with my teammates and my Director, to whom I directly report, as all of our internal users who used the QV platform at least once during the period from January 2015 to March 2016, with just a few exceptions. The users we decided to exclude were C-level executives (15 persons), expatriates working temporarily with us, and IT Group users, who use only their own IT-for-IT dashboards on the QV platform so are not our internal clients. After these exceptions, the size of target population was 3932 persons.

Initially I considered proceeding with a random sample for the sake of efficiency and to improve my chances to come up with a better representative sample of the target population; however, taking into account the feedback I received from both my academic adviser and the Responsible Department warning me about a high risk of low response rate to the surveys, I decided to go with the entire target population.

Following this decision, the questionnaire was distributed online to all of the 3932 internal users via SurveyMonkey by the Responsible Department on Monday, 14 March 2016 (Please see Appendix 5. Invitation to Survey for AR Cycle-1 Questionnaire for a screenshot of the email sent to the target population. Please note that this screenshot is of a test email sent on Thursday, 10 March 2016, which is the same as the actual email sent on Monday, 14 March 2016.). The online questionnaire would stay active until Tuesday, 22 March 2016, initially; however, a decision was made to extend the duration until Friday, 25 March 2016, following the usual practice for in-Bank surveys across the Bank. During this two-week period, no pressure was put on the respondents to complete the survey through their line managers, as opposed to what was being done for some other in-Bank surveys, to ensure the responses we would get were truly voluntary. The only exception was the sending of two reminder emails, one from the Responsible Department and one from my Department (Please see Appendix 6. Reminder for Invitation to Survey for a screenshot of the reminder email we sent in the morning of the last day of the questionnaire.).

At the end of this two-week period, a total of 1035 people completed the survey, meaning that the response rate for this survey was 26.3%, which was well above the expectations of my colleagues from the Responsible Department, as they would expect a response rate of circa 10%, based on their previous experience with in-Bank surveys.

Having closed the survey then, an important point for me to examine was whether the distribution of the respondents according to their work locations (i.e., Head Office, Branches and Regional Directorates) was consistent with that of the target population, a point which would help me understand to what extent the sample at hand was a representative sample of the population in this sense. Having a look at the results in the Table 4.3 below, the distribution of the sample looks -by and large- consistent with that of the target population, which is good news in terms of avoiding any bias that could have arisen due to the sample not being representative of the target population.

Table 4.3. Comparison of sample vs target population

Location	Target Population: # of Users	Target Population: % of Users	Sample: # of Users	Sample: % of Users	Sample: % of Users within Location
Head Office	553	14.06	107	10.30	19.35
Regional Directorates	244	6.21	80	7.70	32.79
Branches	3135	79.73	848	81.90	27.05
TOTAL	**3932**	**100**	**1035**	**100**	**26.32**

4.1.4.4. Research Evaluation

In order to be able to provide a better understanding of the general profile of the survey respondents, this section starts with some descriptive statistics about the demographics and experience of the respondents. Then, it continues with the rest of the survey results and their interpretations.

4.1.4.4.1. Demographics and Experience

Of the 1035 respondents of our survey, 57.8% were male and 42.2% were female (Please see Table 4.4 below.).

Table 4.4. Gender distribution of the survey respondents

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	598	57.8	57.8	57.8
Female	437	42.2	42.2	100
Total	**1035**	**100**	**100**	**-**

As for the respondents' highest level of educations, a majority (84.3%) have university bachelor's degrees, and 11.9% have master's degrees (Please see Table 4.5 below for all the education level figures.)

Table 4.5. Education levels of the survey respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Doctorate	4	0.4	0.4	0.4
Master's	123	11.9	11.9	12.3
University (Bachelor's)	872	84.3	84.3	96.6
High School	18	1.7	1.7	98.3
Other	18	1.7	1.7	100
Total	**1035**	**100**	**100**	**-**

A majority of the respondents were from sales and marketing functions, in line with our expectations, since most of our users work at the branches and the regional directorates in marketing and sales roles (Please see Table 4.6 below).

Table 4.6. Distribution of the survey respondents according to their functions

	Frequency	Percent	Valid Percent	Cumulative Percent
Marketing / Sales	891	86.1	86.1	86.1
Risk Management	25	2.4	2.4	88.5
Credits	15	1.4	1.4	89.9
ALM-T (Assets & Liabilities Management & Treasury)	3	0.3	0.3	90.2
Other	101	9.8	9.8	100
Total	**1035**	**100**	**100**	**-**

The results showing that almost all of the respondents (~96%) had been with the Bank for at least 1 year and almost half of them (~49%) had been with the Bank for at least 5 years when they participated in the survey support the reliability of the results as these people can be expected to have an adequate understanding of the analysis and reporting needs and practices across the Bank (Please see Table 4.7 below).

Table 4.7. Distribution of the survey respondents according to their experience with the Bank

	Frequency	Percent	Valid Percent	Cumulative Percent
1 year or less	42	4.1	4.1	4.1
1-3 years (3 incl.)	267	25.8	25.8	29.9
3-5 years (5 incl.)	221	21.4	21.4	51.3
5-10 years (10 incl.)	339	32.8	32.8	84.1
10+ years	166	16	16	100
Total	**1035**	**100**	**100**	**-**

Similarly, that a good majority (~86%) of the respondents had been using QV applications for at least 1 year could be an indicator of that they could be expected to have an adequate experience with QV and the related changes in their usual work habits to provide some meaningful feedback (Please see Table 4.8 below). I expect this kind of feedback informed by users' real-life experiences and knowledge about the impact of this change initiative on their workplace activities to provide reliable ground for us to inform our further business actions and the way we deliver and manage further changes throughout the course of this research project.

Table 4.8. Distribution of the survey respondents according to their experience in using qv applications at the Bank

	Frequency	Percent	Valid Percent	Cumulative Percent
3 months or less	14	1.4	1.4	1.4
3 months to 1 year (1-year incl.)	131	12.7	12.7	14.1
1 year to 2 years (2 years incl.)	476	46	46	60.1
2+ years	414	40	40	100
Total	**1035**	**100**	**100**	**-**

4.1.4.4.2. Descriptive Analysis

This section starts with the descriptive analysis results for the constructs which were focused on for the purposes of this research project, along with some critical evaluation of the reliability of the scales used. After that, it continues with the analysis of the potential factors on our internal users' openness to change and the impact of the changes coming with QV on their job performance.

When doing this, the focus will be on the key points that have emerged for us to take action and then on critically reflecting on these points and the process, leaving more detailed accounts of the underlying statistical analyses to appendices where necessary, which would be the suitable approach for a DBA thesis.

Figure 4.3 below shows the mean scores of the scales aimed to measure various constructs of interest in this research project. All of these scores have been scaled up to figures over 100, except for SUS, to facilitate interpretation. This was unnecessary for the SUS, of which score is already calculated over 100 according to its original methodology (Brooke 1996; Brooke 2013).

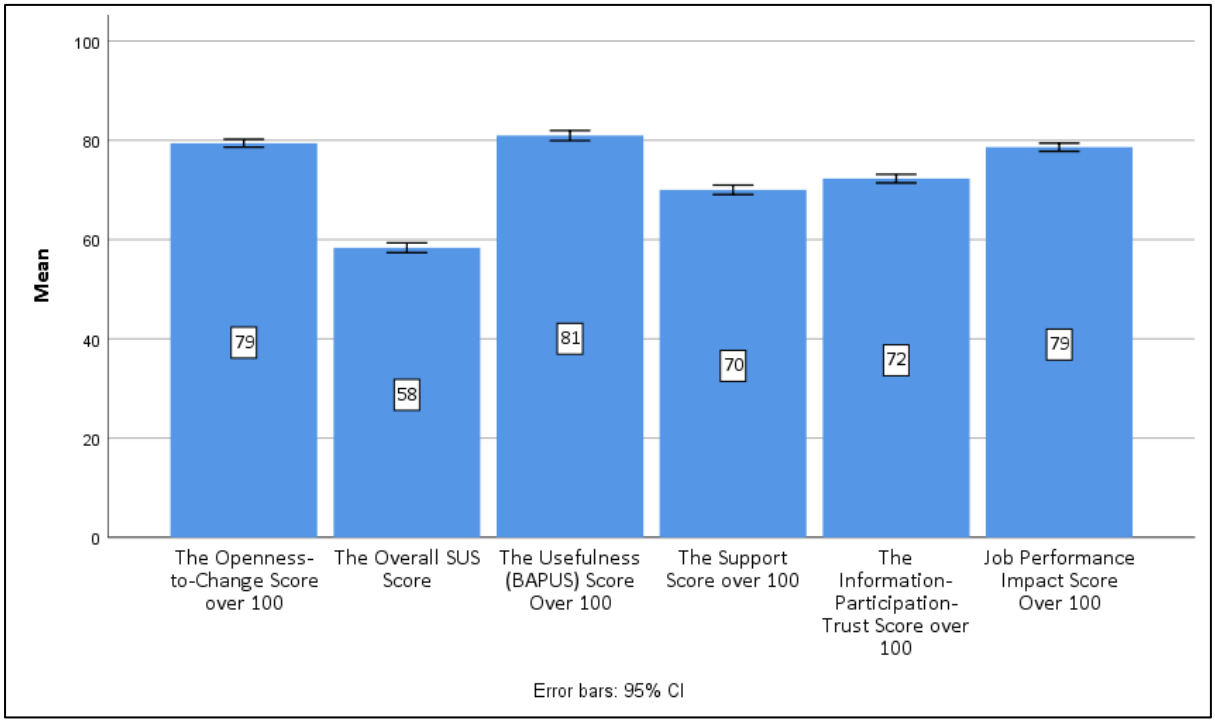

Figure 4.3. The mean scale scores for the constructs of interest in this research project

The relatively higher scores of Openness to Change, BAPUS, and JPIS given in Figure 4.3 are generally in line with my and teammates' expectations, perhaps with the exception of Openness to Change, for which a more neutral outcome could be expected. With Support and IPT Scores around 70, our interpretation as the team was that these points could need improvements, but still not as a priority. The SUS Score, on the other hand, has emerged as the point to be identified as the priority focus of an improvement initiative.

Now from this point forward, the results as per each construct will be provided, followed by the analysis of the potential factors of Openness to Change, helping to identify actions to be taken at the workplace.

Openness to Change

A well-established openness-to-change scale from the literature (Miller, Johnson & Grau 1994; Susskind, Miller & Johnson 1998) has been used as the measure of openness to change. (Please see Section 4.1.4.2 for more details on this).

The overall score has been calculated by following the steps below (This is the method used for all the other scales in this survey as well, with the only exception being the SUS, which has a slightly different calculation method of its own):

- Take the sum of the scores of all the scale items for each respondent as the respondent's score,
- Then get the arithmetic average per respondent of these scores to find the mean score.
- Then, only for the purposes of achieving a result over 100 to facilitate comparison between multiple measures (e.g., Figure 4.3), divide this score by 30 (because there are 6 items in this scale, the maximum score that can be achieved is 30 = 6*5) and multiply the result by 100.

The overall score calculated this way is 23.82 (i.e., 79.4 over 100), which is also the score computed automatically as the scale mean by IBM SPSS Statistics v24, the software used for the purposes of this research project.

Concerning the reliability of the scale, the Cronbach's Alpha Coefficient is 0.746 (~75%,), which indicates an acceptable level of reliability (Garson 2016).

As for the item scores, the scores for the three negatively-worded items (i.e., the items 2, 3 and 6), which are reverse-coded, are lower than the scores for the positively-worded items. For example, the score for the first item, which is "I would consider myself open to the changes that the implementation of QlikView brought to my method of information access." is 4.19, whereas the score for the second item, which is "Right now, I am somewhat resistant to the changes regarding my method of information access that has come with the implementation of QlikView applications." is 3.44. In more general terms, all the positively-worded items have scores above 4, whereas all the negatively-worded items have scores below 4 (Please see Appendix 7. Statistical Analysis Results for the Openness to Change Scale for the statistical analysis results of the Openness-to-Change scale). Appendix 7. Statistical Analysis Results for the Openness to Change Scale

This could point to that our internal users who responded to the questionnaire have found it easier to agree or strongly agree with the positively-worded statements than to disagree or strongly disagree with the negatively worded ones. In the context of this research project, this could mean that our users would generally find themselves open to the changes that come with QV, while they would not that easily rule out some kind of resistance towards that very same changes. This can make more sense when considered together with the usefulness and usability scores, of which usefulness gets a relatively higher score where the usability score indicates some room for improvement (The relation between these constructs is analysed later in this section.).

From a values perspective, as it has its place in the existing theory that people can give some importance to conflicting value traits although not expressing opposing values as value states on a single occasion (Skimina et al. 2019), it could be argued that this discrepancy between the users' responses towards positively and negatively worded items can be stemming from their internal conflicts between openness-to-change values and conservation values, leading them to agree more strongly with the positively worded items, while not very strongly disagreeing with the negatively worded items.

Usability (SUS)

The score for the SUS, which has been computed according to the original method given by Brooke (1996), is 58, for which the maximum score could be 100. As this is also a well-established and widely used scale for the purpose of measuring usability (Brooke 2013), a good level of reliability could be expected for this scale as well. In line with this expectation, the Cronbach's Alpha Coefficient for this scale has been computed as 0.838 (83.8%), which can be taken as the indicator of a good level of reliability (Please see Appendix 8. Statistical Analysis Results for the SUS for the related statistical analysis results of SUS).

The question was then what the score of 58 really meant for us. On the face of it, it could be considered as a less than satisfactory score over 100; however, a bit more elaboration was required to base this judgement on. The benchmark in Figure 4.4 below, which is adapted from the benchmark originally given by Bangor, Kortum and Miller (2008), has been helpful to have a better understanding of where we stood in terms of usability, according to our internal users' evaluations by using SUS. Without delving deeper into the details of this usability benchmark study, our score, which is 58, seems around the "ok" range in one benchmark. We would need to achieve a SUS score of around 70, at least, to be able to say that we have a really good or acceptable level of usability with our QV dashboard applications.

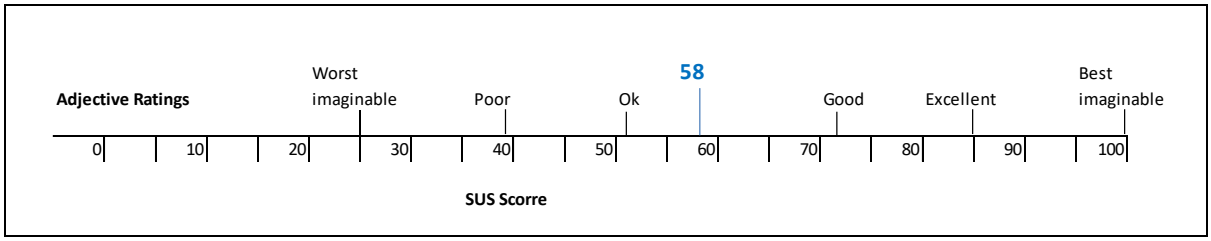

Figure 4.4. A comparison of mean SUS scores by quartile and adjective ratings
(Bangor, Kortum & Miller 2008)

This evaluation concerning the usability of our QV dashboard applications was also more or less in line with our expectations on this topic. During our team meeting on 10 May 2016 to exchange our expectations from this survey, a common concern among all of my 5 team members at that time was that users would somehow express their concerns with the complexity of the dashboard applications. According to my notes of that meeting, my teammates mentioned the presence of some -perhaps- unnecessary tables and charts, the high number of dashboard applications and sheets within them, some inconsistencies between the figures in the dashboards and the same figures on some manually distributed reports as some major culprits for this expectation. My own view was no different as well. Eventually, the results represented by the SUS score look to have confirmed our view in this sense.

As the extent to which our internal users find our dashboard applications usable is a very important factor in their adaptation to the changes coming with this new platform for interacting with data, the relation of this construct, among others, with the construct of Openness to Change would be a major focus area to explore.

Usefulness (BAPUS)

The BAPUS score of 81 (Please see Figure 4.3), as a score over 100, looks adequate to claim that our internal users generally tend to find our QV dashboard applications useful in meeting their information requirements. Since this is also another Likert scale from the AR Cycle-1 Questionnaire, a score around 80 over 100 corresponds to a score around 4 over 5, according to the initial coding of the responses, indicates that the respondents tend to "agree" with positive statements and tend to "disagree" with the negative statements in the scale.

As the items used in this scale are mostly self-generated ones, though having been inspired by my readings and conforming to the general principles of questionnaire design mentioned in Section 4.1.4.3, reliability of this scale required additional focus. This is because a good reliability score would be very important to support confidence in the findings based on this scale as the items were not sourced directly from the literature. As such, this scale can be a candidate for further research with a view to becoming an established scale to measure the usefulness of similar business analytics platforms, applicable in wider, at least similar, contexts. In this context, the Cronbach's Alpha value of 0.961 (96,1%) indicates a very strong reliability (Garson 2016) for BAPUS.

In the item-by-item examination of BAPUS results to see whether there are any attention points as per the items, it should be noted that all but one of the items have scores just around or higher than 4, with the only exception being the fourth item of the scale. This item asks the users

whether the dashboard applications on QV are updated at an adequate frequency. It has a mean score of 3.72, which is relatively lower than the scores for the rest of the items. This may give a hint regarding where to focus on to achieve an even better usefulness for our internal users (Please see Appendix 9. Statistical Analysis Results for the BAPUS for the related statistical analysis results of BAPUS).

Support

The Support score has been computed as 70 over 100, which, in our view, may indicate a by and large satisfactory status with the user support we provide to our internal users, though with some room for improvement. As for the reliability of this two-item scale, the Cronbach's Alpha Coefficient has been computed as 0.966 (96.6%), which indicates a very good level of reliability (Please see Appendix 10. Statistical Analysis Results for the Support Scale for the related statistical analysis results of the Support Scale).

Concerning scoring for each of the two items, the mean scores are the same, with 3.5 over 5 (i.e., 70 over 100) for both of the two. This means that our internal users tend to agree with the statements that they can get adequate support and they can get support in a timely manner regarding our QV dashboard applications, but this agreement is relatively less strong when compared to -say- that for the BAPUS. This may also be related to the SUS score, which indicates room for improvement in terms of usability, as it could be argued that the requirement for support may also be decreased through improved usability.

IPT

The score for the IPT Scale has been computed as 72. Similar to our view on the Support Scale, this is also a score that can indicate a satisfactory perception by the users regarding the extent to which they think that:

- They have been informed about the changes coming with the QV platform,
- They have been able to participate with their opinions being taken into consideration, and
- They trust the team behind the new platform.

The Cronbach's Alpha Coefficient has been computed as 0.893 (89.3%), indicating a strong reliability (Garson 2016). This is a good sign for the reliability of this scale, particularly considering that this scale is also a self-generated one, although the items have been inspired by similar items from the literature (Please see Appendix 4. AR_Cycle-1 Questionnaire Items with Details for details.).

As for the item-by-item results of the IPT scale, the last item of the scale, which is aimed to measure the extent to which our internal users trust the team behind the QV platform, emerges as the one with a relatively higher score, with a score of 3.86. The scores for the other four items are all around ~3.50, which also indicate that our internal users generally tend to agree with the statements that:

- They have been being adequately informed, and
- Their ideas have been taken into consideration (Please see Appendix 11. Statistical Analysis Results for the IPT Scale for the related statistical analysis results of the IPT Scale);

however, given the mean scores are still below 4.00 for each item, we can still find room for improvement here, too. This may be related to our not-fully-structured approach to the change management aspect of this new BA platform (i.e., QV) implementation (Please see Table_4_1 for a self-evaluation on this approach.).

JPIS

The score for the JPIS has been computed as 79. As a score very close to 80 over 100, which would correspond to a score very close to 4 over 5 according to the initial coding of the data, this indicates that our internal users tend to agree with the positive statements concerning the impact of our QV dashboard applications on their job performance.

Regarding the scores as per each of the 3 items in this scale, particularly the first item, which asks to what extent the respondents agree or disagree with the statement that QV dashboard applications have been helpful for them to improve their job performances, emerges as the one with the highest score among the 3 items, with a score of 4.11. The remaining 2 items also have scores just below 4.00, given as 3.88 and 3.81, respectively.

As for reliability, the Cronbach's Alpha Coefficient has been computed as 0.649 (64.9%) for this scale. This indicates a relatively lower reliability for this scale when compared with the other scales used in this research project; however, it still indicates an acceptable level of reliability, as it is above the common cut-off (i.e., 0.60) (Garson 2016). This relatively lower level of reliability can perhaps partially be due to the fact that the three items making up this scale have been scattered across the questionnaire, unlike the other scales, for all of which the items were given together as a set. This was a decision we had taken together with my academic advisor with a view to improving the likeliness of getting a realistic measure of JPIS, also considering the relatively fewer number of items included,

since this scale score is planned to be the dependent variable representing an important focus of our change initiative (i.e., having a positive impact on the performances of our internal users and through this on the performance of our Bank) (Please see Appendix 12. Statistical Analysis Results for the JPIS for the related statistical analysis results of the JPIS).

Open-ended Response

The aim of this open-ended item in the questionnaire is to have an opportunity to gain some deeper insights into our users' perceptions of our QV dashboard applications and/or the way we (i.e., myself and my team members, who are my direct reports) serve them in a more general sense. According to the results, 53.4% of the respondents provided some kind of feedback by answering this question whereas the remaining 46.6% simply put meaningless characters or phrases like "no comment" just to be able to proceed with the questionnaire as providing a response to all items was required.

To analyse the qualitative data that have been collected through this item, I first worked with MS (Microsoft) Excel, together with my team members, to examine all the comments in detail and explore this data to have an idea of potential keywords for coding. As such, I collaborated with my team members for the analysis of this qualitative data from the responses to the free-text feedback item in the questionnaire used for this research cycle. We did not have pre-defined keywords although we could probably identify some meaningful keywords based on our experience with the audience, topic, and previous informal feedback via emails, phone calls, etc., as we preferred to keep a more open mind and let the keywords emerge from within the data. Proceeding with this approach, a total of 76 keywords emerged. Each of the responses may have one or more of these 76 keywords assigned to itself, depending on the content of the response. Then, I used a free software, Wordaizer, to generate word cloud charts along with frequency tables to visualise the results. As given in Figure 4.5 below, the two main keywords that catch attention can be identified as "useful" and "complicated".

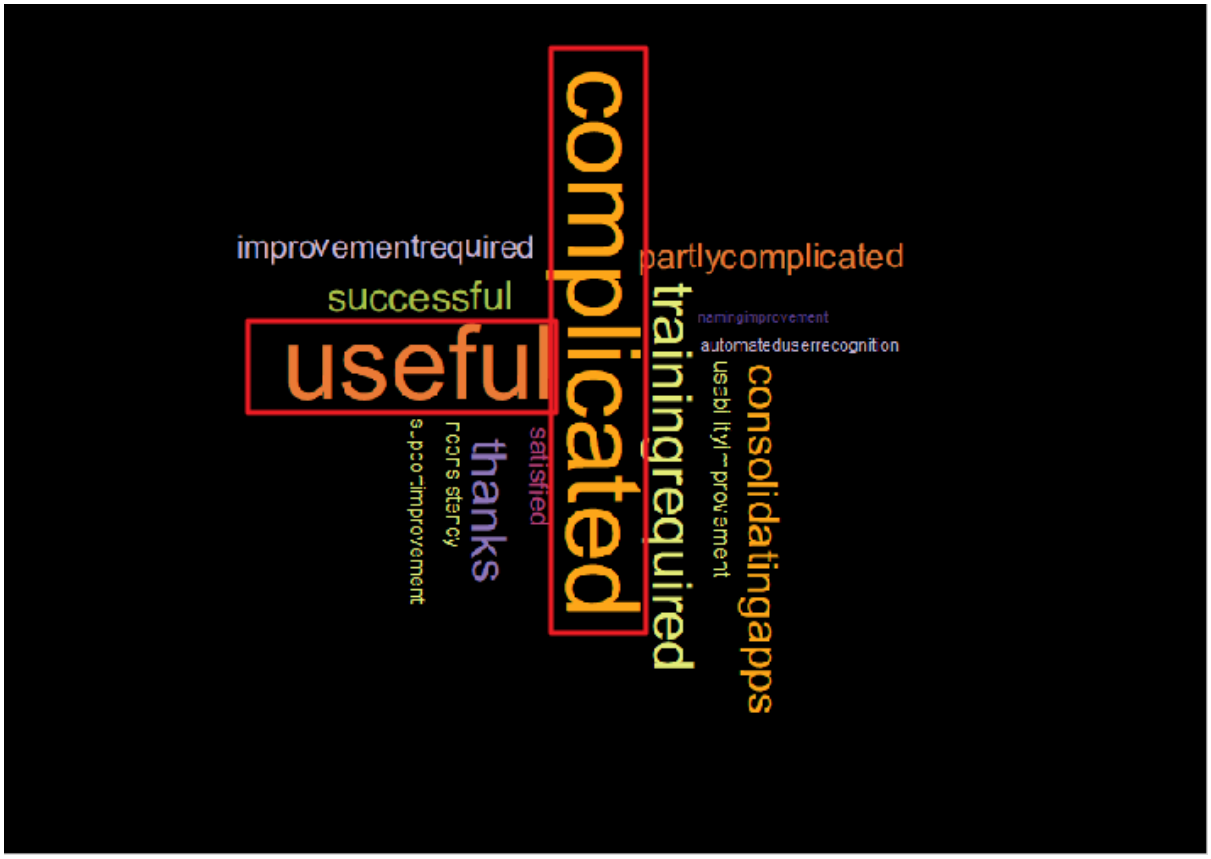

Figure 4.5. Keyword word cloud for the open-ended item responses

In addition to identifying keywords so that we could categorise the data to facilitate analysis, we also jointly assigned a code for the "mood" of each response, considering the rhetoric used by the respondent. We had 3 possible mood values to choose from for each response: Positive, Negative, and Neutral. This was for us to have a better understanding of not only what our users say but the way they say it i.e., their feelings and attitudes in this context. Those who did not provide a response to this item at all have not been categorised, so reported as "null", as we did not have written feedback for those cases. Examples of the users' feedback to which we have assigned mood information are given below:

<u>Mood positive:</u>

"[QV] is a successful application, thanks to those who have contributed to the creation of such an application; however, I think that improvements towards increasing the frequency of the updates will be good." (CS_1, my translation)

Mood negative:

"There are now too many fields of information on QV, I am now confused to find which information is in which field [on QV]" (CS_22, my translation)

Mood neutral:

"I think that some applications can be made simpler" (CS_504, my translation)

With this approach, the mood information was null for 46.6% of the respondents. As for the rest, a majority (21.6%) had a positive mood, 19.2% had a neutral mood, and 12.6% had a negative mood when giving free-text feedback on our QV dashboard applications and our services in a more general sense (Please see Table 4.9 for the frequency distribution of mood.).

Table 4.9. The frequency distribution of mood

	Frequency	Percent	Valid Percent	Cumulative Percent
Null	482	46.6	46.6	46.6
Positive	224	21.6	21.6	68.2
Negative	130	12.6	12.6	80.8
Neutral	199	19.2	19.2	100
Total	**1035**	**100**	**100**	**-**

One last categorisation we performed on this qualitative feedback data was about whether the response included any suggestion for us or not. This was for me and my team to be able to filter those responses including a suggestion and evaluate the suggestions. We only counted specifically stated, concrete suggestions as "suggestion" in this context, therefore eliminating those phrases like "tidying up required", "should be more user-friendly", etc. With this approach, we have found that 30.1% of the respondents provided suggestions in their feedback (Please see Table 4.10 below).

Table 4.10. The frequency distribution of suggestion yes/no

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	312	30.1	30.1	30.1
No	723	69.9	69.9	100
Total	1035	100	100	

These results from the open-ended response seem to be in line with the clues that we have received through the SUS and BAPUS scores, with a relatively higher BAPUS score and an around-benchmark-average SUS score, which can also be seen as indications of a useful platform with some issues on the usability aspect (i.e., related to complicatedness).

To further examine the relation between SUS and BAPUS scores and the open-ended feedback, SUS and BAPUS have been examined across different categories of the mood of the open-ended responses. As this "mood" data reflects our (mine and my team's) perceptions as we read through the responses, this analysis can also provide some kind of double-check, as we would expect higher SUS and BAPUS scores for those observations with a positive mood than that of those with negative mood. As given in Table 4.11 below, the results seem to be in line with these expectations. According to these figures, BAPUS mean score increases from 73.18 to 80.04 and then to 84.87 as the mood changes from negative to neutral and then to positive; similarly, SUS mean score also increases from 46.60 to 56.80 and then to 64.41 as the mood changes from negative to neutral and then to positive. Even when we include the scores for "null" mood data observations, the highest scores are still from those observations with a positive mood.

Table 4.11. SUS and BAPUS scores vs. mood

X12_Mood		**The Usefulness (BAPUS) Score Over 100**	**The Overall SUS Score**
Positive	Mean	84.871	64.410
	N	224	224
	Std. Deviation	16.412	16.862
Negative	Mean	73.180	46.600
	N	130	130
	Std. Deviation	18.730	18.919
Neutral	Mean	80.045	56.800
	N	199	199
	Std. Deviation	15.054	14.187
Null	Mean	81.600	59.340
	N	482	482
	Std. Deviation	16.078	14.023
Total	**Mean**	**80.951**	**58.350**
	N	**1035**	**1035**
	Std. Deviation	**16.637**	**16.194**

At this point, a first step towards a main message has been established: The users tend to find our QV dashboard applications useful; however, they do not find the same applications adequately usable (i.e., they tend to find them complicated). Along with this, at least among those who provided us with an open-ended response, a majority looks to have responded with a positive mood, which could naturally be an important aspect regarding their attitudes towards the changes coming with this new way of interacting with data.

These initial findings are important as the users' feelings and attitudes towards this new means of information access is a critical step in the realisation of further changes, as explained in Section 2.5.

With this view, the relationship between the users' openness to change and other constructs such as SUS, BAPUS, and IPT will be analysed in the following section, including the potential impacts of the related changes on the users' job performances.

4.1.4.4.3. Hypothesis Testing

Considering our implementation of a new BA platform, QV, and new interactive dashboards on that platform as a kind of organisational change effort involving new technology implementation, the users' openness to change would be a very important point to be focused on so that the expected benefits could be realised from this change initiative. These benefits would be improved efficiency and effectiveness in information access, which could eventually lead to improvements in the job performances of the users. In order for this to be possible, we would need to focus on how to better support the adoption of this new way of information access.

As mentioned earlier, in Section 4.1.4.1, openness-to-change as a higher order value has an influence on employees' change-oriented organisational citizenship behaviour. In relation with this statement, employees need situational stimuli to express their values, such as the openness-to-change values, with their behaviours (Seppala et al. 2012).

In this context, the more our users would be open to the changes coming with this initiative, the more widespread adoption would be possible. Therefore, it would be important to be able to create the right stimuli to trigger our internal users' openness to change values towards the changes related to our business actions and interventions.

Considering the explanations above, Openness-to-Change has been identified as the dependent variable in the first step of the data analysis.

Then, as the employees' (or users, in the context of my research) participation in the change effort, their trust in management and supervisors, and the information (or communication) they receive concerning the change effort are mentioned as potential factors on the employees' attitudes towards organisational change (Devos, Buelens & Bouckenooghe 2007; van den Heuvel, Schalk & van Assen 2015; Walker, Armenakis & Bernerth 2007; Simoes & Esposito 2014; Wanberg & Banas 2000; Ertürk 2008), I hypothesised that there would be a positive relationship between IPT and Openness-to-Change. When doing this, considering the context and purposes of this research project, I inquired the users' trust in the team behind the new BA platform instead of management or supervisor, as we are the ones who have been leading and communicating this change effort at all levels of the organisation.

Continuing with Openness-to-Change as the dependent variable, I also hypothesised that Usability, Usefulness, and Support would have a positive relationship with Openness-to-Change. This means that the more usable and useful our users find the new platform, and the more they agree to the idea that they have received adequate support regarding their adoption of the new BA platform as the means for information access, the more open they would be towards the changes coming with the implementation of that platform. This hypothesis is based on the idea that usefulness and usability of the platform along with the support they receive would help users get what they require from the new BA platform and do this more easily, thus leading to more positive attitudes towards the changes in their information access. In making this hypothesis, I was inspired by the concepts of change appropriateness, personal valence, self-efficacy, and social support as potential factors with an impact on the employees' attitudes towards organisational change, which are defined as below:

- Appropriateness: The perception of how the proposed change initiative will ensure that the organization addresses the gap explained between the organisation's current state and the desired state (Armenakis, Harris & Feild 2000). As such, it is closely related to the perception of usefulness as part of the cognitive component of the attitudes towards change (Bouckenooghe 2010)

- Personal Valence: The benefits of the change effort that would be relevant for an employee personally (Walker, Armenakis & Bernerth 2007),

- Self-Efficacy: The extent to which employees believe that they would be able to handle the coming changes and continue to perform well in their jobs in the face of these changes (Wanberg & Banas 2000),

- Social Support: The presence of another party for an employee to contact to be able to get information, encouragement, reassurance, etc. (Wanberg & Banas 2000).

Consequently, the 4 hypotheses below have been tested in the first step of the analysis, by using Multiple Linear Regression Analysis function on IBM SPSS 25:

H1a: There will be a positive relationship between the users' evaluation of Usability and Openness-to-Change. That is, those users who report higher Usability scores will tend to have higher Openness-to-Change scores.

H1b: There will be a positive relationship between the users' evaluation of Usefulness and Openness-to-Change. That is, those users who report higher Usefulness scores will tend to have higher Openness-to-Change scores.

H1c: There will be a positive relationship between the users' evaluation of IPT and Openness-to-Change. That is, those users who report higher IPT scores will tend to have higher Openness-to-Change scores.

H1d: There will be a positive relationship between Support and Openness-to-Change. That is, those users who make more positive Support evaluations will tend to have higher Openness-to-Change scores.

In Step 2, the extent to which the changes coming with our new BA platform were having an impact on the users' perceived job performances has been analysed. For this purpose, I hypothesised that usability (SUS) and usefulness (BAPUS) of the new BA platform, along with IPT and Support, would have positive relationships with JPIS; however, these relationships would be mediated by the users' Openness-to-Change. Hence, the hypotheses below have been tested in this second step, again by using the Multiple Linear Regression Analysis function on SPSS 25:

H2: The impacts of Usability, Usefulness, IPT, and Support on Job Performance Impact will be mediated by Openness to Change.

H2a: There will be a positive relationship between the users' evaluation of Usability and Job Performance Impact. That is, those users who report higher Usability scores will tend to have higher Job Performance Impact scores.

H2b: There will be a positive relationship between the users' evaluation of Usefulness and Job Performance Impact. That is, those users who report higher Usefulness scores will tend to have higher Job Performance Impact scores.

H2c: There will be a positive relationship between the users' evaluation of IPT and Job Performance Impact. That is, those users who report higher IPT scores will tend to have higher Job Performance Impact scores.

H2d: There will be a positive relationship between the users' evaluation of Support and Job Performance Impact. That is, those users who report higher Support scores will tend to have higher Job Performance Impact scores.

H2e: There will be a positive relationship between Openness to Change and Job Performance Impact. That is, those users who report higher Openness to Change scores will tend to have higher Job Performance Impact scores.

Identifying a mediation effect requires that (Baron & Kenny 1986);

- The predictor (i.e., the independent variable) must have an impact on the mediator variable,
- The predictor must have an impact on the outcome (i.e., the dependent) variable,
- The mediator variable must have an impact on the outcome variable,
- The impact of the predictor on the outcome variable must be of a smaller size when both the predictor and the mediator are included in the model than when the predictor is used alone.

In light of these hypotheses, the proposed model is given in Figure 4.6 below.

On the other hand, although the 4-step approach by Baron and Kenny (1986) is deemed to be very useful for understanding the fundamentals of the mediation analysis and for the illustration of the concept of mediation, mediation will be tested through the analysis of the effect sizes for the purposes of this research project, due to some limitations[8] of the 4-step approach and it having been replaced by effect size analyses in more contemporary studies (Field 2017; Kenny 2021).

[8] Discussions of these limitations are beyond the scope of this thesis; however, interested readers may refer to these two resources for the details: Field (2017); Kenny (2021).

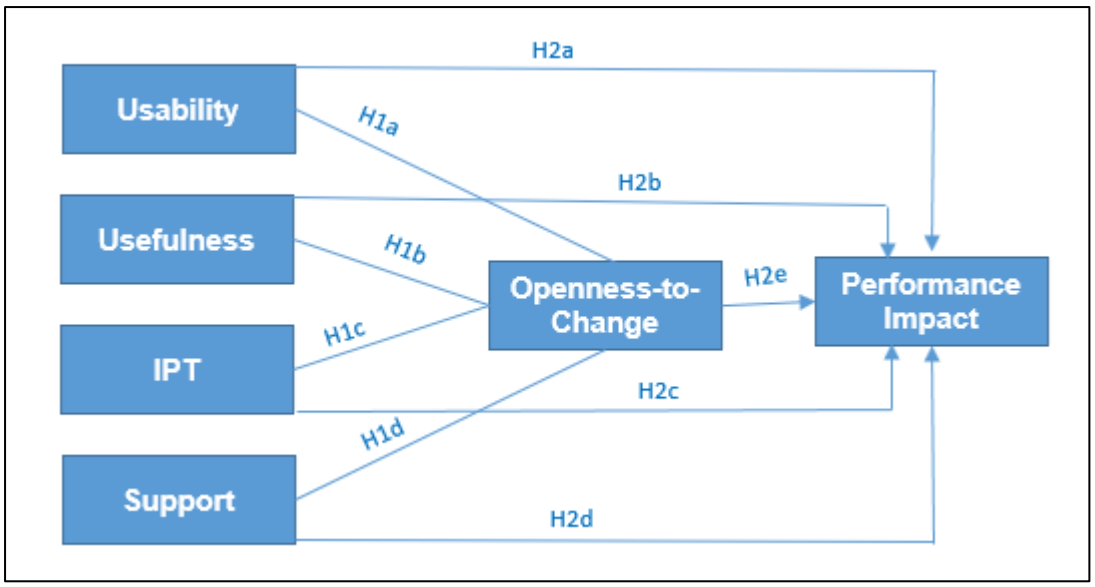

Figure 4.6. The proposed model

The following part of this section continues with the results of these analyses, by which our actions at the workplace will be informed. Then, a reflective section on the overall process of the AR Cycle-1 as I experienced it will follow.

The details of the statistical analyses of these hypothesis tests are provided in Appendices, along with some brief methodological commentary, as these details are not the main focus of this research project and the DBA thesis, which focus on the workplace interventions and related organisational changes.

Multiple Linear Regression Analysis

Step 1

Three of the four hypotheses (H1a, H1b, and H1c) were supported, whereas one of them (H1d) was not supported. (Please see Table 4.12 below for the significance test results, and Appendix 13. Statistical Analysis (Multiple Linear Regression) Results for the Step-1 Hypothesis Tests for the rest of the analysis output.).

Table 4.12. Descriptive Statistics for the Variables in Multiple Linear Regression Analysis Step-1

	Descriptive Statistics					
	Number of Observations	**Mean**	**Std. Error of Mean**	**Median**	**Min**	**Max**
The Overall SUS Score	1035	58.345	0.503	57.500	0.000	100.000
The Usefulness (BAPUS) Score Over 100	1035	80.666	0.518	80.000	20.000	100.000
The Support Score over 100	1035	70.019	0.484	70.000	20.000	100.000
The Information-Participation-Trust Score over 100	1035	72.278	0.438	76.000	20.000	100.000

Table 4.13. Model Summary Statistics for Multiple Linear Regression Analysis Step-1: Dependent Variable OTC, Independent Variables SUS, BAPUS, IPT, and Support

ANOVA[a]					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	28183.004	4	7045.751	49.122	.000[b]
Residual	147735.257	1030	143.432		
Total	**175918.261**	**1034**			

a. Dependent Variable: The Openness-to-Change Score over 100

b. Predictors: (Constant), The Information-Participation-Trust Score over 100, The Usefulness (BAPUS) Score Over 100, The Support Score over 100, The Overall SUS Score

The "Sig." value, which is given as .000 <= α = 0.05 threshold, in Table 4.13 above indicates that the model is meaningful at 95% confidence level. In other words, the null hypothesis "H_0: None of the independent variables has an impact on Openness to Change" has been rejected.

Table 4.14. Model Coefficients and Significance Test Results for the Hypotheses in Multiple Linear Regression Analysis Step-1

	Unstandardized Coefficients	Std. Error	Standardized Coefficients	Sig.
	B		Beta	
(Constant)	53.287	2.437		0.000
The Overall SUS Score	0.229	0.027	0.284	0.000
The Usefulness (BAPUS) Score Over 100	0.102	0.025	0.130	0.000
The Support Score over 100	-0.044	0.027	-0.052	0.110
The Information-Participation-Trust Score over 100	0.105	0.032	0.113	0.001

For the hypothesis H1a, the null hypothesis was "H_0: There is no significant relationship between Usability (The Overall SUS Score) and Openness-to-Change". This null hypothesis has been rejected due to the significance value given in the "Sig." column of Table 4.14 for the Overall SUS Score is 0.000, which is below the $\alpha = 0.05$ threshold. Thus, it could be stated at 95% confidence level that there is a statistically significant relationship between Usability and Openness-to-Change.

Similar interpretation can be made for the test of hypotheses H1b and H1c on the same grounds:

- It could be stated at 95% confidence level that there is a statistically significant relationship between Usefulness (BAPUS) and Openness-to-Change.
- It could be stated at 95% confidence level that there is a statistically significant relationship between IPT and Openness-to-Change.

As for the relationship between Support and Openness to Change, the null hypothesis of "H_0: There is no significant relationship between Support and Openness-to-Change" could not be rejected as the Sig. value for Support has been computed as 0.110, which is larger than the $\alpha = 0.05$ threshold. As such, the hypothesis H1d was not supported.

Step 2

Six hypotheses have been tested in Step 2. Of these 6 hypotheses, 5 hypotheses related to the factors' effects on JPIS were supported, whereas the hypothesis concerning the mediation effect of Openness-to-Change was partially supported. (Please see Table 4.16 and Table 4.17 below for the significance test results, and Appendix 14. Statistical Analysis (Multiple Linear Regression) Results for the Step-2 Hypothesis Tests for the rest of the analysis output.).

Table 4.15. Descriptive Statistics for the Variables in Multiple Linear Regression Analysis Step-2

	Descriptive Statistics					
	Number of Observations	**Mean**	**Std. Error of Mean**	**Median**	**Min**	**Max**
The Overall SUS Score	1035	58.345	0.503	57.500	0.000	100.000
The Usefulness (BAPUS) Score Over 100	1035	80.666	0.518	80.000	20.000	100.000
The Support Score over 100	1035	70.019	0.484	70.000	20.000	100.000
The Information-Participation-Trust Score over 100	1035	72.278	0.438	76.000	20.000	100.000
The Openness-to-Change Score over 100	1035	79.411	0.405	80.000	23.333	100.000

Table 4.16. Model Summary Statistics for Multiple Linear Regression Analysis Step-2: Dependent Variable JPIS, Independent Variables SUS, BAPUS, IPT, Support, and OTC

ANOVA[a]					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Regression	126337.786	5	25267.557	421.201	.000[b]
:Residual	61729.031	1029	59.989		
Total	**188066.817**	**1034**			

a. Dependent Variable: Job Performance Impact Score Over 100

b. Predictors: (Constant), The Openness-to-Change Score over 100, The Support Score over 100, The Usefulness (BAPUS) Score Over 100, The Overall SUS Score, The Information-Participation-Trust Score over 100

The "Sig." value, which is given as .000 <= α = 0.05 threshold, in Table 4.16 above indicates that the model is meaningful at 95% confidence level. In other words, the null hypothesis "H_0: None of the independent variables has an impact on JPIS" has been rejected.

Table 4.17. Model Coefficients and Significance Test Results for the Hypotheses in Multiple Linear Regression Analysis Step-2: Dependent Variable JPIS, Independent Variables SUS, BAPUS, IPT, Support, and OTC

	Unstandardized Coefficients	**Std. Error**	**Standardized Coefficients**	**Sig.**
	B		**Beta**	
(Constant)	6.717	1.907		0.000
The Overall SUS Score	0.140	0.018	0.169	0.000
The Usefulness (BAPUS) Score Over 100	0.466	0.016	0.575	0.000
The Information-Participation-Trust Score over 100	0.152	0.021	0.159	0.000
The Support Score over 100	0.072	0.018	0.083	0.000
The Openness-to-Change Score over 100	0.125	0.020	0.121	0.000
Dependent Variable: Job Performance Impact Score Over 100				

According to these results given in Table 4.17 above, it could be said at 95% confidence level that all of the 5 independent variables (i.e., SUS, BAPUS, Support, IPT, Support, and Openness-to-Change) have significant impacts on the dependent variable JPIS, as all the significance values are given as 0.000, which is well below the threshold of α = 0.05, leading the corresponding null hypotheses to be rejected. This means that the hypotheses H2a, H2b, H2c, H2s, and H2e are supported.

As for the mediation effect of Openness-to-Change, the PROCESS Macro v4.1 (Hayes 2022) has been installed and used on SPSS 25, so that the effect size along with the significance of the mediation effect could be analysed (Hayes 2013; Field 2017; Kenny 2021). As the PROCESS Macro normally runs only with one predictor at a time, the analysis has been conducted by running the macro four times with Openness-to-Change as the mediator, one of the factors (i.e., SUS, BAPUS, IPT, and

Support) as the predictor, and the remaining three factors as the covariates at each of the four iterations (Hayes 2013). The results of this analysis are given in Table 4.18 and Table 4.19 below.

Table 4.18. Results of the Mediation Analysis: Total and Direct Effects

Predictor	Effect Type	Effect	se	t	p	LLCI	ULCI
BAPUS	Total effect	0.479	0.016	29.411	0.000	0.447	0.511
	Direct Effect	0.466	0.016	28.908	0.000	0.434	0.498
SUS	Total effect	0.169	0.018	9.578	0.000	0.134	0.204
	Direct Effect	0.141	0.018	7.830	0.000	0.105	0.176
IPT	Total effect	0.165	0.021	7.835	0.000	0.124	0.207
	Direct Effect	0.152	0.021	7.307	0.000	0.111	0.193
SUP	Total effect	0.067	0.018	3.713	0.000	0.031	0.102
	Direct Effect	0.072	0.018	4.084	0.000	0.038	0.107

Dependent: JPIS (Job Performance Impact Score)
Mediator: Openness to Change

According to the table above, all the total and direct effects have been found to be significant at 95% confidence level ($P = 0.000 < \alpha = 0.05$), which is in line with the results of the regression analysis conducted previously in Step 2 (Please see Table 4.13). According to the b-coefficients for the total effect sizes, which have been given as the "Effect" and which can be used directly for comparison as there is no difference in the units of measurement across the predictors, BAPUS has the highest effect on JPIS with an effect size of 0.479, followed by SUS, IPT, and SUP, respectively.

Table 4.19. Results of the Mediation Analysis: Indirect Effects

Predictor	Indirect Effect	BootSE	BootLLCI	BootULCI
BAPUS	0.013	0.004	0.005	0.022
SUS	0.029	0.006	0.017	0.041
IPT	0.013	0.006	0.003	0.025
SUP	-0.005	0.004	-0.013	0.001

Dependent: JPIS (Job Performance Impact Score)
Mediator: Openness to Change

According to the Table 4.19 above, the indirect effects of BAPUS, SUS, and IPT on the outcome variable, JPIS, through the mediator, Openness-to-Change, have been found to be statistically significant as the bootstrapped confidence intervals for these predictors do not include zero (Field 2017). Considering that the indirect effect sizes are relatively small when compared with the total and direct effect sizes in Table 4.18, a conclusion can be made that the mediator, Openness-to-Change, has small but statistically significant mediation effects between these three predictors (i.e., BAPUS, SUS, and IPT) and the outcome variable, JPIS.

As for the remaining predictor, Support, which does not have a statistically significant impact on the mediator, Openness-to-Change, as has been established previously (Please see Table 4.12), the bootstrapped confidence interval includes zero, indicating that Openness-to-Change does not have a mediation effect between Support and the outcome variable, JPIS (Field 2017).

Table 4.20 below provides a summary of the results of the hypothesis tests. Additionally, having established the results of all the hypothesis tests for this research cycle, Figure 4.7 below presents the final model with only those relationships which have been found statistically significant at 95% confidence level.

Table 4.20. A summary of the hypothesis test results

#	Hypothesis	Hypothesis	Result
1	H1a	There will be a positive relationship between the users' evaluation of Usability and Openness-to-Change. That is, those users who report higher Usability scores will tend to have higher openness-to-change scores.	Supported
2	H1b	There will be a positive relationship between the users' evaluation of Usefulness and Openness-to-Change. That is, those users who report higher Usefulness scores will tend to have higher openness-to-change scores.	Supported
3	H1c	There will be a positive relationship between the users' evaluation of IPT and Openness-to-Change. That is, those users who report higher IPT scores will tend to have higher openness-to-change scores.	Supported
4	H1d	There will be a positive relationship between Support and Openness-to-Change. That is, those users who make more positive Support evaluations will tend to have higher Openness-to-Change scores.	Not Supported
5	H2	*The impacts of Usability, Usefulness, IPT, and Support on Job Performance Impact will be mediated by Openness to Change.*	Partially Supported

#	Hypothesis	Hypothesis	Result
6	H2a	There will be a positive relationship between the users' evaluation of Usability and Job Performance Impact. That is, those users who report higher Usability scores will tend to have higher Job Performance Impact scores.	Supported
7	H2b	There will be a positive relationship between the users' evaluation of Usefulness and Job Performance Impact. That is, those users who report higher Usefulness scores will tend to have higher Job Performance Impact scores.	Supported
8	H2c	There will be a positive relationship between the users' evaluation of IPT and Job Performance Impact. That is, those users who report higher IPT scores will tend to have higher Job Performance Impact scores.	Supported
9	H2d	There will be a positive relationship between the users' evaluation of Support and Job Performance Impact. That is, those users who report higher Support scores will tend to have higher Job Performance Impact scores.	Supported
10	H2e	There will be a positive relationship between Openness to Change and Job Performance Impact. That is, those users who report higher Openness to Change scores will tend to have higher Job Performance Impact scores.	Supported

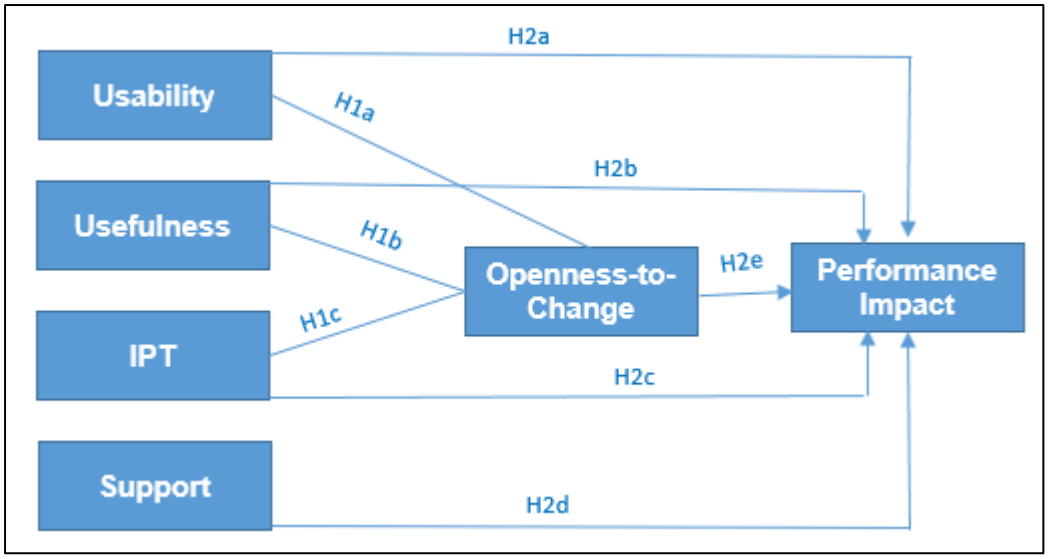

Figure 4.7. The final model, representing all the significant relationships

SEM (Structural Equation Modelling)

The hypotheses given in Table 4.20 have also been tested by using another statistical analysis method, SEM (Structural Equation Modelling), with a view to providing an alternative analysis of the model established via Multiple Regression Analysis previously in this Chapter and then proceeding accordingly, informed by the evaluations of these two alternative analyses.

SEM, as an extension of GLM allowing for the testing and visual display of more than one regression equations at the same time and bringing together a collection of statistical analysis methods such as regression analysis and factor analysis, enables the incorporation of measurement error of the observed variables into the model as separated from the random error term (i.e., disturbance or noise), thus providing an enhanced view of the relationships between the constructs in question (Blunch 2013; Malkanthie 2015).

The SEM Analysis has been performed on IBM SPSS AMOS 25.0.0 software by starting with the proposed model (Please see Figure 4.6 for the proposed model) as the structural model and the relationships between the questionnaire items (i.e., manifest variables) and their related constructs (i.e., latent variables) as the measurement model. Then, the analysis proceeded by imposing further restrictions and incorporating covariances into the model, with a view to improving the model fit. Care has been taken throughout the analysis to ensure that these improvements were not based solely on the empirical findings as provided in the analysis outputs but also on substantive thinking on the structures of and the potential relationships between the constructs in question so that the final model would not only be one with a better fit to the data but also theoretically meaningful and thus potentially more generalisable (Blunch 2013) (Please see Appendix 15. Statistical Analysis (SEM) Results for the Hypothesis Tests for more detailed explanations).

The results of the SEM analysis conducted as such are provided below, with more details provided in Appendix 15. Statistical Analysis (SEM) Results for the Hypothesis Tests . Selected absolute fit indices and selected comparative fit indices have been used to evaluate the model fit. This approach enabled the researcher to evaluate the model fit both according to the results of the Chi-Square analysis as an absolute fit measure, and in comparison with the saturated and independence models (Blunch 2013; Malkanthie 2015).

Table 4.21. The Model Fit Statistics for the SEM Analysis

Model	Chi-Square	Degrees of Freedom	Sig.	GFI	PGFI	CFI	RMSEA	LO 90	HI 90	PCLOSE
Default (Final) Model	2832.405	525	0.000	0.861	0.718	0.920	0.065	0.063	0.068	0.000
Saturated Model	-	-	-	1.000	-	1.000	-	-	-	-
Independence Model	-	-	-	0.196	0.185	0.000	0.217	0.215	0.219	0.000

According to the Chi-Square results given in Table 4.21 above, the model does not seem to fit well to the data as the Sig. value of 0.000 < α = 0.05 suggests rejecting the null hypothesis of "Ho: There is no significant difference between the model and the data (real life)" . As such, a conclusion can be made at the 95% significance level that there is a statistically significant lack of model fit. However, as the sample in question is reasonably large with 1.035 cases and the Chi-Square test statistic tends to generate results leading to the rejection of the null hypothesis in large samples (Blunch 2013), it could be helpful to evaluate the overall model fit by taking into account the other statistics given in Table 4.21 as well. As such, the GFI (Goodness-of-Fit Index), which can be considered as the SEM equivalent of Linear Regression's R-Square, has been computed as 0.861, suggests a more satisfactory model fit, as it looks closer to the upper bound (i.e., 1.000), although values closer to 0.95 would indicate a better fit. Similarly, the PGFI (Parsimony-based Goodness-of-Fit Index) has been computed as 0.718, suggesting a good model fit, as values above 0.60 for parsimony-based fit indices are usually considered to be indicating a satisfactory model fit (Blunch 2013). The CFI (Comparative Fit Index) value of 0.920 looks below the suggested minimum threshold of 0.95 for a good fit (Blunch 2013); however, it is still above 0.90, a value that can also be considered as satisfactory (Malkanthie 2015), so it could be argued that it may still indicate a somewhat satisfactory fit. Lastly, the RMSEA (Root Mean Square Error of Approximation) has been given as 0.065, slightly over the recommended threshold of 0.05, but below the maximum threshold of 0.10 (Blunch 2013), indicating a satisfactory fit to some extent, even if not an outright good fit. (The LO 90 and HI 90 values define the 95% confidence level for the RMSEA statistic, and the PCLOSE value is the Sig. value given for the test of whether RMSEA in the population is below 0.05 or not. The figures indicate that RMSEA in the population is not below 0.05.)

Considering the explanations on the model fit above, the model has not been found to be fitting confidently well to the data; however, the fit is not far from satisfactory. As such, the

interpretation of the analysis results will continue below with the model estimates. Considering the research objectives, only the estimates concerning the relationships between the constructs in question (i.e., the structural model) will be given here in this section. (For a more detailed view of the analysis results, please see Appendix 15. Statistical Analysis (SEM) Results for the Hypothesis Tests).

Table 4.22. Estimates of the Model Coefficients with Standard Errors, Critical Ratios, and the P-values

Dependent Variable	Independent Variable	Estimate	S.E.	C.R.	P
OTC	SUS	0.485	0.214	2.265	0.024
OTC	BAPUS	0.116	0.027	4.22	***
OTC	Support	-0.016	0.027	-0.614	0.539
OTC	IPT	0.394	0.056	7.085	***
JPIS	USB	0.29	0.13	2.237	0.025
JPIS	BAPUS	1.017	0.024	41.543	***
JPIS	Support	-0.01	0.016	-0.613	0.54
JPIS	IPT	-0.038	0.033	-1.148	0.251
JPIS	d1	0	5.71413E+16	0	1
JPIS	OTC	0.04	0.022	1.795	0.073

According to the figures in Table 4.22 above; SUS, BAPUS, and IPT have statistically significant effects on OTC at the 95% confidence level, meaning that users' OTC in the face of the organisational changes related to the implementation of QV platform has been impacted by the usability of the platform, the usefulness of the platform, and their evaluations of IPT. Among these factors, SUS has been found to be the one with the largest nominal impact on OTC with a coefficient estimate of 0.485, followed by IPT and BAPUS, respectively. The impact of Support has not been found to be statistically significant as the P-value for Support has been computed as 0.539, which is below the threshold of $\alpha = 0.05$. These results look in line with the results of the previous Multiple Regression Analysis with the same constructs, which were given in Table 4.12.

As for the factors having an impact on JPIS, the impacts of SUS and BAPUS have been found to be statistically significant at 95% confidence level, with BAPUS having the largest nominal impact with a coefficient estimate of 1.017. It is followed by SUS, which has a coefficient estimate of 0.29.

The impacts of OTC, IPT, and Support on JPIS have not been found statistically significant at 95% confidence level[9]. This result partially diverges from the results of the previous Multiple Regression Analysis with the same constructs, which were given in Table 4.13, where the impacts of all 4 factors (i.e., SUS, BAPUS, IPT, and Support) were found to be statistically significant. On the other hand, it is similar in that the two factors with the highest nominal impacts on JPIS have been found as SUS and BAPUS in both of these analyses.

Considering the parallel findings for the impacts on OTC and partially parallel findings for the impacts on JPIS, and taking into account the not-good-enough fit of the model in SEM Analysis as opposed to a satisfactory R-Square in the Multiple Regression Analysis, a decision has been made to proceed with the final model given in Figure 4.7 for the rest of this research project.

The next section will continue with an overall commentary on the results so far and my reflections on this entire research cycle (i.e., AR Cycle-1).

4.1.4.5. Research Conclusions from Fieldwork

Quantitative research methods were used for the purposes of this first AR cycle with an aim of collecting relatively high-level data on a wide range of topics from openness to change to usability to job performance impact. To this end, a survey has been conducted with a large number of participants from across the Bank as a starting point to guide us through not only the business actions to be taken but also concerning the further stages of this research project.

The data collection method used for this purpose was an online questionnaire, and the methods for data analysis were statistical data analysis methods, including both descriptive statistics and predictive statistical modelling. Through these means, insights have been gained into the users' perspectives concerning the changes they had been experiencing thanks to our QV implementation, and a model has been established regarding the impact of various factors such as usefulness and usability on our users' openness-to-change and eventually on their job performances.

These insights have informed our decisions at the workplace concerning the next steps to serve our users' decision support requirements and also further research activities, which will be covered in the following sections for the next AR cycles.

[9] Another factor, d1, represents the error term (disturbance) of the model in which JPIS is the dependent variable. Its coefficient has been estimated and not fixed, because the variance of it has been fixed to a small positive value instead, due to having been computed as a small negative value initially (Blunch 2013).

4.1.5. Reporting Findings

4.1.5.1. Academic and Business Outcomes

From an academic perspective, the relationships between the usefulness and usability aspects of a new BA platform along with the users' perceptions of IPT and the users' openness-to-change have been established in the context of a new BA platform implementation and ongoing usage across a mid-scale private bank in Turkey.

The results presented in the previous section indicate significant relationships between SUS and BAPUS, the usability and usefulness scales used in this research project, and our internal users' (i.e., Bank employees') openness-to-change. As these relationships are all positive relationships tested through causal models in statistical terms, this may lead us to an important finding that the more usable and useful the users find the new BA platform, the more open they would be towards the changes coming with that platform, which would be a strong point for us to consider when deciding on our workplace actions informed by this project. Similarly, the results show that the more the users think that they are informed on and are able to participate in the change effort and the more they trust the team behind the effort, the more open they would be towards the related changes.

Based on this finding, it could be argued that the perceived usefulness and usability of the BA platform together with IPT can act as the situational stimuli (Skimina et al. 2019) to activate people's openness-to-change values (i.e., of those with openness-to-change value traits) in the context of this research project, informing potential business actions towards improved adoption of the new means of information access. These actions can be those to be taken directly on the platform or in relation to it, with a view to enhancing the overall user experience so that the users' openness to the related changes in their workplace activities, processes, resource allocations, and -potentially- organisational structures could be supported.

In their book on IT-related change management, Lientz and Rea (2004) also point out this aspect from the resistance point of view, mentioning the necessity to learn a new software or system among the triggers of resistance to change, so business actions aimed at improving usability and usefulness can serve the purposes of tackling with resistance-to-change.

This was generally in line with our expectations, as we would normally expect the users to be more willing to adapt to the changes coming with this platform if they found it to be useful for their

requirements and usable enough to ensure a smooth user experience without losing much time clicking around.

Similarly, the relationship between Openness-to-Change and Job Performance has also been established in this context. This relationship has also been found to be a positive one, meaning that the more open our internal users are towards the changes coming with the new BA platform, the more positive impact they would report on their job performances. This is another important point as at the end of the day all of what we have been doing at the workplace is to support an increase in the overall performance. Furthermore, the mediation effects of Openness-to-Change between the 3 factors (Usefulness, Usability, and IPT) and Job Performance have also been significant, meaning that these 3 factors' impacts on Job Performance are partially mediated by Openness-to-Change.

On the other hand, these mediation effects have been found to be relatively small in terms of effect sizes though being statistically significant. The results indicate stronger direct relationships than indirect (mediated) relationships between Usefulness, Usability, and IPT as independents and Job Performance as the dependent. This means that the more our users find the new BA platform useful and usable the more positive impact they would report on their job performance. For the other predictor, Support, no statistically significant mediation effect of Openness-to-Change has been found at all.

From a business perspective, the main output from this first action research cycle is the direct feedback we have received from our internal users. This was the first time we had such an interaction with our users all across the Bank. Considering the results presented in the previous section, the main message we should get is that we look strong in terms of providing the users with the information they require to support their decisions and actions; however, we have room for improvement regarding the usability of our new BA platform (and the dashboards we develop on that platform). This conclusion is supported by the findings presented in Section 4.1.4.4.2, where we have observed a much higher score for BAPUS than SUS (Please see Figure 4.3). This was also in line with the users' open-ended feedback, on the analysis of which the two most common themes emerged were Useful and Complicated (Please see Figure 4.5).

The users' mean openness to change score is relatively much higher than the mean SUS score, indicating that our users tend to have positive attitudes toward the changes coming with our new BA platform, even in the face of issues with the usability.

Following from this point, another important output from a business perspective is the information on where to focus our efforts on in order to be able to improve our users' experience with

QV. According to the findings given in the previous section, focusing on the usability aspect would require not only working directly on more user-friendly designs, but also improving our communications with the users in terms of providing support, information, and opportunities to participate in the process of delivering the changes coming with QV.

Considering these together, combining them with our experience within the Bank and prioritising the potential actions accordingly, we have decided with my team members and our Director, the CDO, to take a concrete step directly towards improving usability. For this purpose, we performed a market search to find a credible consultancy company to guide us through the process towards achieving better usability on QV.

The business actions taken following the findings of this action research cycle are summarised below:

- Hire a strong UX consultancy company to delve deeper into the users' perspectives on usability and then do the necessary and/or suggested revisions on our dashboard applications on QV. (These revisions could be simple adjustments or entire new versions or even new applications to replace existing ones.) (Please see Section 4.2, which is the section dedicated to the next AR Cycle)

- Organise the Business Analytics and Information Management department into two new units (i.e. within the same department), the BA Applications and BA R&D (Research and Development) units, so that one part would be better able to focus on further research and development activities (e.g. new requirements in light of the new technologies, platforms, organisational approaches, etc.) while the other would be better able to focus on maintaining and improving our existing dashboard applications and carrying out the related daily tasks.

- Improve our communications with the users to the extent possible, through "did you know this?" type regular emails.

- Be more flexible regarding some common requests from our users where we could see quick wins.

Of these main points, the first one was the first time ever that we as a team would collaborate with a UX consultancy, meaning that our approach was shifting from a generally content-only one, putting more emphasis on the usability aspect than ever before. This was due to our raised awareness

towards facilitating the realisation of desired changes through better adoption of the new means of information access.

Having established the academic and business outcomes of this action research cycle, the next section will proceed with my reflections on the entirety of this research cycle, providing explanations of what I have learned and how I will adjust my future actions in accordance with this learning. For this purpose, I will use the IDEA (Identification, Description, Evaluation, Action) framework provided during the previous modules of this DBA programme (Shepherd 2014b).

4.1.5.2. What Have I Learned?

Identification

In this section, I will critically reflect on my experience with the AR Cycle-1 research activities I performed (including the literature review I performed prior to the actual start of this first research cycle). The time frame for these activities covers the period from January 2016 to August 2016, involving predominantly my own efforts, with the collaboration of my team members and my colleagues from other departments at the Bank when required, all under the guidance of my academic advisor.

Description

I started this research project with a review of the BA and Change Management literatures once I had decided on the research topic, which emerged directly from within my workplace activities, together with my academic advisor. Then I gave a start to my AR Cycle-1 research activities with the preparation of a comprehensive questionnaire as the means of data collection for this research cycle. During the preparation process of this questionnaire, I acted under the guidance of my academic advisor, consulted the relevant literature, and collaborated with my team members and my colleagues from the Responsible Department. During the process, I kept in contact with my team members to collect their expectations and comments regarding the survey. I also asked for their collaboration during the fine-tuning of the questionnaire items and the pilot distribution stage.

Once the survey data had been collected, I started to work on the analysis of this data set. At this stage, I studied on my own, consulting the relevant literature when required. After the completion of the data analysis, it was time to interpret and report findings. I performed this mostly with my own efforts; however, collaborated with my team members and the CDO for the preparation of internal

and external presentations (i.e., to the CFO, the upper management in general, and at an external UX conference).

Evaluation

Personal Development as a Researcher and a Professional

I started this DBA Programme with almost no background on social sciences. The concept of "reflection" and its relationship with learning has been a completely new area for me. Hence my readings on work-based learning, practice-based research, and insider research prior the start of my research cycle activities proved very useful.

Through these studies, I realised that there were other legitimate ways of doing research than quantitative research methods, that subjectivity had its place in research as well as objectivity so long as it was subject to critical review were among the most important points to consider.

Regarding my review of the change management literature, at first, I was surprised to see that there was vast amount of research focusing on various types of organisational change initiatives, and there were many discrepancies even in the definitions of concepts among different researchers in this context. Then I came to connect this situation with what I had realised during my readings on practice-based research, so I started to consider these discrepancies more positively as different points of view allowing flexibility and more open-mindedness to me as well, rather than inconsistencies leading to troublesome ambiguities.

I have learned about different types of organisational change such as incremental or radical change, as well as different points of view on the phases of an organisational change effort, for many of which the roots could be found in the phases given by Lewin (1947a; 1947b). I also learned about different levels of change such as individual change and team change (Coghlan & Brannick 2014), as well as different contents of organisational change, including IT-related organisational change. These enabled me to look at our own efforts at the workplace from a different perspective, the change management perspective, and evaluate our own activities through making the connection with these points in the literature. Through this lens, I realised that we needed to focus more consciously and informedly on the change management aspect of our workplace activities, as the mostly technical efforts we had been focusing on were only part of the entire picture.

When I started to prepare the questionnaire, I noticed that I would need some good level of prior reading about how to develop a questionnaire which would be a good fit for the purpose, though I had studied survey design and research methods courses and had found the opportunity to put my

knowledge into practice by taking part in a few real-life projects during my BSc and MSc programmes at Hacettepe University.

To summarise, I have found a great opportunity to develop my researcher as well as and professional skills throughout the process, covering areas from organisational change management and business politics to usability, user experience, and questionnaire design.

Team Development and Change

My team which is working on the workplace project have been a team of 4 to 6 employees throughout the research process. Collaboration between myself and my team, and also my Director, was mostly for the business actions, with the research activities being my own endeavours carried out alone, under the guidance of my academic advisor. In this sense, my experience so far have been another realisation of the type of collaboration described by Coghlan and Brannick (2014), where the core action research project is a collaborative effort whereas the thesis action research project is carried out independently by the researcher.

This type of collaboration, with all of us as a team participating in the business decisions and actions but myself working alone on the research activities was not only due the nature of the AR mentioned above [i.e., my methodology not being PAR (Participatory Action Research) but AR], but also this was an intentional choice of direction by myself, possibly as an expression of my values in the context of this research project. With self-enhancement strongly emphasised over self-transcendence in my values (Please see Appendix_1_My_Personal_Values for details), I have kept the decisions on the aims, methodology and direction of the research project at my own hands, only under the guidance of my academic advisor and module leader. This may have limited the team members' involvement in the research activities and their development in this sense.

This approach to collaboration notwithstanding, throughout the AR Cycle 1, I have observed team members' rising awareness concerning the wider impact of our visual analytics initiatives in terms of the changes they are leading to in the working habits of employees across the Bank, particularly the fact that the focus of their own efforts was mostly on the technical aspects of the job with a task-oriented approach. As this task-oriented approach could be prone to confusion with a results-oriented approach sometimes, the research process proved constructive in that my team members have become more aware that the ultimate result would not be achieved simply by developing new visual analytics applications but only by the realisation of the wider-scoped changes in the working habits, processes, resource allocations and perhaps organisations of our internal clients.

Organisational Change and Collaboration

This research project has started as an action research investigation into an ongoing, open-ended, and change-oriented workplace project.

As the workplace project was aimed at bringing about change in the way people use data and information across the Bank through the implementation of visual analytics applications, with a view to significantly improving decision support and leading to more efficient processes, it involved a strong technical dimension. Therefore, it could be considered a good fit for an action research project, as information systems discipline is considered to be a suitable field for action research thanks to its applied nature (Baskerville & Wood-Harper 1996).

Adopting a similar approach, a reflective account of the pre-DBA steps of the workplace project has been provided in Section 4.1.4.1, evaluating the business actions vis-à-vis the change management approach given by Lientz and Rea (2004) for IT-related change projects. The highly technical, implementation-oriented focus of the pre-DBA steps emerged as the main discrepancy from the aforementioned approach, with the management of change having not been taken as a separate effort. The implementation had been successful in making the new means of information access an integral part of the business-as-usual across the Bank; however, it had not made the desired impact on the wider picture, which is people's ongoing usage of legacy methods in parallel, consequently not-fully-realised efficiency gains.

Apart from my team, participation of the employees across the Bank was enabled only through the online questionnaire, which could be considered a relatively weaker form of participation when compared to some qualitative research methods; however, the comprehensive content of the questionnaire, including a free-text feedback item, has turned out to be useful to enable a large number of participants to have their voices heard at once.

Another collaboration extending beyond my own department was with the Responsible Department for the purposes of questionnaire design and implementation. For the colleagues there, too, this was a first in that someone from outside their department would come with a questionnaire draft at hand, including well-established scales from the literature, asking for collaboration. At the beginning, they were quite positive and responsive. As the meetings progressed, on the other hand, I found the manager rather defensive against my proposed questionnaire, insisting on that it was way too long and no one would like to complete it. This process proved tricky, with me holding my grounds when it came to trying to interfere with the established scales from the literature, and with some questionnaire design principles, and them insisting on their usual ways of preparing and distributing

questionnaires. Similar issues also emerged on the ownership of the questionnaire-related communications across the Bank and the collected data.

Referring to a record in My Research Diary dated around the days of these discussions, I would feel as if I were in movie, a character in it, where I lived some events that I read in a book, saw in a picture or in my dream before they became reality. This was because every single encumbrance I faced in this research process up to that point was indeed written in the books and papers I had read about practice-based research. This did not help me fully avoid or very easily overcome such challenges, but for sure made me aware of these beforehand and helped me deal with these in a conscious, constructive, and solution-oriented manner.

Action

I will start to formally plan and manage the changes we will introduce as part of our efforts. The first step towards this will be to start regular communications with our internal users across the Bank through emails.

As for the next steps of this research project as well as our future initiatives at the workplace, the findings from this research cycle have been communicated to my team members, the CDO, and the CFO accordingly so that we will adjust our way of doing our job in a way that will enable us to manage the change effectively; not only through proper planning of the technical efforts but also through better communication, collaboration, and change-related planning.

Regarding collaboration with other departments across the Bank, I will act more in advance to avoid delays due to possible contentious issues. I will also stay calmer while still holding my position when I have supporting evidence so that I could avoid triggering additional resistance. I will also keep in mind that organisational politics does have a role whenever we need to collaborate with other departments and try to create or demonstrate benefits of the joint effort to the collaborating party so that they can be more willing to take part in a supportive manner.

4.2. Action Research Cycle – II (the spin-off cycle)

This section describes and reflects on the immediate actions planned and taken following the conclusion of AR Cycle-1, which constitute the AR Cycle-2.

We were able to act promptly to initiate and proceed with this new cycle, as no additional data collection or analysis for the “Diagnosis” step of this cycle was necessary. This is because a

diagnosis had already been made, based on the findings from the AR Cycle-1 research activities, particularly based on the evaluation of the survey data. Hence the name “the spin-off cycle”.

Although the workplace activities of this cycle cover a timespan of around 1 year, this will be a relatively short section, with the diagnosis coming from the previous cycle, and the workplace interventions bringing relatively small-scale, incremental changes, though with an impact on almost all of our internal users.

4.2.1. Diagnosis

Considering the findings explained in the previous section, one important area where an intervention was needed stood out: The usability of our dashboard applications.

As explained in the previous section in detail, the users were generally satisfied with the usefulness of these dashboard applications; however, the usability score indicated room for improvement.

As the potential impact of usability on the users’ openness-to-change and on the user’s job performance has also been found to be statistically significant (please see the Figure 4.7), a decision was made to start a new sub-project, which was a workplace project aimed at delving deeper into the usability issue and making necessary improvements.

As the business action of this cycle is focused on the usability aspect of the UX regarding our dashboard applications, it could be useful to elaborate a bit more on the conceptualisation thereof, so that the aim, actions, and the outcomes of this cycle can be clearer for all readers.

The definitions of UX and usability is another area where there are a number of different approaches in the literature as to how these two terms are defined and how they are related to each other. There are occasions where the aforementioned two terms can be used interchangeably as well (Stewart 2015; Mirnig, Meschtscherjakov, Wurhofer, et al. 2015; Hassenzahl & Tractinsky 2006; Wikipedia n.d.).

Alben (1996), for example, defines user experience covering “all the aspects of how people use an interactive product” (Alben 1996, p.12), such as the feelings they have using it, to what extent they understand the way it works, and to what extent it serves their purposes.

Hassenzahl and Tractinsky (2006) state that the term UX has been used to convey a range of meanings from traditional usability to a broader approach to include “beauty, hedonic, affective, and

experiential aspects of technology use" (Hassenzahl & Tractinsky 2006, p.91), whereas they draw a narrower picture for the term usability, which they mention as a task-and-work-related paradigm. They also present their own definitions for UX as "a consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc.)" (Hassenzahl & Tractinsky 2006, p.95). The Authors continue to say that UX goes beyond the aim of remediating usability problems to create outstanding quality experiences, as a problem-free experience would not be the same thing as an outstanding experience.

Similarly, Stewart (2015) also points to a comparison by many people between the terms usability and UX, mentioning usability as a narrower-focused concept focusing on the ease-of-use of systems, whereas UX "goes beyond usability by including such issues as usefulness, desirability, credibility, and accessibility" (Stewart 2015, p.949).

In light of the conceptualisations above, which have been included here not as the results of a full literature review but as examples to have a better understanding of the various definitions in the literature, it can be derided that UX is a broader concept to convey the meaning of an overall evaluation of the user's experience with a system, including usability, which itself is focused on how easy it is to use a system and on remediating any problems thereof.

In-line with this understanding, a professional resource, The Usability Body of Knowledge, defines UX as "Every aspect of the user's interaction with a product, service, or company that make up the user's perceptions of the whole.", with UX design as a discipline being concerned with various elements including layout, visual design, brand, interaction, etc., whereas it defines usability as "the degree to which something - software, hardware or anything else - is easy to use and a good fit for the people who use it." (Usability Professionals Association 2010).

Standardised definitions of these concepts (i.e., UX and usability), in the face of varying definitions mentioned above, have been given by ISO (International Organisation for Standardisation) as below:

User Experience:

"User's perceptions and responses that result from the use and/or anticipated use of a system, product or service.

Note 1 to entry: Users' perceptions and responses include the users' emotions, beliefs, preferences, perceptions, comfort, behaviours, and accomplishments that occur before, during and after use.

Note 2 to entry: User experience is a consequence of brand image, presentation, functionality, system performance, interactive behaviour, and assistive capabilities of a system, product or service. It also results from the user's internal and physical state resulting from prior experiences, attitudes, skills, abilities and personality; and from the context of use." (ISO 2019)

Usability:

"Extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

Note 1 to entry: The "specified" users, goals and context of use refer to the particular combination of users, goals and context of use for which usability is being considered.

Note 2 to entry: The word "usability" is also used as a qualifier to refer to the design knowledge, competencies, activities and design attributes that contribute to usability, such as usability expertise, usability professional, usability engineering, usability method, usability evaluation, usability heuristic." (ISO 2019)

Here in the definitions given by ISO, too, UX has been defined with a broader view, covering all the aspects of a user's experience with a product, system, or service, including not only the usage-related outcomes such as comfort and accomplishments but also the user's emotions and beliefs. Additionally, UX is considered as a consequence not only of the capabilities of the system, product or service such as functionality, performance, interactive behaviour, etc. but also of the user's certain attributes such as skills, experience, personality, etc., along with the context of use.

Usability, on the other hand, is considered as a more easily delineated and narrower-focused concept, indicating an outcome of to what extent specified users can accomplish specified goals effectively, efficiently, and satisfactorily by using a particular product, system or service. Though not explicitly stated, it can be derived from these two definitions that usability is included within the overall concept of UX.

Many resources in the usability literature refer to this definition of the term by ISO when doing research into the sub-constructs of usability or developing tools aimed to measure the usability of various products, systems, or services (e.g. Brooke 1996; Brooke 2013; Oztekin, Nikov and Zaim 2009; Kortum and Bangor 2013).

Adopting a similar approach, this definition of the term will also be used for the purposes of this research project, with its 3 sub-dimensions derivable from the aforementioned definition as effectiveness, efficiency, and satisfaction. This looks suitable for the business context, where we would definitely like to see our internal users accomplish specific tasks (such as monitoring daily figures, budget realisation performances, investigating the causes of changes in their figures, etc.), be able to do these easily and without spending unnecessarily long time, and feel satisfied with they have done.

In collaboration with a UX consultancy, we decided that this would be the optimal approach in our professional setting, with our focus set on usability, also considering that our users' feedback on usefulness, another main pillar of the overall UX, was quite positive according to the results of AR Cycle-1 survey.

4.2.2. Planning

The general approach to the workplace project at hand would be changing in my department, shifting from an almost entirely content-focused approach to a more balanced one where we would focus on usability in a more systematic way. To this end, a decision has been made with the CDO's approval to seek professional help in identifying the points for improvement and to better equip ourselves as a team on the concept and applications of usability.

Based on the findings of the previous AR Cycle, improving the usability of the dashboard applications could be an effective means to the end of supporting the users' openness-to-change towards the changes related to the usage of interactive dashboard applications for information access.

Following an investigation into the UX consultancy market via internet, we held initial discussions with a few companies and then proceeded with a formal bidding process during which the two selected companies submitted their formal proposals. In the end, a decision has been made to work with a UX consultancy in Istanbul, which also had global connections and was the organiser of an established international UX conference which was taking place annually. In the meantime, we also attended usability trainings offered by the same company.

Following the initial results from the AR Cycle-1 survey results during June-July 2016, the plan was to finalise the consultancy selection and all the procedures for the official contract before the end of summer the same year, with a view to starting the actual effort in September or October and completing by the end of the year. Work progressed by and large as planned in this respect, and a kick-of meeting with the UX consultancy of our choice was held on 1 November 2016.

As the usability tests, workshops, and the preparation of a usability guide are all business actions taken as well as the development of the new-version QV dashboard applications, these will be explained shortly in the next section, which is the section dedicated to the "taking action" step of this research cycle.

4.2.3. Taking Action

The aim of the kick-off meeting with the UX consultancy on 1 November 2016 was to nail down the details of the planning of our actions to delve deeper into the usability problems and potential remedial actions concerning our dashboards applications.

The actual start of the project happened well before this date, though, prior to all the formalities being complete, such as our initial meetings with representatives from each of the 3 business lines, which, together with their staff in the branches, made up the vast majority of our internal users. This enabled our kick-off meeting to immediately precede a workshop with attendees from all of these business lines.

The workshop took place on 03 November 2016, with the aim of preparing and deciding on personas (i.e., typical anonymous characters to represent a variety of our internal users) and the dashboard applications to be focused on as a priority. The selected dashboard applications would be the ones to be used for the usability tests in the next step. As the focus of my DBA research project is not the detailed examination of the usability issues in our dashboard applications per se, just a summary of this process will be provided here, without including details about the work that was done.

The workshop was moderated by the partner of the UX consultancy, supported by his two team members. There were attendees from each of the three business lines along with an attendee from the Performance Management.

As this workshop was part of the business action of this second AR cycle, we selected the persons to attend the workshop in a purposeful manner, with the aim of ensuring representation of each of the business lines with colleagues who would be capable of contributing to the overall effort both through their experience with QV and their knowledge and experience of their own business contexts and their field networks (i.e., people working at regional directorates and branches). I, together with my two team members, attended the workshop, but mostly stayed silent after the introduction, to let the opinions of the user-side flow freely so that we could focus on observing the process and making contributions when required. In the beginning, though, attendees were generally

silent and not very responsive, but then the discussion gained momentum when contentious issues were put on the table. An excerpt from an entry in my research diary for that day (i.e., 03/11/2016) says:

> "During the first half-an-hour or so, the participants from the business lines were generally silent, at times apparently questioning the reason for why they were at that workshop. There was a tendency in one or two of them to quickly jump to the solutions i.e., their proposed solutions in terms of content coverage and visual design rather than setting the details of the research process ahead.
>
> (…)
>
> The first discussions started when we raised the question of which sheets of which dashboard applications would be in the scope of the usability tests to be conducted.". (Özel n.d.)

At the end of the meeting, 4 personas had been identified and the dashboard applications to be used for the usability tests had been decided on. The 4 personas were: Branch Manager, Branch RM (Relationship Manager), Region/Head Office Analyst, and Corporate Banking Staff. Details concerning the underlying discussions and justifications of this selection is out-of-scope for the purposes of this DBA research project; however, it could be relevant to state that these personas were agreed on by all the attendees, following discussions throughout the workshop. Then, following the advice from the UX consultancy, we would need to identify a total of 15-16 individual users, 3-4 for each persona, to take part in the usability tests to be conducted.

In the following two weeks, we worked on finding the right people to take part in the usability tests, taking into account the varying degree of usage experience within the pools of potential test-takers for each of the 4 personas. We identified the test-takers at the end of this period, and agreed with the UX consultancy on these people, also considering their QV usage profiles.

The usability tests were conducted by the UX consultants at the selected users' workplaces (e.g. at their branches for the selected RMs) during the working hours. This was an intentional choice upon the UX consultancy's advice that it could be better to observe the users in their actual work settings so that a more realistic picture of their experiences with QV could be achieved than would be possible in an isolated test environment. All the usability tests were completed within 3 weeks, with video-recordings of the sessions and before-test and after-test interview notes taken as the data to be analysed. Then the UX consultants worked on the analysis of this data at our office for approximately two weeks. The UX consultancy delivered two outputs for us, on 29/12/2016:

- A final report of the study, and
- A usability guide for us to use as reference for our future dashboard application designs and developments.

Then, there was a short pause in this process due to the regular year-start workload, during which we focused on the maintenance and adjustments of some of our dashboard applications related to the year change, and also on coping with some additional ad-hoc requests from the business lines, which usually happens during that time of each year.

Following this period, around the start of March 2017, we started to focus on preparing the new versions of our existing QV dashboard applications, starting with the most frequently used one, which was also one of those used for the usability tests. These improvements, based on the usability report and our new usability guide, would comprise the second part of the business actions within this second AR Cycle. In the meantime, we also shared the report and the usability guide within our own Division i.e., the two departments including ours, with the approval of the CDO.

Following a 2-month effort, we replaced our most frequently used dashboard application with its new version, which was the first of those new versions to come, on 09/05/2017 and announced this via an email to all our users (Please see Appendix 16. The Screenshot of the Email Announcement of the First of Our New Version QV Dashboard Applications for a screenshot of the email. Please note that some parts of the information, including the name of the dashboard application, have been intentionally blurred for the purposes of confidentiality). Afterwards, the process continued with the rest of our existing dashboard applications. We completed the new versions of all of them by the end of 2017, having replaced the previous versions throughout the second half of the year.

To sum up, we had 2 business outcomes as a result of the business actions taken throughout this cycle:

- A usability report and accompanying usability guide-formalised internally within our Division, based on the findings from usability tests and expert evaluation of the UX consultancy,
- New versions of circa 25 dashboard applications, each one comprising a number of sheets, as a result of the UX-oriented re-design and development process, based on the usability report and the usability guide.

The actions having been briefly explained above, the next section will proceed with the evaluation step of this AR Cycle.

4.2.4. Evaluating

We had 7 principles in our new usability guide, prepared for us by the UX Consultancy, which were Efficiency, Simplicity, Ergonomics, Findability, Readability, Error Prevention, and Consistency. Without delving deeper into the details of these principles as this would be out of the scope of this DBA research project, it could be useful to mention that we adhered to the advice based on these principles in our new version development efforts, aiming to improve the usability of our dashboard applications, with all the 3 dimensions of usability as mentioned in the definition by ISO being addressed: Effectiveness, Efficiency, and Satisfaction (ISO 2019).

After enabling user access to the very first new version dashboard application, replacing the previous version, the natural question for us was how to evaluate the outcome of this action, while continuing the developments of new versions for the rest of our dashboard applications. Another questionnaire to the entire user body could be an option; however, it was yet too early for such a move if we would compare the results with that of the AR Cycle-1 questionnaire. This was because our users had already been using the QV dashboard applications for more than 3 years back when we distributed our AR Cycle-1 questionnaire, whereas it was just the first time they were experiencing with the first new version dashboard application during the current cycle. Additionally, distributing widespread questionnaires was not always our top choice from a business point of view, as many Head Office groups had a tendency do so, leading to staff across the Bank getting fed up with this kind of participation.

Instead, considering the upcoming start of the third AR cycle, two topics were included in my interview schedule with aim of getting some insights from the user-side on these new version developments. Therefore, the interviews, of which main aim was to feed the diagnosis step of the AR Cycle-3, also served the purposes of the evaluation step of this cycle.

Considering this intersection between the research cycles, the research method employed for this purpose (i.e., semi-structured interviews) are elaborated on in the section dedicated to AR Cycle 3, whereas only the results of the data analysis of the two interview items related to this cycle are given in Section 4.2.4.3 below.

4.2.4.1. Research Planning

Following the explanation above about this second cycle being a spin-off cycle, Section 4.3.1.1 explains planning of this research intervention.

4.2.4.2. Research Action/Fieldwork

Following the explanation above about this second cycle being a spin-off cycle, Section 4.3.1.2 explains the fieldwork of this research intervention.

4.2.4.3. Research Evaluation

There are two themes under the main theme Best Experiences in the interview schedule which are aimed at generating information and insights into the users' perspectives concerning the changes that we have been delivering on and through QV dashboard applications. Of these 2 themes, the first one is on the organisational changes experienced thanks to implementation and roll out of the QV dashboard applications in general, and the second one is, with a narrower focus, on the UX-oriented changes that we had been doing on the QV dashboard applications following the users' feedback during AR Cycle-1.

QV Change Overall

This main theme is aimed at delving deeper into the users' perspectives concerning the changes they experience due to the implementation of interactive dashboard applications as the new means of information access. This will be a qualitative research step on top of the mostly quantitative survey in AR Cycle1, by interviewing selected users from the Head Office.

As the recent usability improvements are also a part of the users' overall experience with a potential influence on their openness to the changes happening or expected thanks to this new platform, this main theme is included in this section, dedicated to AR Cycle-2.

The major themes that emerged concerning the overall QV-related organisational changes are given below, with more details for the most common ones included. (Only the most relevant themes from a change management perspective are included here. A complete overview of the references coded at this main theme is given in Appendix 17. Hierarchy of Nodes – QV Change Overall.)

The main importance of these views expressed during the interviews is that all the points made by the interviewees on some positive or negative aspects of the users' experience with the new platform are related to the expected, wider-scoped changes related to its better adoption, as can be noticed in wordings of the themes and/or the quotations made (Please see Section 2.5 for more on the wider-scoped changes).

QV Room for Improvement.

- Thinking that QV has a limited positive impact due to its being not-easy-to-use for everyone.

  "(…) now in my view QV is a very important tool for reporting, but umm…on the other hand I look at…well…who gets reports from QV who generates own reports or submits requests despite that is already on QV…in my view we are still not at the point where we were supposed to be. There are multiple reasons for this. One can be related to the visualisation aspect, because I see that they take it from QV, then revise it on Excel shortens something adds something removes columns then distributes it etc. This actually is a data visualisation effort. For example, if QV can bring its visuals to such a state that this effort would never be required…he/she does not generate any new data just gets what is there [QV] and then works on it….to visualise…there is something there regarding visualisation." (CS_011, Reference 1, my translation)

- Mentioning inadequate QV training.

  "Another thing that is missing in my view is that there is a fast turnover of staff in the field. Most probably we are not doing anything specifically addressing QV for our new hires. Ok there is, we might be offering something, but we do not put them through something [training] aimed at usage." (CS_011, Reference 1, my translation)

- Mentioning that QV allows only limited customisation on the user side.

- Mentioning that QV needs further usability improvements.

- Thinking that QV does not meet one's expectations.

- QV enabling the users to do their own interactive analyses.

  "umm…now QV has much more enabled us to do analyses on our own" (CS_014, Reference 3; my translation)

"well, when I look you know when you want detailed information you can reach that very easily. I think that it is user-friendly once you have gotten used to doing that drill-down etc." (CS_004, Reference 1, my translation)

- QV having a very positive impact.

  "I am sure you follow up more closely. When you look at the number of clicks there is indeed a very positive development there. Those who have joined from other banks also say this." (CS_008, Reference 1, my translation)

  "well…let me say now…you may remember as I have been in the process right from the beginning, we used to ask for the number of clicks etc. from you. Now everybody clicks that is number 1. Everybody has learned to use QV…umm…as they have learned to use it now new requests started to come from there, which is nice…we also use from time to time." (CS_003, Reference 1, my translation)

- Pertaining to the need for a shift in organisational culture.

  - Thinking that further change in the approach across the Bank should change from requesting data from someone else to self-engaging with data.

    "well, an easier way is found I say this generally for the teams across the Bank let's request something and they give it to me why should I bother to open and look myself. This approach needs to change so that QV can be used effectively. People do not prefer it unless this approach is changed. When we reject the requests on the grounds that those are already on QV they are made into using it but then they start to say things like but I do not know how to use this who will support me etc. There are these problems in my view…that is why I do not feel that change has happened." (CS_005, Reference 1, my translation)

  - Mentioning that QV has a limited positive impact due to lack of adequate standardisation of requirements on the business side.

  - Not observing significant changes coming with the QV.

  - Thinking that teams do not really want to use QV.

- Mentioning the QV team's responsiveness positively regarding fast development.

- QV has improved workplace efficiency.

- Mentioning that QV provides support for different points of view.
- QV rendering some manual reports redundant (even if they are not dropped).
- Finding QV helpful for supporting business planning, decisions, and actions.
- Finding QV very useful to get deep-dive information on a specific topic.

When the tags coded inductively during the transcription are examined, the most commonly emerging ones are:

- Self-service Analytics,
- Efficiency,
- UX
- Tool Performance,

pointing to both the positive experiences and perceived room for improvement according to the participants' perspectives.

QV Change Recent

Below are the most common themes emerged concerning the participants' perceptions -or lack of perceptions- of the UX-oriented changes that we had performed during the last one year, as of the date of the interviews (A complete overview of the references coded at this theme is given in Appendix 18. Hierarchy of Nodes – QV Change Recent.).

- QV Further Improvements Required.
    - Further tidying up and simplification required so that users can find what they need and perform their analyses more easily.

      "Now QV has really become very messy probably because there are too many requests. Probably you will be consolidating them again because there comes a request from me, another from SME Banking another from Micro SME Banking etc. but some of what we say have commonalities somewhere. If you do like open another sheet here another sheet there etc. you will probably have repetitions…probably, I say." (CS_002, Reference 1, my translation)

- Mentioning the need for better communication between the QV team and the user side.

  "For example, we used to see some information when we held meetings with you when the modules were created. But we discovered how those in the field actually use it when we dealt with it ourselves, because the field's point of view is another thing. I mean technical approach is different. That is why we transmitted it to the field through trainings. The issue here is how we can trigger curiosity that is another topic. No matter what you create on this [QV]. Making the curiosity around this happen…perhaps we need to talk about this. That [curiosity] still does not exist and this makes me sad." (CS_006, Reference 2, my translation)

- Mentioning the need for increased participation of business users on QV development decisions.

- Facing usability issues with the new version and observing resistance-to-change.

  "I am used to the old version on one hand so of course there might be some struggling [with the new versions] but as we always use it, we get used to the new one as well. But there are people who do not use as frequently as we do. You know I told you about two examples for this: A small change in the Cash Flow [a specific dashboard application] causes a backlash from the field like 'I just got used to it and then you changed again', 'why is this change just when we got used to' etc." (CS_008, Reference 1, my translation)

- Lack of a detailed view on what has recently changed on QV UX.

  "well, I do not know the details, to be honest. Let me not say anything wrong." (CS_001, Reference 1, my translation)

  "In my view, the biggest change is that you started to do different things [new dashboard applications]. I can say like this." (CS_003, Reference 1, my translation)

- Having an awareness of the recent UX improvements.

  "Well…I know that…I do not use every application, but I know that you went for some simplification, tidying-up etc. We did not observe a very significant change in Kumbara [a specific dashboard application]. Some main points we tried to do…Other than that…concerning

the ones we use most frequently; we know that you have done some simplifications etc." (CS_001, Reference 1, my translation)

- Thinking positively about the recent changes thanks to QV being simpler and easier-to-understand.

  "I see…that is very clear I have seen in the last 4 months or 6 months whatever it has become simpler for example regarding the applications I use. Büyüteç [a specific dashboard application] and the likes has become more clearly understandable those filters and gauges have become simpler. Let me not say simple but [they] have been divided into understandable categories. That is a positive change in my view…umm…but other than that I do not notice any similar change. That is the change the simplifications and having been divided into categories you know those columns to be added and filters being visible separately…that is a positive change for me." (CS_005, Reference 1, my translation)

- Experiencing improvements in the time required for solutions when problems arise.
- Having access to a wide variety of data.
- Mentioning lack of curiosity and appetite for learning across HO.
- Mentioning positively the communication with QV team.

In addition to the themes stated above, the tags generated inductively during the transcription point to an ongoing emphasis on:

- UX
- Tool performance
- Efficiency
- Communication
- Participation

As the qualitative data analysis results have been provided above for this cycle, the next section will proceed with the conclusions from fieldwork.

4.2.4.4. Research Conclusions from Fieldwork

The results of the interview data analysis indicated that while the participants generally seemed to have a positive overall view of the changes experienced thanks to the implementation of QV dashboard applications, they also seemed to point to a need for further improvement.

The positive views were mostly based on the grounds that QV had helped improve efficiency by enabling staff across the Bank interact with data to generate information themselves and that there was a wide topic area coverage together with multiple points of view.

The room for improvement, on the other hand, seemed to concentrate mostly on the need for further improvements in usability, better training, which is also related to usability, and limited flexibility for customisations on the user side so that the expected, wider-scoped changes (Please see Section 2.5 for more details) in the workplace activities of the users across the Bank could be realised to a larger extent.

Some participants also pointed to a need for a cultural change across the Bank so that staff could embrace the means to interact with data in a self-service manner instead of submitting a request and waiting for someone else to do the job.

As for the recent UX-oriented improvements, which were presented to the users with the new versions of the QV dashboard applications, one interesting finding was to see that not every participant had the awareness of these improvements to the extent that we would expect. However, in hindsight, this seems in-line with the relatively small number of feedback emails we received directly from the users upon the introduction of our new version dashboard applications. Although we received emails with both positive and negative views on these new versions, there was not an unusually high number of such feedback. As for those participants who had an awareness of the changes, their views were generally positive, some mentioning that the new versions were simpler and easier-to-use.

One participant mentioned that some users from the field were complaining about the changes and questioning the reason behind these changes when they were just getting used to working with the previous versions, pointing to a typical aspect of resistance to change for us to deal with.

In conclusion, the new versions developed as the business action of this research cycle were developed following the users' feedback on usability via the questionnaire in AR Cycle 1, and on top

of that the usability tests performed and the know-how provided by a UX consultancy; however, they did not generate either a significant praise or a backlash from the users. Usage of our QV dashboards applications continued at roughly the same levels, without us losing internal customers, and without significant changes in the usage statistics. This may be at least partly due to the incremental nature of these changes, as they can be viewed as continuous and gradual improvements rather than radical, large-scale changes (Walker, Armenakis & Bernerth 2007), and partly due to our related communication efforts, which were confined to email correspondence only.

4.2.5. Reporting Findings

4.2.5.1. Academic and Business Outcomes

From an academic perspective, this research cycle has presented important findings in the context of my own workplace, the Bank. The analysis results of the interview data indicate that some incremental changes aimed at improvements on the usability of the dashboard applications might not have generated a significant impact or even awareness on the user side to the extent that we would expect, although these changes were informed by the findings from AR Cycle-1 along with the usability tests conducted at the earlier stages of this second AR cycle.

Together with this, the comments of the interview participants who did have a higher awareness of these improvements indicated a need for further improvement, despite acknowledging that the dashboard applications have become easier-to-use with these changes. This leads me to acknowledge that usability improvements are something that we will need to do continuously, without an absolute end unlike a defined project, and together with improved communication about these changes.

Another important point is the stated need for a cultural change across the Bank so that all the efforts we put into development of easier-to-use interfaces can be completed by changes in user behaviour accordingly, as simply implementing a tool or technology would not lead to a downright change in the people's habits automatically (Cameron & Green 2009).

The experience throughout this research cycle, and the results explained above necessitated a revised, wider-scoped approach to bringing about organisational changes through visual analytics initiatives. According to the model established in the previous cycle, which is given in Figure 4.7, usability improvements could be expected to make a more significant impact on the further realisation of the related changes as usability was found to have a significant impact on the users' openness to

change. That the outcome of this cycle indicates a less-than-expected awareness on the incremental changes towards improved usability, together with the mixed feedback (i.e., both positive and negative) on the improvements made, has been the grounds for me to consider a broader picture, integrating the aforementioned model into that picture as well.

This can partly be due to that we could have put our expectations a bit too high about the changes in this cycle, despite their incremental and narrower-focused nature, expecting them to potentially lead to more significant changes in the workplace activities of staff across the Bank and their perceptions thereof (e.g. this expectation could have been realised if we had received some comments during the interviews that more manual efforts had been stopped thanks to the usability improvements on QV dashboards, freeing up resources for their core business and/or more value-added tasks.). As incremental changes are relatively smaller, continuous, and evolving interventions (Bouckenooghe 2010; Walker, Armenakis & Bernerth 2007; Coghlan & Brannick 2014), this type of changes that have taken place in the course of a 1-year period might have gone as a relatively low-profile effort in the eyes of many users.

On the other hand, one or two quotations made from the interviews earlier in this section hint at both a positive perception and a resistance to the new design, indicating that even these interventions can potentially trigger resistance to some extent. Overall, that the usage frequency has been stable could be taken as a positive indicator towards positive contribution of these improvements in time.

Another aspect to be considered could be the scope of the intervention, recalling the dimensions of change given by Lientz and Rea (2004) in their book on IT change initiatives. They present a spider chart for two generic change initiatives by marking the scale of change as per each dimension on the chart, stating that the marks on the aforementioned spider chart represent subjective judgements.

Following this example, based on personal knowledge and experience in the context of the Bank and my own job function, a subjective, retrospective judgement as per each of these dimensions could provide further understanding of the outcome, and potentially inform the following cycle. The results of this judgement are provided in Figure 4.8 below, which is based on the dimensions of change given by Lientz and Rea (2004), with underlying critical evaluations given in the following Table 4.23. (The greater the scale of change in each dimension, the greater the score assigned -from 1 to 5- representing the researcher's subjective evaluation.)

According to this evaluation, it could be verified that the business actions of this second AR cycle were relatively smaller changes with an incremental nature, carried out on one or two applications at a time, with a relatively notable impact only on two of the dimensions of change. These two dimensions are the work itself (i.e., data analytics and reporting) and the related procedures. This judgement is based on the reasoning that the UX-oriented design and technical changes in the dashboard applications have led to new interaction flows on the applications, with a view to supporting users' further adoption of these applications as the primary means of information access in their decision-making processes. The more internalised this platform is the more consequential changes we can expect in areas such as efficiency and resource allocation.

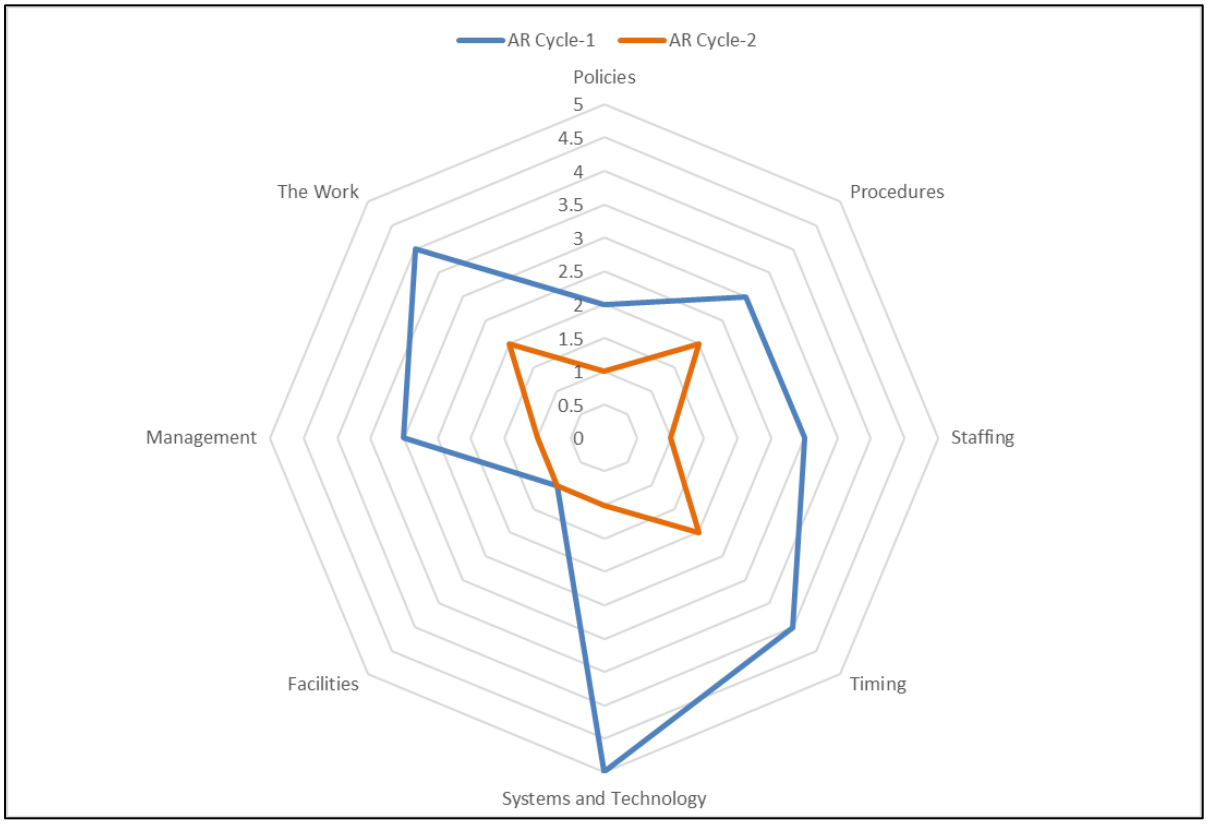

Figure 4.8. AR-1 and AR-2 changes by the dimensions of change given by Lientz and Rea (2004)

Table 4.23. A critical evaluation of the AR cycle-1 and AR cycle-2 change initiatives

Dimensions of Change	Definition	AR Cycle-1	AR Cycle-2	Status Quo (Pre-AR Cycle 1)	AR Cycle-1 (Changes & Status)	AR Cycle-2 (Change & Status)
Policies	How the work is governed	2	1	No formal data analytics and reporting policy. De facto policy of financial consistency.	De facto policy of centralised design and development of visual analytics applications. CDO Office's (formerly Management Reporting) intermediary role between IT and Business.	Limited or no change.
Procedures	How the work will be done	3	2	No formal data analytics and reporting procedures. Manual, distributed efforts. High IT dependency.	Data modelling, design, and development solely by CDO Office, with only raw data provided by IT. Democratisation of data: Dramatically increased interactive visual analysis capability on the user-side.	Limited change due to UX improvements, replaced or removed applications.
Staffing	Who does the work	3	1	Reports and static dashboards prepared by HQ and Regional Directorate staff.	Visual analytics applications are developed and distributed solely by the CDO Office. Manual reports eliminated at the CDO Office; however, continue and/or evolve across the Bank.	Limited or no change.
Timing	When the work is done	4	2	Daily, weekly, monthly periodic reports. Takes long time, as work is labour-intensive.	Most of the visual analytics applications are updated automatically on a daily basis. End users are able to interact with data momentarily.	Partial improvements in updateness
Systems and Technology	How the work is to be done	5	1	Traditional BI tool (querying and reporting). In-house report menus, developed by IT. Spreadsheets. Non-IT controlled databases (e.g., MS Access).	New enterprise business analytics platform for visual analytics in place. Spreadsheets and legacy reports co-exist with the new platform.	Limited or no change.

Dimensions of Change	Definition	AR Cycle-1	AR Cycle-2	Status Quo (Pre-AR Cycle 1)	AR Cycle-1 (Changes & Status)	AR Cycle-2 (Change & Status)
Facilities	Where the work is done	1	1	Always on premise.	Mostly on premise. Mobile access to visual analytics applications is enabled; however, not very user-friendly.	Limited or no change.
Management	How the work is directed	3	1	Regular line management, included in the BaU of staff and managers.	Visual analytics efforts managed by the CDO Office. Apart from that, regular line management, included in the BaU of staff and managers.	Limited or no change.
The Work	The work itself	4	2	Performance reports, Status reports, All static reports with very limited interaction.	Interactive visual analyses on a wide range of topics such as performance management, CRM, daily status, etc.	Limited change due to UX improvements, replaced or removed applications.

From a business perspective, this research has led us to shift our focus from a mostly content-oriented approach to UX-oriented approach in our dashboard design and development efforts. We collaborated with a UX consultancy for the first time, performed usability tests and developed a usability guide in collaboration with this consultancy. This helped us develop ourselves in another field of knowledge and expertise as a team as our focus has expanded beyond the technical aspects of designing and developing visual analytics applications.

Having developed our first new version dashboard applications based on the insights from the usability tests and in accordance with our new usability principles, I delivered a presentation at the UXISTANBUL 2017 Conference[10] to a multinational audience about our UX-oriented R&D efforts at that time, which was an opportunity to share our experience with an international audience of professionals.

During the course of this research cycle, this research and our business actions made an echo across the international group the Bank belongs to as well, making the news on the Group's intranet page on 27 November 2017 (Please see Appendix 19. The News of This Research on the Group's

[10] https://uxistanbul.org/uxistanbul17/

Intranet for a screenshot of this news), significantly supporting the Bank's and CDO Office's reputation within the group.

These were the business outcomes of this research cycle, both improved means for the users' information access, and the related internal and external communication thereof, raising our profile as the CDO Office and helping secure support for our future efforts.

4.2.5.2. What Have I Learned?

Identification

In this section, I will critically reflect on my AR Cycle-2 activities. These include deciding on the means of data collection (i.e., the semi-structured interviews), the interview schedule, my handling of the interviews, and interview data transcription and analysis. The timeframe for these activities is from September 2016 to September 2018, with the business actions having taken place between September 2016 and December 2017.

Description

In this cycle, business activities of my department were aimed at making UX-oriented changes on our QV dashboard applications informed by the findings of the previous cycle. My research activities were aimed at getting insights into the users' perceptions of these recent, UX-oriented changes, along with their experiences with the overall changes that had been coming with the implementation of QV from the beginning, to put the results better in the appropriate context.

The interview items related to this cycle in my interview schedule comprise only a small part of the interview schedule. This is because the same interviews have been used to generate data not only for the evaluation step of this cycle but also for the diagnosis step of the following cycle (i.e., AR Cycle – 3), to which a much larger part of the interview schedule is related. Two sub-topics for the purposes of this cycle in the interview schedule were included under the main theme of "Experiences (Discovery)". I let the interview participants talk freely on their experiences with the QV dashboard applications, on how they and the field staff, with whom they were in close contact, perceive the changes occurring due to our QV implementation, and on the recent UX-oriented changes that we had performed. Then I transcribed the interviews fully by using NVivo software and performed the analysis of the qualitative data by using the same software.

Evaluation

Articulating this cycle was a complicated task for me, with the diagnosis coming from the evaluation step of the previous cycle, and the evaluation step embedded in the diagnosis step of the following cycle, making this one a truly spin-off cycle. This was a realisation of the emergent nature of an action research investigation (Coghlan & Brannick 2014) in the context of this research project, which proved to be both an advantage and an issue for me to deal with. This could be considered an advantage, on one hand, because this emergent nature has provided some flexibility in conducting the activities of this cycle and arranging the steps as per the requirements of my research. On the other hand, this flexibility has come with an additional level of complexity due to the uncertainty in terms of the structuring of my thesis. Probably, more experienced action researchers could experience such difficulty to a lesser extent if at all, but as an insider researcher with a quantitative background, I needed some additional time to have a clear mind about how to articulate this cycle in writing.

Another issue I had to deal with was the incremental nature of the changes that we were making in the scope of this cycle, leading to a lengthy period of over one year for us to complete our business actions (i.e., an overhaul of many dashboard applications with UX-oriented improvements), which seemed to me as spending a long time without being able to do any further research activity (e.g., for the evaluation step), hence causing some anxiety concerning the duration of a DBA programme.

As for the business actions, we completed the overhaul of all of our QV dashboard applications roughly within one year, based on a successful collaboration with a UX consultancy, so in that sense the business actions were completed successfully. However, we still had issues with communication. Although we started the process with a workshop including participants from all business lines, and then proceeded with the usability tests again in collaboration with the same participants, there was still some negative feedback, though not many, and even a furious response, when we introduced the very first of our new version dashboard applications to the users. An entry in my research diary, dated 14/05/2017, reads like this:

> *"At around 10.30am on Monday, as I was just having a look at the agenda in the week ahead, sorting out some recent emails, a colleague from the *** Department, who had also attended our workshop on 03.11.2016, called me by phone. When I answered the call, I heard a very angry, furious voice, making some authoritative statements towards me. The issue was that exactly on the day we first replaced the existing version of our most frequently used dashboard application with the new version that we re-designed with a UX focus and added some*

significant new capabilities, he and his team were to hold a QV training session to the newcomers to the Bank, and they were furious to see the new version in the training session for the first time.

(…)

Additionally, as he described the changes we made as "radical change", asking how dare we did implement such radical changes in the blink of an eye, I replied that these changes were not radical changes but rather improvements that were already agreed on, and that radical change was another thing. (…)"

This happened despite my colleague with whom I made the conversation above was among the participants of our meetings on this topic, starting from the very first workshop. This was another proof for me that the way and the frequency we communicate change is as important as the changes themselves, if not more.

Action

As I feel better equipped to deal with and take advantage of the emergent nature of action research, I will plan and implement my following research cycle with more confidence, better tailoring it to what is actually happening in the workplace. This will also have an impact on the overall structure of my thesis in that I will be able to better articulate my business and research actions, taking into account the need for a retrospective approach in some parts.

Regarding the incremental nature of the changes we made during this cycle, my action will be to prepare a plan for this kind of changes which will involve smaller batches of improvements with shorter, easier-to-follow timeframes so that I can handle them in smaller, faster cycles and have the opportunity to learn and improve on the way, without waiting for the entire process to be completed (This will normally be applicable if and when incremental change is involved.)

As for the communication, there seems to be an obvious need for me to take this seriously and communicate more frequently and collaboratively with all the stakeholders involved in my workplace activities. This will help me not only to raise awareness to a higher extent about our services and the changes we make, but also to avoid unnecessary conflicts and arguments with our internal clients. I will proceed this way to better manage the perceptions of people, and also for the purposes of organisational politics.

4.3. Action Research Cycle – III

Following the implementation of the new versions of QV Dashboard applications, we went on to investigate further what we could do to better support the decisions and actions across the Bank, helping the realisation of related changes to a greater extent. In doing so, we also had a view to being better informed about our internal users' perspectives and visions, covering all the three main business lines we served.

Coinciding with this 3rd cycle was also our perceptions that we were receiving some limited and mixed feedback from our users concerning our recently developed new version QV dashboard applications (Please see Section 4.2.4 for details). This was based on various email exchanges and telephone calls with the users, happening as part of our business-as-usual, and not through specifically solicited feedback. Hence, two QV-specific themes were included in my interview schedule, with an aim of collecting information from the participants about their perceptions of QV-related changes, regarding both the recent developments and the overall QV experience.

In light of the explanations above, the Diagnosis step of this 3rd cycle took place contemporaneously with the Evaluation step of the previous cycle (i.e., the 2nd cycle), by collecting data for dual purpose in one research action, which was conducting semi-structured interviews with our selected internal clients.

From this point forward, sections from 4.3.1.1 to 4.3.1.4 explain the research actions, which constitute the third cycle of the thesis action research project, as embedded into the "diagnosis" step of the core action research project (Please see Figure 3.1 for an overview of the research cycles).

4.3.1. Diagnosis

4.3.1.1. Research Planning

The first decision for us to take at the beginning of this step was to determine the method of data collection with the aim of gaining further and up-to-date insights into our users' experiences and visions concerning their exploitation of data. Along with the team discussions at the workplace, I was also consulting my academic advisor on this decision so that the research method could be both fit-for-purpose from the business perspective and academically sound from the research perspective.

After considering alternatives such as sending a second online questionnaire to the users (for the results of the first questionnaire, please see Section 4.1.4.2), performing focus groups, making in-person structured interviews, etc., a decision has been made to proceed with semi-structured interviews to collect some rich qualitative data from users, who would be selected to cover all the 3 main business lines that we serve. As qualitative and quantitative research approaches can be used in combination to provide a better overall understanding of the topic of investigation (Silverman 2010; Creswell 2013; Robson, Shannon, Goldenhar, et al. 2001; Hughes, Jones & Roy 2002), the aim in proceeding with the interviews was to gain deeper insight into the users' perspectives on top of what had already been established during the first research cycle through the implementation of a comprehensive questionnaire.

The next point to be clarified was the main themes to be covered in these interviews (i.e., those themes that would be included in the interview schedule). Considering the research aims stated above, interviews would need to focus on the potential changes and/or improvements in relation to the perspectives and visions of our internal users, without being confined to feedback on any specific platform or application and without becoming kind of specific technical requirements analysis or issue remediation plan. Having consulted the relevant literature on qualitative research methods with these considerations in mind, making use of elements of appreciative inquiry looked to be a suitable approach for this kind of research investigation.

Appreciative Inquiry, which is one of the approaches to organisational development (Bouckenooghe 2010) along with other alternatives such as survey feedback, action research, etc., views organisational change as an organisation's requirement to exploit its best and most positive potential, thereby shifting the focus from finding and solving problems or improving pain points to exploiting the positive potentials (Bouckenooghe 2010).

Although this can mean that the "Diagnosis" step of a typical action research cycle is replaced with a positive-potential-oriented "Discovery" step of the appreciative inquiry when appreciative inquiry is employed as an overall organisational change approach (Bushe 2012), research also has that shifting the focus to exploiting the best potential with an appreciative approach does not necessarily mean neglecting or dismissing negative aspects of the experiences or problems thereof, but rather it is about going beyond fixing the problems or improving the pain points for development, by understanding the successes and further amplifying them, like in the case of PAAR (Participatory and Appreciative Action and Reflection) (Ghaye, Melander-Wikman, Kisare, et al. 2008). Notwithstanding that the approach in this research project is AR and not PAAR, it has still been possible to make use of the elements of appreciative inquiry in preparing the interview schedule, as appreciative inquiry can

also be helpful as a research tool (Michael 2005) and a method for creating appreciative discourse (Rao 2014), even when it is not adopted as the overall approach to a research or organisational change initiative. As such, the interview schedule has been prepared with most of the main themes representing the steps of an appreciative inquiry approach.

Another point to decide on was the selection of our colleagues to be interviewed. These interviews would be dual-purpose efforts i.e., with both business and research purposes, so this was a topic we discussed together with my team and my director, the CDO. As the vast majority of our internal users (86.1%, please see Table 4.6 for details) were marketing and sales staff from the three main business lines of the Bank (i.e., Retail Banking, SME Banking, and Corporate Banking), a decision was made to proceed with selected colleagues from these business lines so that the insights we would get would be related to the experiences and visions of a large portion of our users.

Another issue to be considered was whether to include participants from the field (i.e., regional directorates and branches) or proceed only with participants from the Head Office business lines. After discussing within the team and together with the CDO, a decision was made to proceed with only participants from the Head Office business lines. This decision was based on the fact that the Head Office participants to be interviewed would be the people with a close communication with the field staff and were in such positions that they had significant influence on both sales and marketing activities and reporting habits of those people. Additionally, we had already collected some quantitative data from a wide user base via our questionnaire back in 2016, and also had performed usability tests with the selected field staff to make a diagnosis based directly on their actual experiences. This time, feedback from people with a higher-level view from the Head Office perspective, who had experience in data-related tasks and communication with their respective field colleagues, could provide more in-depth insight and foresight to us than pure end-user feedback.

Finally, the third decision to make was whom to invite as the participants for our interviews. Although the number of staff working in the three main business lines varied significantly across these business lines (Number of Retail Banking staff larger than number of SME Banking staff, both much larger than Corporate Banking staff), it did not make sense to determine the number of participants from each of these business lines on a pro-rata basis, as we would have a small group of participants for the interviews (i.e., 10-15 participants). Moreover, this would not be a sample aimed at statistical estimation or prediction, but rather we needed to collaborate with those of our colleagues who would be in a good position to be able to provide us with some rich information and insights based on their experiences and visions. With this approach, we selected 14 participants covering all three main

business lines: 4 from Retail Banking, 4 from Corporate Banking, 5 from SME Banking, and 1 from a transversal function serving -and reporting to- all these 3 business lines.

From that point forward, the plan was to give a start to the interviews in November 2017 and complete the interviews in 2-3 months so that we would be able to make better informed decisions concerning our business actions from 2018 forward.

4.3.1.2. Research Action/Fieldwork

Having decided on the potential participants, I started to work on the interview schedule. This schedule would cover the major themes that we would like to address during the interviews, rather than closed-end, more specific questions (Stroh 2000b). Making use of the elements of appreciative inquiry as discussed in the previous section, but also including other major topics that we would like to hear about from the participants' perspectives, the interview schedule has been prepared in such a manner that the rich data we would get via interviews would be useful for both research and business purposes.

The first main theme in the interview schedule (The concepts of Analysis, Reporting, Analytics, Visual Analytics, and Advanced Analytics, their connotations, as perceived by the interview participants) is aimed at helping us see the perceived meanings of the concepts that constitute the focus of our workplace activities and their purposes from the eyes of those at the receiving side (i.e., our internal clients). It could be helpful for us to use the data from the conversation to be better able to understand participants' meanings (Creswell 2014) and see whether there is a mismatch between what we think we offer or should offer and what they think they get or should get. This could be useful for us to evaluate in-depth what kind of changes they experience and how, if any, what kind of changes they desire, ensuring we better know what people mean. As one of the aims of qualitative research is "to access the 'world' in terms of those people being researched" (Stroh 2000, p.196), and I would like the participants to speak for themselves with their own words with the aim of having some in-depth data relevant for the purpose of this research (Hughes, Jones & Roy 2002), this first theme is intended to be the starting point regarding these purposes. Starting the interview with this topic also seems in-line with the recommendation given by DiCicco-Bloom and Crabtree (2006, p. 316) that "the first question should be broad and open-ended, should reflect the nature of the research and be non-threatening".

As for the guiding items included under this theme, these are aimed at clearly understanding what people mean when they use these terms in their definitions of requirements or shortcomings, the level of awareness regarding different types of requirements, as well as the connotations of a word included in our Department's name (analytics), as this can also affect their expectations from us.

The second main theme (Experiences with and views on the applications within the Bank – Positive aspects) is one of the three elements that reflect the appreciative inquiry approach (Cooperrider, Whitney & Stavros 2008), aimed at deriving information from the participants about what they would define as their best experiences in the context of data analytics and the underlying reasons or arguments for them to define that experience as the best. Two relatively narrower-focused sub-themes have also been included under this main theme, one concerning the participants' views on the changes that have been introduced via the implementation of our QV dashboard applications, and the other -with an even narrower focus- concerning the participants' views on the impact -if any- of the more recent, UX-oriented improvements that we had made following the feedback from the AR Cycle-1 questionnaire. However, I did not explicitly mention these improvements during the interviews in order not to prompt or direct the participants, with an aim to collect information starting from their awareness thereof.

The third main theme (Experiences with and views on the applications within the Bank – Dreamed of), continuing with the appreciative inquiry elements (Cooperrider, Whitney & Stavros 2008), was aimed to prompt the participants to share their visions for 5 years later. I would ask them to simply dream about what type of working they would be happy with, 5 years later, concerning the data analytics efforts across the Bank. This could be helpful for us to set our direction for the next 5 years then, as well as to better evaluate which aspects of this dream would look different from what we already had and from our own visions.

The fourth -and the final- main theme in the interview schedule (Experiences with and views on the applications within the Bank – Determining the changes to be made) is also the following step of an appreciative inquiry (Cooperrider, Whitney & Stavros 2008). This was aimed to get insights on some specific proposals for change action, following from the dreamed future in the previous main theme and adding the "how" question to the "what" thereof, so that we could have some clear input in deciding on our business actions from that point forward. (For the full interview schedule, please see Appendix_20_Interview_Guide_AR_Cycle_3).

It is worth noting that these interviews had a much broader focus than the experiences with QV or any other specific tool and technology, aimed at exploring the participants' experiences and

visions in relation to how data and information is exploited across the Bank to support business decisions and actions and the envisioned changes thereof (i.e., apart from only two sub-topics which were included for the purposes of AR Cycle-2).

Selected participants were invited for the interviews via calendar invitations including brief information on the aim of these interviews and how the interview data would be used (Please see Appendix 21. AR Cycle-3 Interview Invitation for the English translation of this text and a sample screenshot of the actual invitations).

In contrast with my initial expectations, all the participants reacted quite positively and were very willing to participate, so all of the invitations were accepted. However, due to the busy agendas of everyone, including mine, and also with the impact of the typical year-end workload across the Head Office, completion of the interviews lasted for much longer than would be anticipated. I performed the first one in November 2017 and the last one (i.e., the 14th one) at the end of May 2018. This timespan, which turned out to be longer than expected, caused some additional challenges for my workplace activities in that we had already derived some valuable insight, but we had not managed to complete the interviews in full whereas we had to proceed with some business actions due to the dynamics of our business agenda (More elaboration on this point is provided later in this chapter, as part of my reflections on this research cycle).

All of these 14 interviews were made in the meeting rooms at our Head Office building, joined by one of my team members, whom I worked together with for R&D purposes. All but one of the participants joined us alone, with only one exception in which the invited participant joined together with another colleague, who also made some contributions on occasion.

The interviews did not follow the schedule strictly, rather the conversation was guided through the themes in the schedule. The meetings were set for 30 minutes, and it proved to be an adequate duration to cover all the themes in the interview schedule, except for just one of the interviews, which lasted for a slightly longer time. I adopted a style with which I would not be perceived like asking questions for strictly structured answers, nor did I use the same exact wording for every interview, keeping in mind that one of the key differences of interviews from questionnaires was their being not standardised but rather tailored to individuals (Stroh 2000b). The themes in the interview schedule acted as triggers to initiate the flow of words from the participants, with the rhetoric being adjusted according to the flow of the conversation and the relationship or rapport between myself and the participants.

In general, the interview would start after a warm welcome and a brief chat on the Bank's agenda at the time, our common projects-if any, as well as some non-business talk on social topics. I would then request the participant's consent for recording the interview, and then start the conversation with the first theme. I would generally explain the topics we would like to hear about for each main theme and then let the participant speak for himself/herself; however, I would still make ad-lib comments, clarifications, or reminders to keep the conversation going and not drifting off the topic for extended time periods, while at the same time paying attention not to impede or direct the flow of the participant's views (Stroh 2000b).

4.3.1.3. Research Evaluation

All the interviews were on a business iPhone and then transferred to my computer, where I would save the files in a dedicated folder and where they would then be accessible only by myself. Two separate backups of this folder have been made, one on my OneDrive, which is password protected, and the other on my external storage device, in case any problems occur with the original files or with my computer.

The next thing to do was to transcribe all these audio files in full, following the advice in the relevant literature (e.g., Stroh 2000a; Kowal & O'Connell 2013; Schreier 2013).

Notwithstanding the discussions in the literature concerning the use of CAQDAS (Computer-Assisted Qualitative Data Analysis Software) for the analysis of qualitative data, this has been an established way of analysing qualitative data for many researchers in the last two decades (Gibbs 2013) . As a researcher with a quantitative background and having been working with computer software for the purposes of data analysis as well as in many other aspects of my life, I came to a conclusion that I could use a suitable software not only to be able to analyse the rich qualitative data generated through the interviews but also to be able to store and keep track of my analysis and data more securely (Gibbs 2013). With this approach, I installed NVivo from the Middlesex University's related resources webpage and imported all the 14 audio recordings of my interviews into this tool.

Interview transcription has proved to be a time-consuming and laborious task, as is explained well in the literature Stroh (2000). I spent around 5 hours on average to transcribe each of my 14 interviews by using NVivo. This was despite the fact that the tool (i.e., NVivo) proved really helpful in this endeavour, by making it possible to simultaneously listen and write down parts of the interview audio files and to link the transcript to the sections of the audio file. I might have spent somewhat

longer time transcribing than would be otherwise as I took this step as the beginning of my analysis at the same time, assigning some initial tags to the relevant parts of my transcriptions when I thought that would be helpful for the next step, which is the in-depth analysis of the interview data.

As the analysis of qualitative data is not a strictly structured process, though still requiring systematic examination of the data, and what is essentially required is the researcher getting immersed in the data, engaging with it to derive meaning through analytical reasoning (Stroh 2000b; Thornberg & Charmaz 2013) , I performed the analysis in a semi-structured manner, making use of various methods for qualitative data analysis, but not confining myself to one single method.

When I first started transcribing the interviews, I started coding as well, during which I was simply labelling (or tagging) the parts of the interview transcription according to the topics they were related to so that this could guide me in further analysis in terms of sorting and comparing various parts of the data (Stroh 2000b; Maxwell & Chmiel 2013; Thornberg & Charmaz 2013). In this sense, this step of my analysis, which is kind of open coding, reflected an inductive approach (i.e., as in the case of a Grounded Theory approach), with the codes emerging entirely from the participants' words or phrases and the connotations they were triggering in my mind on the way , without any specific coding frame, list of tags, or any other material prepared prior to this step of coding (Gibbs 2013; Maxwell & Chmiel 2013; Thornberg & Charmaz 2013; Costley, Elliott & Gibbs 2010). This notwithstanding, I had the context in my mind, so the tags that emerged inductively do reflect this context as well, in that I did not confine myself to using the participants' exact words but also their meanings and relations as perceived by myself in this context. A total of 29 tags (open codes) have emerged during this process, which could require further analysis to create consolidated ones or hierarchies to better reflect and summarise the meanings derived from the data. No specific rules were observed at this step (e.g., any part of the text could have been assigned to a number of tags, some parts might not have been assigned to any tag at all, etc.).

Coding was performed in English (i.e., by using English words as codes), whereas the interviews were held completely in Turkish (with the exception of English words scattered here and there as part of the business jargon) and the transcripts were also in Turkish. One option could be translating the entire transcripts to English at first, but I did not choose to do so on two main grounds. First, this would be a significantly time-consuming and laborious effort and probably with little -if any- added value given I was already able to do the coding in English. Second, the translation would no longer be the participants' own words anymore, potentially having the impact of my understanding and articulation on the original meaning as conveyed by the participants themselves (Roulston 2013). Thus, I opted to directly analyse the raw data (i.e., the original transcripts) as is, proceed with the

coding in English, and then provide the translations of direct quotations when required during the thesis writing.

Once I had completed all of the transcriptions, I started to work on the analysis of data and I felt the need of perhaps a more structured approach for further analysis to some extent so that I would be better able to derive and articulate the meaning as a result of the analysis (This can be at least partly due to my quantitative background, which means I am much more familiar with more structured techniques of data analysis such as statistical modelling.).

From this point forward, I set aside these inductively generated tags for a while and started to build up a structure to be able to better organise and analyse my data and present the results thereof. This structure was a coding frame, an essential component of the Qualitative Content Analysis (Schreier 2013). As elements of appreciative inquiry had been used in the interview schedule and the flow of the conversation had been organised with this approach, I followed the same path and formed the main categories in the coding frame from the main themes in the interview schedule (i.e., each of the main themes in the interview schedule became one of the main categories in the coding frame). For the sub-categories, however, I proceeded with a data-driven approach, reading along in detail, poring over the statements of the participants to understand clearly what they were saying, the reasons, assumptions, and the reasoning behind these meanings (Schreier 2013), and creating codes in an active mode to the extent possible (i.e., using the -ing form of the verb). This constituted the "initial coding" step of the interview data analysis (Thornberg & Charmaz 2013).

When doing this coding, as opposed to what I had done during the inductive tagging, I kept loyal to the two basic rules of Qualitative Content Analysis: Every segment of the text has been coded, and every segment has been coded under only one sub-category under the same main category (Schreier 2013). However, although I started with 4 initial cases (i.e., interview transcripts) that I thought could be a representative sample of the 14 interviews at hand as pilot cases to construct the coding frame at first, I did not confine my coding to the coding frame constructed at the end of the coding of these 4 transcripts, meaning that I drifted away from one strict requirement of Qualitative Content Analysis (Schreier 2013). Instead, I proceeded by simply reading the transcriptions with analytical questions in my mind (What is his/her main concern? What category I can relate this statement with? How can I define what he/she is talking about? etc.) (Thornberg & Charmaz 2013) and coding along in the already created nodes when possible, but still creating new sub-categories under any of the main categories when I felt the need to do so. Expectedly, the number of new codes created during the analysis of each interview transcript decreased as the analysis progressed, with almost no new nodes emerging during the analysis of the last 2 interview transcripts.

Could the order with which the files were analysed have had an impact on the nodes generated? Probably yes, however, this might not be a material impact as the emerging themes were getting clearer towards the end of analysis, although the exact wordings of the initial codes could be slightly different. Additionally, it could be argued that the same question applies to Qualitative Content Analysis in any case, because the selection of the pilot cases to construct the coding frame could be expected to have a similar impact anyway.

A thematic criterion has been used throughout the coding process, and not a more formal, rule-based criterion such as doing the coding according to some inherent structural units in the text such as the sentences or paragraphs. Although the latter approach could have been more time-efficient with its structured manner, the thematic criterion (i.e., assigning or changing the code wherever in the text a change of the theme is observed) helped ensure a better fit between the codes and the coding frame, as explained by Schreier (2013).

After the completion of this initial coding step, further analysis of the data in the focused coding step (Thornberg & Charmaz 2013) has been performed, creating higher level nodes by consolidating those initial nodes which would be more meaningful together as they were actually focusing on the same themes. Consequently, a hierarchy of nodes has been created with the main themes in the interview schedule as the main categories (i.e., main nodes), the nodes created under these main categories during the initial coding phase at the bottom (child nodes), and one or two additional, aggregated level-nodes in between.

Coding was performed only on the bottom level child nodes and then the number of cases and references were aggregated to the higher-level nodes to facilitate the analysis and comprehension.

Proceeding with the analysis as described above, a balance has been achieved for the purposes of this research project, somewhere between a strictly rules-based approach and a freely-engaging approach, as summarised by Flick (2013).

Having explained the approach adopted in engaging with the data for in-depth analysis, this section will continue with the findings from the qualitative data analysis. These findings are organised according to the main themes in the interview schedule to facilitate the flow and understanding (Please see Appendix 20. The Interview Schedule for AR Cycle-3 for the interview schedule).

Definitions and Connotations of the Concepts

Reporting

11 of the 14 participants provided definitions for the term "reporting", leading to 18 coding references, with varying levels of details in their definitions (Please see Figure 4.9 below for a visual expression of these details in terms of wordcounts.)

- Standardised Periodic Information

  The most common theme (i.e., sub-category) concerning the meaning of reporting emerged as the reports being "standardised periodic information". An interesting finding here has been that the majority of the units coded here mention or imply that this standardised periodic information need not necessarily be aimed at supporting a business decision or action, like in the quotation below:

  "I perceive reporting as there is something regular, monotonous, continuing every time, which is required to be monitored and reported to somewhere like performance reporting or requiring something to be done but this does not mean that something necessarily will emerge from the report" (CS_001, Reference 1, my translation)

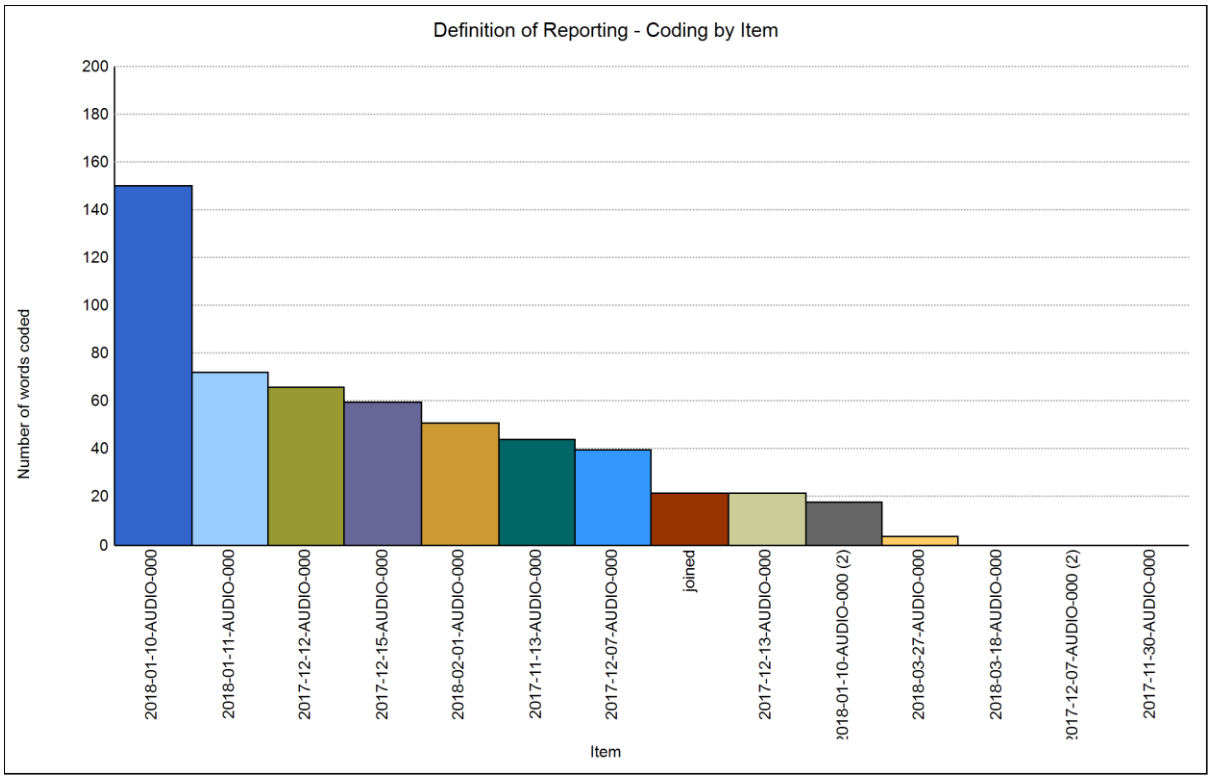

Figure 4.9. Interviews (cases) by word counts coded at definition of reporting

- Hierarchical conceptualisation of the terms

  Another common theme emerged as the participants' perceptions of a kind of a "hierarchical conceptualisation of the terms", starting with reporting at the first level and towards advanced analytics at the top. I provide two examples below, with the participants' own words (with my translation).

  "In my view i.e., if you ask what they connotate for me let me start with report i.e., let me go from bottom upwards…" (CS_005, Reference 1, my translation)

  "One of them is analysis…let's say like this reporting comes first…I consider that as something which comprises directly all the numbers. Analysis is one step after that" (CS_002, Reference 1, my translation)

The notion of reports not necessarily being related to any specific action to follow was interesting, because we would think that some reports were perhaps not worth preparing at all, but still being continued, despite having no clear decision-or-action-related purpose. This point could be linked to how the decisions concerning report production were being made and whether there was a need for a change in this area.

A complete overview of the references coded at this theme is given in in Appendix 22. Hierarchy of Nodes – Perceived Meaning of Reporting.

Analysis

All but one of the participants provided their definitions of the term "analysis" and its connotations for them, leading to a total of 22 references by 13 cases. They generally tended to elaborate relatively more on this term, when compared to reporting (Please see Figure 4.10 for the wordcounts per case for this node). Another tendency I observed is to talk about analysis and analytics in an intertwined manner, mostly using both of the terms when describing their meanings.

- Making sense of data through in-depth reasoning over data and reports

  The one and only common theme emerged concerning the meaning of "analysis" in the participants' minds was "making sense of data through in-depth reasoning over data and reports", on which an almost unanimous agreement has been observed. Analysis was being perceived as a more detailed, deep-dive examination of the data and/or the reports produced

beforehand. The common points were that analysis was a further step onwards from reporting, it involved detailed examination of and in-depth reasoning on data and reports, leading to business decisions or actions, as given in the sample quotations below:

"(…) but if we are making an analysis then we need to go somewhere something like a decision. This is why while reporting is more monotonous and periodic presentation of the same format analysis is somewhat more in-depth towards achieving results which will lead to decisions." (CS_001, Reference 1, my translation).

"Now…There is a confusion both in the Bank and in the sector regarding this analytics and analysis thing, in my view. Everybody sees analysis and analytics as looking at the numbers, examining reports which brings together a lot of numbers…umm…I am sure you know this better as this is your area of expertise but there are this kind of misunderstandings in many other departments. In my view, analysis-analytics is the art of making numbers talk to each other…The art of deriving something from here and then turning that into business strategy and tactical plans." (CS_010, Reference 1, my translation)

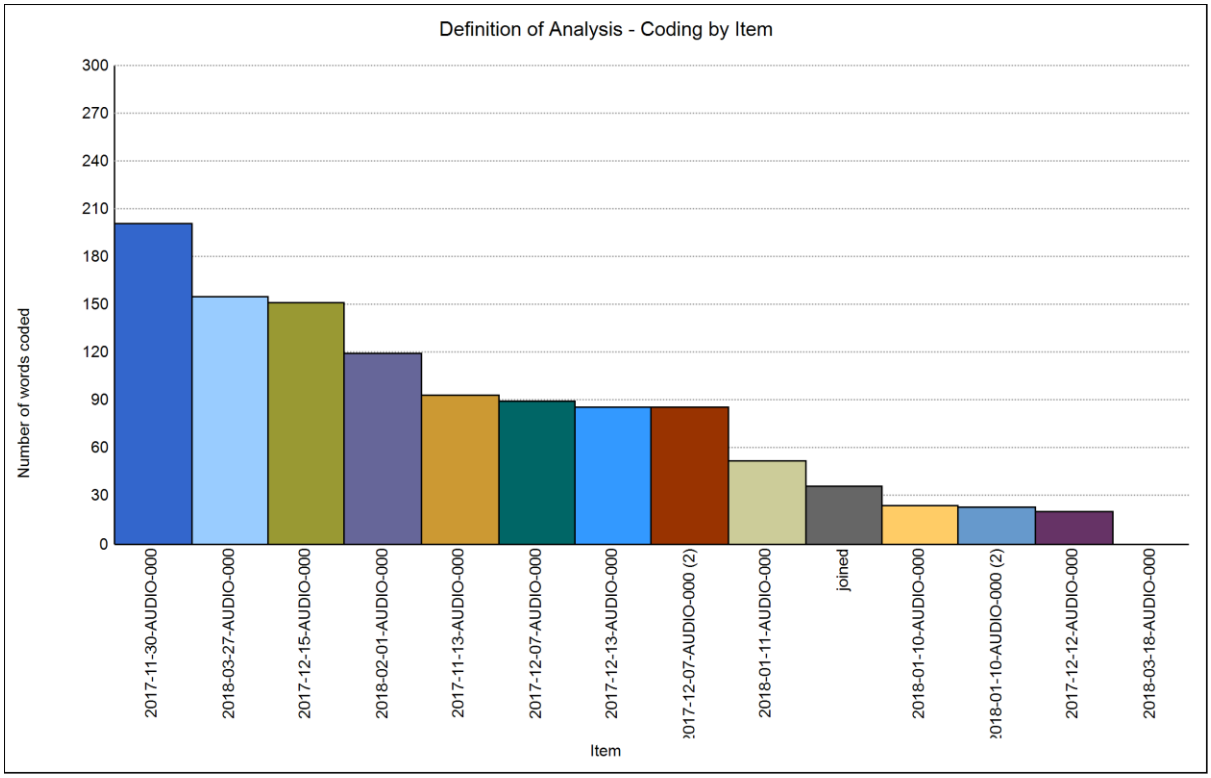

Figure 4.10. Interviews (cases) by wordcounts coded at definition of analysis

"(…) when it comes to analysis, I can say that it is the method to reach a conclusion through the information in a report i.e., the interpretation of the report" (CS_004, Reference 1, my translation)

A complete overview of the references coded at this theme is given in in Appendix 23. Hierarchy of Nodes – Perceived Meaning of Analysis.

Analytics

Few participants could provide their perceived meaning of the term "analytics", with only 6 references. This may be considered partly in-line with the evolving status of the term and with a number of viewpoints involved in its conceptualisation (Please see Section 2.4.1 for details).

Another point here is that the participants tend to talk about analytics and analysis together, not perceiving them as separate concepts or feeling unable to articulate the relationship and the differences between the two terms, as in the examples below:

"Analysis and analytics are intertwined, in the end…we are doing some work in that sense" (CS_014, Reference 1, my translation)

Notwithstanding this, 2 participants explained analytics with reference to more advanced analysis methods such as statistical modelling and data mining:

"When it comes to analytics, it is more like the part of the job related to how we can use this information in the end, how we can integrate this into our way of doing work in detail you know more like [data] mining etc." (CS_011, Reference 1, my translation)

"Analytics is the modelling more towards the statistical dimension, segmentations, but actually those efforts on the models where clustering regressions are used in the background." (CS_005, Reference 1, my translation)

A complete overview of the references coded at this theme (i.e., perceived meaning of Analytics) is given in in Appendix 24. Hierarchy of Nodes – Perceived Meaning of Analytics.

Advanced Analytics

Similarly, few participants provided their perceived meaning for the term advanced analytics; however, of the 6 references by 4 cases, 4 references were relating the term to big data, new technologies, and sophisticated analysis methods, in some cases beyond their current knowledge, like in the examples below:

- Big Data, new technologies, and sophisticated analysis methods

  "Well I do not have much knowledge on that to be honest so I do not want to say something wrong or direct wrongly but you know there are some analyses we have been doing, probably when I think of advanced analytics it is more in-depth analysis of big data like the same example is given everywhere when I attend trainings that Facebook has every information on our daily life and can look at it to show us what we can like or buy…but if this is too much then the person could be bored so they can say 'ok we have showed this to this person 5 times let's not show anymore' etc. so they can proceed towards more advanced…" (CS_001, Reference 1, my translation)

  "Advanced analytics is what we perform right now through the arrival of functions related to big data on top of the traditional models and segmentations…there is how I define advanced analytics…new functions and the implementation of new technologies." (CS_005, Reference 1, my translation)

A complete overview of the references coded at this theme is given in in Appendix 25. Hierarchy of Nodes – Perceived Meaning of Advanced Analytics.

Visual Analytics

There are 7 references from 6 participants for the perceived meaning of visual analytics. They sound more in agreement and clear when compared to those given for analytics and advanced analytics above. Both of the two themes where these references are most commonly made mention visualisation of data or results.

- Making information easily understandable at a glance through data visualisation

  "Not my area of expertise but let me say what I understand: Visual analytics is I think what we frequently use on QlikView…umm…the thing that shows more easy-to-consume information, results…my perception is like this, to say the least" (CS_010, Reference 1, my translation)

- Visualising the results of analyses

  "(…) visual analytics is actually making all the outputs of this work [data analysis] much more readable and understandable both for the analytics teams and for the business lines" (CS_005, Reference 1, my translation)

A complete overview of the references coded at this theme (i.e. perceived meaning of Visual Analytics) is given in in Appendix 26. Hierarchy of Nodes – Perceived Meaning of Visual Analytics.

Purpose of Data Analytics

Notwithstanding the relatively few contributions on the perceived meanings of the terms analytics and advanced analytics, all but one of the participants shared their views on the purpose of data analytics and provided elaborations, resulting in 35 references from 13 participants.

Expectedly, the main themes emerging here are all related to business decision making in one way or another, with another interesting theme also mentioned, though with fewer references, relating to questioning one's own assumptions. The most commonly referenced themes are given below, with selected quotations.

- Supporting business decisions and actions

"If there are positive outputs, we look at how we can further improve this or if there are negative findings then we look at how we can eliminate these and stepping into the action stage. The aim is making analyses leading to action, actually" (CS_003, reference 2, my translation)

"(…) can determine the organisational structure well this can extend to organisation depending on what you are analysing I mean can lead to structural changes and numeric changes etc. can guide me. In the end…mmm...how can I say…can guide me in any way for the future" (CS_004, References 1-2, my translation)

- Setting Strategy and Tactics

"Analytics and reporting well now of course the demands of the business line….in the process there are times when you need to set focus concerning product, risk, income…concerning managing the field…now there is also the aspect related to managing people in the end processes related to branches…This is the same for other business lines as well you know you need to focus on certain things and make the staff in the field to work on that same thing…processes and structures aimed at this…campaigns may be included in this whatever" (CS_012, Reference 1, my translation)

A complete overview of the references coded at this theme is given in in Appendix 27. Hierarchy of Nodes – Purpose of Data Analytics.

Standard vs Ad-hoc Requirements

All but one of the participants shared their views on this topic, with an agreement emerging on that both standard and ad hoc efforts were required. Other 3 most common themes emerging were the perception of ad-hoc requirements as more detailed work, periodic preparation as a defining feature of standardised reports, and standardisation as a target state for ad-hoc requirements.

- Mentioning that both standard and ad hoc efforts are required

  "Yes yes of course both are required…well…you cannot do everything tailor-made, naturally…like that" (CS_008, Reference 1, my translation)

  "Let me say overall: There is standard reporting and there is ad hoc reporting. Yes, and in our business probably you cannot standardise everything. When we think of cash management…you can standardise many things but not everything. I can compute the main bank the same way, the counts [number of clients, products], bank cheques the same way…collections…but when it comes to DDS or TFS [more specific products], their systematic is different." (CS_002, References 1-2, my translation)

- Mentioning more detailed work as an attribute of ad hoc requests

  "Because you have a more limited time there and perhaps many things can be requested, more detailed analysis than normal reporting can be necessary…umm…the second thing is…well…you know…needs more effort actually" (CS_001, Reference 1, my translation)

  "Ad hoc requests when indeed something very critical happens just to give an example normally you monitor through a standard report you have a standard world, but such kind of a thing happens like something hits the bottom or the top…something you will examine in detail to understand that thing can be an ad hoc request" (CS_005, reference1, my translation)

- Mentioning periodic preparation as a defining attribute of standard requirements

  "For me standard reporting is something that I do traditional e.g., mostly concerning mass management cheque volumes by regions, averages, comparisons with these averages, etc. traditional standard reporting, produces monthly…you know you remember [from my time with cash management]" (CS_002, Reference 1, my translation)

- Mentioning standardisation as a kind of target state following ad hoc analyses

"We try to reduce and standardise all [of the ad hoc reports]" (CS_004, Reference 1, my translation)

A complete overview of the references coded at this theme (i.e., standard vs ad hoc requirements) is given in Appendix 28. Hierarchy of Nodes – Standard vs Ad Hoc.

Discovery (Experiences)

"Discovery" is the first phase of appreciative inquiry (Cooperrider, Whitney & Stavros 2008; Rao 2014; Bushe 2012) and corresponds to the second main theme in my interview schedule. In this phase, the aim was to gain insights into the users' best experiences in terms of reporting and analytics, and the underlying reasons that made those experiences the best for them.

The 4 sub-topics under this main theme are below:

Best Experience, Best tools & collaborations, QV Change – Overall, and QV Change – Recent.

As the analysis results for the last two of these were discussed in the previous section (AR Cycle-2), these will not be included here.

Best Experience

The most common themes that emerged under this topic are explained below.

- Supporting business through deriving meaning from data:

  When talking about what they recall and define as their best experiences, there was almost unanimous agreement on this theme: The participants were talking about some specific reporting and analytics efforts through which they managed to support their businesses by deriving meaning from data.

  That they mention or imply feelings like "satisfaction" and "happiness" through this achievement among their comments could be considered as a reflection of their personal values of "achievement" and "self-direction", as overall context of the comments hint at this satisfaction arising from their being able to carve out useful insights from complex data. It could be argued that this satisfaction can also be due to the realised capability of helping others through the decision support provided, which would then hint at an expression of "benevolence" values instead. However, as the existing theory has established that opposing personal values cannot be expressed as value states in a given occasion (Schwartz et al. 2012;

Skimina et al. 2019) and considering the professional context in which this satisfaction is felt, it looks reasonable to consider this as an expression of achievement and self-direction values.

The most common child themes emerged under this node are as below:

- Making sense of complex data

  "Now you need to look from very different points of view for example the risk records data I have just mentioned…. there are many data in the system, but this is already what we know we need to improve and focus on…well…making use of artificial intelligence…this makes me happy…I mean establishing the relationships at the background and generate an analysis. For example, what I will do now exhilarates me…I mean how have performed in risk records, which companies have been the ones we weren't able to grow in, etc. knowing the reasons and showing to someone…umm…these are concrete analyses with both feet on the ground, because there is reality there…When I see and prove this, I feel happy and comfortable…Is that clear?" (CS_003, Reference 1, my translation)

  "Ok ok…for example our KKB Datamart is one of the best ones for me, because in that case while you have the potential to use external data for prediction but KKB data is flowing without being parsed…there is a language nobody understands…making that meaningful was an important aspect of the job and we resolved that…in my view this, end-to-end- from parsing the data to making sense of it and to conclusions, is a huge and excellent job…this is satisfactory for me." (CS_005, References 1 & 2, my translation)

- Supporting business decision or action through ad hoc data analysis

  *"We performed a job together with CRM on *** Hesap [a specific savings account product] in my view a very nice analysis…I mean those brackets [of the account balances], what happened who went to where [which product or other bank], customers in which brackets are leaving more, what can we do, etc. a very meaningful effort…particularly working with different groups…these are the first that come to my mind."* (CS_014, Reference 1, my translation)

  "Well, we have passed through a remediation for 2-3 years and we examined the SME Banking customer data in detail due to the requests there concerning industry-based analysis etc. Well, there for example having SAS at hand and having suitably skilled

resources in my own team to meet my requirements proved very useful both for my team and for the Bank. I mean in terms of doing the analyses right way, making the right decisions, experiencing the process seamlessly, meeting the deadlines, making all that work ready in time, that proved extremely useful. The experience where I felt both the need for, and power of data has been that remediation." (CS_011, Reference 1; my translation)

  - Feeling happy for enabling users to visually analyse and interact with data
  - Making discoveries through data analysis

- Creating Efficiency

  "…and without any need for training I mean we have done KKB, let's say, now from retail RM to micro-SME RM you would need to teach this step by step, help them make this systematic then there would be gaps there…now someone, preventing all these gaps, resolving all these issues in just a minute with just one single click…the rest is only using the data right way." (CS_006, Reference 2, my translation)

- Collaborating with a wide range of stakeholders

When my inductive tags are included in the picture along with these themes, it becomes clear that throughout the participants' accounts on their best experiences, I had tagged their statements with two common topics: Efficiency and Self-service Analytics. Particularly Self-service Analytics, relating to a more autonomous approach with users' increased enablement to prepare their own visuals to for interactive analysis, again could be considered as an expression of "self-direction" values given in the basic personal values theory (Schwartz 1992; Schwartz et al. 2012), which could be helpful in informing our workplace actions.

A complete overview of the references coded at this theme is given in Appendix 29. Hierarchy of Nodes – Best Experiences.

Best Collaboration & Tools

The participants were asked about the collaborations they possibly had made and the tools they had used for what they would describe as their best experiences. This was aimed at getting some useful insights into what type of teams they were collaborating with, what types of tools they were using, and what was making them feel best in this context. During the analysis, I noticed that it could make sense to have two aggregate nodes representing the two most common themes emerging,

which were mentioning either QV as a tool and the QV team (our division) as a team with whom they collaborated, or some other tool and some other team. This is because, expectedly, most of the times the participants were mentioning something related to one of these two themes.

The participants also shared some critical feedback when talking on this topic.

The most common themes and the critical feedback are given below:

- Mentioning QV and/or QV team positively
    - Efficiently working with QV Dashboard Apps

      "But when making these proposals for example we had a look around to see how many FX transactions are made and how much money we need to make…there was a dedicated app for this on QV, the FX Desk, we found that and it saved our lives" (CS_001, Reference 1, my translation)

      "The most important job, introducing a new era to the Bank, has been the Risk Records app on QV." (CS_006, Reference 1, my translation)

    - Mentioning QV as the best for the purposes of reporting etc.

      "But for example, QlikView to be honest I put that in a separate place when it comes to reporting etc. considering my previous banks as well. Let me be clear that there {QlikView] is the best platform I have ever seen so far." (CS_001, Reference 1, my translation)

      "Here of course for example let me say that for example QlikView application is a very successful application in my view if you look…I mean…you have done a very good job there." (CS_013, Reference 1, my translation)

    - Mentioning the QV team for the best experience

      "What makes the best is…well…we also have further things to do but I will say something about you…for example that latest changes report we have made together with you…that was a spectacular job…. that is what I use the most on QV" (CS_013, Reference 1; my translation)

- Mentioning other tools and-or teams positively
- Critical feedback

- Feeling lack of confidence in the consistency of the data
- Facing problems in finding the right contacts for collaboration and in receiving the required support
- Experiencing a limited selection of tools
- Complaining about performance issues on BO
- Mentioning room for further improvement in QV
- Mentioning unsatisfactory collaboration with IT.

When my inductive tags are included in the picture along with these themes, the most common topics which I related to throughout the participants' accounts on their best collaborations and tools emerge as UX, tool performance, self-service analytics, and efficiency.

A complete overview of the references coded at this theme (i.e., best collaboration & tools) is given in Appendix 30. Hierarchy of Nodes – Best Collaboration & Tools.

Dream

During the dream phase of appreciative inquiry (Rao 2014), participants describe the desired state of the organisation from their perspectives. When doing this, they imagine the best state of the organisation (Bushe 2012), building on the best experiences they articulated during the discovery phase (Michael 2005).

Proceeding with this approach, participants were asked about how they would draw an ideal picture of the Bank for 5 years later, or what type of an environment they would dream of, in the context of reporting and analytics across the Bank. This included both technical aspects like the tools and technologies, and non-technical aspects such as the data-analytics roles and responsibilities, skill sets, standards, organisational structures, etc.

The emerged themes, along with the selected quotations from the participants, indicate a tendency towards the expression of openness-to-change values, with almost every participant mentioning their desire for novelties, be them on processes, in-Bank regulations, or tools and technology. Given the main theme is "dream", this is obviously what could be expected. There is a general tendency towards more autonomy on the end-user side, with them being further empowered for self-service analytics, which can be considered as an expression of "self-direction" values (Schwartz 1992; Schwartz et al. 2012). Together with this, there is also an overall desire for a "single screen"

through which everything could be accessible via one single click. This desire could be seen in stark contrast with the desire for self-service analytics; however, from a values perspective, this can also be considered as an expression of the personal value of "hedonism", which also lays on the openness-to-change side of the personal values continuum (Schwartz 1992; Schwartz et al. 2012), not contradicting the self-direction values in this sense.

On the other hand, when asked about non-technical aspects of their dreamed futures for the Bank, at least some participants were reluctant to some extent. They would either make no suggestions at all, sometimes explicitly stating that they would not like to comment on the organisational structure-related topics, or they would share their ideas with some kind of disclaimers in advance. From a values perspective, this stance could be related to some "conservation" values, namely "conformity" and "security" (Schwartz 1992; Schwartz et al. 2012) in that the participants might have felt their position in the Bank being exposed to risk due to some remarks on these issues (A closer look from the values perspective will be provided later in this section, following the results according to the main themes in in the interview guide).

The themes emerged during this dream phase are given below:

- Upgrading data analytics capabilities
    - Automated and customised analytics producing ready-to-consume information to support decisions and actions.

      "Like this…if continue as is we will need to employ quite many people. I dream of something like…umm…artificial intelligence is integrated into data analysis tools…umm…together with artificial intelligence, something where what I need is produced faster…when necessary I would just write what I need and artificial intelligence at the background would deliver what I need very fast, because for the rule set of an analysis to collect the related data one by one and set up the correlations then tidying up etc. fiddling with the data many times is not the right thing to do…That needs to become much faster." (CS_011, Reference 1, my translation)

      "so, what will we have at hand? We will have robo-advisers at hand. I am not sure whether that will be 5 years or more because I am not sure whether databases and data are ready for this at the moment or not…actually this is what I dream of. What the robo-adviser will provide is actually that well like I have just mentioned today as a result of what we produce periodically or ad hoc people do the interpretation and feel

that there is something there and try to have an impact on decisions…but this a too long and laborious process. Instead, these intelligent systems [robo-advisers] will be doing this and automatically triggering other systems when an alert is produced…this where we will go, in my view." (CS_007, Reference 1, my translation)

- Business users being able to engage with data in self-service manner

  "…besides they must be able to create their own formats.

  [Me]: Do you mean all the users? Just to clarify…

  Yes, I mean all users must be able to create their own formats." (CS_008, Reference 1, my translation)

  "umm…say…he/she will open his/her screen nicely…[he/she will think/say] look I want to have a look at this what my status is well like just I mentioned in a world where the self-service thing has been realised…where he/she will not need to ask anything [and instead will do self-service]" (CS_005, Reference 1, my translation)

  "As we will have ad-hoc in our life also in the future when it comes to data analysis normally I think that we will need staff to do these…and yes within business lines themselves, because standardisation for us is to some extent yes but then absolutely another touch…umm…of course some intelligence from a system can do something but still you need someone to give that intelligence to that system…intelligence does not happen on its own in the end…so in my view we will reach more digital visual but we will still need staff as well…this, in my view." (CS_004, References 1 & 2, my translation)

- Having access from mobile devices to mobile-oriented analytics apps

  "well…umm…I meant that these reports…now of course our RMs will work from home from outside they are more in the field, so the visuals of these data are very important. These devices [showing his iPhone] are more…when compared to laptops…absolutely [the visuals] should be designed with these in mind right from the beginning. I will show this on iPhone 7 so it must be adaptable to there, if not at least I can share some main headings there etc. they must be designed with these in mind. I don't know the techs of course; I talk with intuition." (CS_010, Reference 1, my translation)

"Mobile will gain more prominence. Perhaps you will need to open many things on QV from here [showing his iPhone] tomorrow…[RM] will have a look at it to see what volume he/she has with a customer during a visit to that customer" (CS_002, Reference 1, my translation)

- Focus shifting to advanced analytics including predictive analytics
- Improved consistency across the results obtained by different teams i.e., single version of truth
- Unqualified tasks being automated

- Regulating data analytics efforts across the Bank
  - Further empowerment and authorisation of users

    Well perhaps I, as someone dealing with this [data analysis and reporting] in the specificity of business line, must be further authorised…this could be something very valuable in the end…I must gain priority in how and where things will go like I said…those go back and forth I mentioned well let's consolidate that then there will absolutely be need for a tool…we are talking about big data in the end…well…umm…Perhaps it needs to be organised across the Bank concerning to whom we will approach…A holistic thing…can be teams in control [of that organisation]" (CS_012, Reference 1, my translation)

  - Having a better structured data roles framework so that everyone can focus on one's core business

    "Let me say like this there I something like this in terms of organisation…for example reporting we have similar problems in our own teams….say we will need a report on a topic…there is IT, there is Performance Management, there is BI, there is CRM-well I no longer go to the CRM for reporting, though…I don't come to you for reporting either as you have already put it on QlikView in a similar shape but there is a good deal of confusion in my view…I mean I have been working in marketing for 5 years I have been here for 5 years and still I sometimes do not know who is doing what. People do not know [this]. I mean when you say analytics it is in many departments…when you say reporting something can pop up everywhere so I think that these should be tidied up in terms of organisation, in my view." (CS_014, Reference 1, my translation)

"Hence that provided a significant balance…We could not yet achieve that internally on our own under retail…there is BI here, we have our own data management team under the business line…unfortunately it is not clear which of these will do which job…Nothing is clear" (CS_005, Reference 1, my translation)

- Increased adaptability according to changing business priorities

  "For example, there must be something that is able to change in line with the changing priorities on the business lines side." (CS_008, Reference 1, my translation)

- Setting up a mechanism to help find the right contacts for data-related requirements

  "When it comes to the teams [there should be an organisation] where responsibilities and definitions are clear. You are perhaps doing the distribution of duties internally but when a new request comes from the business line it stays unassigned well we enter a vicious circle to find out who will do that…umm…perhaps someone like a meeter-greeter to take the request, saying yes this is to BI, this is to IT, this is to BA, etc. a team like that or just someone to consolidate and redirect [the requests]. Just one person responsible for that task, for example." (CS_001, Reference 1, my translation)

- Increased efficiency and effectiveness through process optimisation
- Improved adaptability to new technologies through the ability to decide and act fast
- Feeling reluctant or unable to be specific about the dreamed data-related organisational structure

- Improving the usability of analytics platforms
  - Having access to a customer-and-RM-centred holistic view on a single user interface

    "Five years later, when I look, there must be a system on which I can see every breakdown of a specific customer and every breakdown of a specific RM through just one click or through a very simple single screen…all those tables and such from a single point…umm…perhaps such a structure will need to be set up that will feed into the customer number [level of detail] and enable access to each and every one them [the customer details]at the same time." (CS_001, Reference 2, my translation)

    "umm…more umm…let me say like this…a simpler structure which will be easier to use for everyone needs to be set up. For example, you know we say a holistic view of the

customer we do a simulacrum of this on the Single Screen [a dashboard app we developed together] but there should be structure which can take a very detailed x-ray of the customer with a single click." (CS_008, Reference 1, my translation)

- Data being processed fast, and results being achieved fast

  "Now 5 years later…now the customer…customer…wants to be customised. If the customer wants to be customised…umm…then I think that there will be need for a structure where reports on a business line basis, on an RM basis, on a branch basis are updated faster and where AI is involved more in the background [of these reports]" (CS_010, Reference 1, my translation)

  "Let me think for a moment well when comes to 5 years later…at the moment there are still things that we do manually you know bringing together Excels if you think…you know I think that there will be more like a single click and faster, in the first instance." (CS_004, Reference 1, my translation)

- Having easy-to-understand outputs for end users

- Upskilling staff
  - Improving data literacy on the business user side
  - Business lines being better able to define own requirements
  - Better qualified workforce which will be able to intervene in automated decision systems when they start to create incorrect patterns
  - Better qualified workforce which will be able to turn expertise into action to create added value for our clients
  - Having highly qualified analytics staff with both analytics and business knowledge, working freely on advanced analytics

- Dreaming of data-and-digital culture spread across the whole organisation

  "Yes, this is something standard can be found even in caricatures…umm…the [tendency] of managements in some topics like let's hire a team and address this topic to them and then they will take care of it. This is not something supposed to be done that way. These are skills that must be adopted all across the organisation…digitalisation…everybody has a potential for

digitalisation…Your job has, procurement management has, etc. It is not something to be performed solely by a department which has it in its name. Data is something like this." (CS_011, Reference 1, my translation)

A complete overview of the references coded at this theme (i.e., best collaboration & tools) is given in Appendix 31. Hierarchy of Nodes – Dreams.

Similar to the emerging themes in this analysis, the inductive tags created and coded at these nodes during the transcription also indicate a general tendency of the users' dreams for 5 years later to focus on more developed analytics capabilities such as predictive analytics, self-service analytics, mobile analytics, along with UX and analytics governance. As such, this vision has clues for both technical and organisational changes.

Change Actions Proposed

This is the last main theme in the interview schedule, corresponding to the 3rd step of an appreciative inquiry process, "Design". The aim in covering this main theme is, like the aim of the corresponding step in appreciative inquiry, to identify concrete changes proposed to make the dreams come true (Rao 2014; Bushe 2012; Cooperrider, Whitney & Stavros 2008).

The themes emerged during the analysis of this main theme are given below. As would be expected, the proposed actions for change are closely related to the future vision discussed in the "Dream" step above.

- Regulating data analytics efforts across the Bank
    - Further empowering and authorising users in business lines to do their own analyses

      "Now as a business line what do we have? We have various functions cash management, foreign trade, etc. There are data which have not been processed for years. Although not directly as data ownership, there should be teams and responsible people to handle and manage these, with the name given, and also they should be authorised, is that clear? I mean I must be able to have access [to that data] and know what is in, not to do the analyses immediately. This is another perspective, more professionally…a tool for this purpose would be great, I do not know how, though. I mean this may look like technical detail, but even if Finance [Finance Group] knows some things better there is the need for an intermediary role within the business lines

to adapt [what Finance knows and the data has] to the requirements of the business lines." (CS_012, Reference 1, my translation)

- Regulating analytics efforts across the Bank in terms of roles and responsibilities, term definitions, standards, distribution frequencies, etc.

  "Well, I would definitely ban people doing independent analyses at the regional directorates…umm…if any regional directorate or branch needs a specific reporting then that should be a request to the centre [HO] and should be prepared only if the HO agrees to do, otherwise I would take this to Internal Audit. I absolutely think that all the managers and region directors should use the same KPIs with the same perspectives and interpret accordingly, so this should not vary across [branches and regions]. One day one of them looks at [the figures] per RM the other day in total, one day net banking income other day net profit such and such…these varying approaches should be discontinued. There must be single target, single point of view and the same period and the same reporting systematic." (CS_006, Reference 3, my translation)

- Changing approach so that data analyses can be made only by the properly skilled teams set up for this purpose

  "That is a job that requires more a significant skill set centrally, not something that everyone can do. You know we can handle 'the data transforms into information and what that information tells me to do' part in a more distributed manner but that analytics part is not something that everybody can do." (CS_011, Reference 2, my translation)

- Enabling better self-service and mobile visual analytics

  - Taking action to enable access from mobile devices

    "on both sides…well…let me say like this: customer, internal process, reporting…I would use here more [showing his iPhone]. None of your reports are being shared here…nothing I mean zero." (CS_002, Reference 3, my translation)

    "and of course, you know Murat once QV at one time QV was made accessible via iPad, right? Or it is already accessible but for example I do not know very well I did not use recently but when I tried to use it did not feel very usable for me via mobile…Well

I do not know how to do but in mobile usage, too [should be more easy to use]…that is very important (…)" (CS_008, Reference 1, my translation)

- Enabling fast access to specific KPIs with the ability to interactively analyse further details

  "umm….in terms of technology…now we have changed the men [staff], but they need to have a technology enabling them to work with a high performance. I mean you know in our current world one hits the button and waits for 20-30 minutes and nothing happens in the end…this should happen…indeed we need to have a tool and technology where performance is better." (CS_005, Reference 1, my translation)

- Enabling self-service visual analytics

  "the second part is those things like QV etc. should absolutely be what I say like self-service analytics. I mean there should be no more things like 'I cannot bring this next to that' etc." (CS_005, Reference 1; my translation)

- Improving usability
  - Developing a single user interface enabling a holistic view of the customer and RM

    "Yes, it is going there actually what the field wants is more or less this…they can see all of these at the moment but one form this screen another from that screen…if the guy is a very intelligent one he/she can bring these together and do something but the rest, claiming that they are already too busy with daily work, don't care too much." (CS_001, Reference 1; my translation)

  - Tidying up QV platform by eliminating repetitive apps, separately categorising summary and detail apps, etc.

  - Building up a library (or inventory) of QV apps so that the users can find the required information easily

- Bringing change in the organisational culture
  - Becoming more practical and efficient

    "I would change the structuring as I have just mentioned. Well, the biggest hurdle blocking us now is umm…our sluggish systems sluggish structures. The thing that will

carry us to future is setting up intelligent and fast systems. I mean when I say structuring this is both organisational structuring but above that there needs to be a mental change." (CS_007, References 1,2; my translation)

    - Changing business approach so that all business decisions will be supported by data
    - Becoming open to change
- Enabling access to real-time or near-real-time data
- Enabling automation and digitalisation through data analytics
    - Automating decisions through data analytics
    - Developing a mechanism for automated alerts and notifications
    - Digitalisation of processes
- Improving data consistency across platforms to ensure better reliability on the user side
- Serving external customers' analytics and reporting requirements
- Shifting the focus of reporting to be future-oriented i.e., with predictive capabilities

When considered together with the tags coded inductively during the transcription, the themes emerged under this main theme look similar to those most commonly coded tags such us analytics governance, UX, mobile analytics, predictive analytics, etc.

A complete overview of the references coded at this theme (i.e., change actions proposed) is given in Appendix 32. Hierarchy of Nodes - Change Actions Proposed.

A closer look at the Interviews from the Values Perspective

As mentioned earlier, one point that caught my attention during the interviews was some or perhaps just a few participants' relative reluctance on talking openly about their future visions, particularly concerning non-technical matters such as organisational structuring and roles and responsibilities. This led my researcher-self to return to the interview data and explore it once again, this time in an effort to derive the potentially associated personal values for each of the participant statements that were coded either at the "Dreams" main theme or at the "Change Actions Proposed" main theme.

In this further attempt of qualitative data analysis, a relatively liberal approach has been adopted to get immersed in the data, seeking explicit, implied, or derivable keywords concerning the personal values, in relation to the definitions of values in terms of their motivational goals given by Schwartz et al. (2012). For example, "excitement, novelty, and change" would indicate an expression of the "stimulation" value, "freedom to determine one's own actions" would indicate "self-direction-action" value, etc. (Schwartz et al. 2012, p.669).

Considering the relevant main themes in the interview guide, which are "dreams" and "change actions proposed", it could be argued forefront that the underlying values would turn out to be openness-to-changes values, as the main themes used to guide the conversation lead the answers towards future visions, which entail change. On the other hand, it was worth an analysis as I had personal observations throughout the interviews, in at least a few of them, pointing to kind of a tendency to be more prudent on some issues.

Values coding has been performed on the previously change-or-dream-referenced parts of the conversation; however, in some exceptional accounts, different parts of the same referenced item could be coded at different values. Another point worth mentioning is that any given part of the transcription has never been coded at opposing values, but it could have been coded at congruent values (e.g., at both "stimulation" and "self-direction-action"). Coding has been performed according to the 19 distinct values given by Schwartz et al. (2012) and then the codes have been aggregated into the four higher order values, which are also given by Schwartz et al. (2012).

For example, the first of the two excerpts below has been coded at "stimulation" and consequently aggregated into "openness-to-change", whereas the second one has been coded at "conformity-rules" and consequently aggregated into "conservation", both from the same participant.

"*I would change the organisation, for example.*" (CS003, Reference 3, my translation): Coded at "stimulation".

"*As ad-hoc will always be a part of our life concerning data analysis, I think that we will absolutely need [M: continue as is] staff to do these here*" (CS003; Reference 2, my translation): Coded at "conformity-rules".

An overview of the underlying values, as identified through this analysis, and the selected inductive tags, which are included to provide more context, are given in Table 4.24 below. As would be expected normally, most of the participant accounts on their "dreams" and "change actions proposed" have been associated with openness-to-change values, and to a lesser extent, self-enhancement values. On the other hand, there are those parts of the conversation that have been

associated with conservation values, though these do not constitute a significant portion of the whole. For example, concerning the those parts of the interviews tagged as "Analytics Governance", there were 24 references associated with openness-to-change values, 5 references associated with self-enhancement values, and 2 references associated with conservation values, according to the figures in the first row of Table 4.24 below.

Table 4.24. Personal values (Schwartz et al. 2012) vs. selected tags

#	Tag	Conservation	Openness to Change	Self-Enhancement	Self-Transcendence
1	Analytics Governance	2	24	5	0
2	Data Visualisation	1	3	0	0
3	Democratisation of Data	0	2	0	0
4	Dictionary	2	10	0	0
5	Digitalisation	0	1	0	0
6	Efficiency	1	15	2	1
7	Mobile Analytics	0	13	1	0
8	Predictive Analytics	1	13	0	0
9	Self-service Analytics	0	9	1	0
10	Standardisation	0	2	0	0
11	UX	1	11	1	0

A participant-based analysis has also been performed to be able to judge how many of the participants' accounts included statements associated with opposing values. A numerical summary of the results of this analysis is provided in Table 4.25 below. Similar to the previous table, case-by-case distribution of the underlying values is also dominated by the openness-to-change values, as expected; however, it seems that 7 out of 14 participants have made some conservation-oriented statements as well, along with more openness-to-change-oriented statements.

It could be argued that these results do not indicate a significant tension or internal conflict on the participants' side as there relatively few occasions where participants' accounts are related to conservation values; however, considering the main themes under scrutiny are already "dreams" and "change actions proposed", and also taking into account the rapport between myself and the participants, all of whom are my colleagues, the mere observance of these few occasions where conservation seems to be the underlying value could remind the tension between the declared values of the Bank, which was discussed in Section 2.2 and Section 4.1.4.1.

Table 4.25. Higher order values by cases

#	Case ID	Conservation	Openness to Change	Self-Enhancement	Self-Transcendence
1	CS_001	0	1	0	0
2	CS_002	0	6	0	0
3	CS_003	1	4	1	1
4	CS_004	3	5	0	0
5	CS_005	0	6	0	0
6	CS_006	0	2	3	0
7	CS_007	1	6	0	1
8	CS_008	1	8	1	0
9	CS_009	0	3	0	0
10	CS_010	1	8	0	0
11	CS_011	0	7	0	0
12	CS_012	2	10	3	1
13	CS_013	0	10	0	0
14	CS_014	1	4	0	0

4.3.1.4. Research Conclusions from Fieldwork

The analysis of the data generated from the first main theme, the definitions and connotations of the terms related to data analytics, suggest that the users have a clearer understanding of reporting and analysis as opposed to analytics and advanced analytics. With reporting they tend to perceive a meaning of mostly periodic standardised information generation, though ad hoc reports are also required, and this may not even be to support a specific business decision or action.

With the term analysis, they tend to have an understanding of more in-depth examination of data and reports, the endeavour aimed at making sense of those reports and data to support business decisions and actions.

Visual analytics also looked relatively clear in the participants' minds, with a general agreement of an emphasis on the visualisation of data in an easy-to-consume manner and with the availability of interactive exploration, which might probably have developed thanks to the Bank's some 6 years of experience with QV as of the time of the interviews.

Analytics and advanced analytics, although seeming to be more vague terms in the participants' minds, do have connotations of in-depth data analysis, with more involvement of technology and advanced techniques which are sometimes unbeknownst to the participants themselves. This points to a fair level of agreement between what we (me, my team, and our division in a broader sense) aim to do across the Bank and what they would expect from us, at a conceptual level.

One interesting finding for us has been to see the participants' view that reports were not necessarily supposed to be aimed at supporting business decisions and actions but could be generated just for the sake of information sharing. On the other hand, there seemed to be a good level of agreement on the purposes of data analytics efforts being to support business decisions and actions.

Regarding the participants' best experiences, they would generally mention or imply their satisfaction in cases where they have made sense of complex data, mostly to support business decisions or actions at various levels. Making discoveries through data analysis is also mentioned as another ground for satisfaction in a similar manner.

Following from best experiences, their dreams for 5 years later in the Bank were mainly about having more advanced data analytics capabilities enabling users very fast, one-click access to their desired information, also involving automated alerts and decisions when possible, with mobile usage included. This particular aspect of their dreams, of course, looks closely connected to the potential efficiency to be created in terms of FTEs, as was mentioned in Section 4.1.4.1 with the metaphor of "elephant in the room"; however, it seems that everyone was either considering themselves or their teams out of the scope of this critical issue. This could be the case for a number of reasons such as they considering their core business something else so such advancements could free up their resources to focus on their core business activities rather than data analysis and reporting, or that such advancements simply look to be a very longshot considering the -perhaps unconsciously- tension between the desired innovativeness and inherent conservativeness of the Bank.

As part of these more advanced capabilities, they were also dreaming of more autonomy on the user side not only to interactively do their own analysis with high performance but also to generate their own visuals.

The most common elements of their dreams were:

- Visual analytics becoming available via mobile devices in a user-friendly manner,

- A better regulated data analytics environment across the Bank with a clearer definition of who does what, when, shares with whom, etc., and
- A shift in the focus of data analytics towards predicting what will happen in the future.

As for the concrete change proposals, interestingly perhaps, the most common theme was about taking action to better regulate the data analytics environment across the Bank. Although having better self-service and mobile visual analytics capabilities was also another common theme emerged as a concrete change proposal, the internal regulation aspect was more emphasised here. This might be due to the fact that the Bank already had some level of maturity in data analytics capabilities notwithstanding the room for further improvement; however, there was no formalised framework to establish how things would be done in the context of data analytics, leaving the Bank with a de facto distribution of roles and responsibilities, and a lack of clear standards and definitions. The relatively established status of a data governance framework across the Bank might also have contributed to the identification of the lack of such a framework for reporting and analytics.

Consequently, our business actions for this cycle would be informed by these views summarised above.

4.3.2. Planning

Informed by the findings from the "Diagnosis" step, the experience based on the ongoing workplace project, and also the experience based on the data governance programme which had been progressing as a separate, contemporaneous effort, a decision was made and approved by the CDO to focus on three main areas from the second half of 2018 onwards:

1. Continue working on visual analytics with a new initiative aimed at enhancing mobile and self-service analytics across the Bank: This was intended to be another step in the journey towards the realisation of changes mentioned in Section 2.5 through better adoption of interactive dashboard applications.
2. Start a new initiative aimed at designing and implementing a new framework for the governance of reporting and analytics efforts across the Bank. This new framework would be a new layer on top of the recently implemented data governance framework, leveraging the experience and eventually co-existing and interacting with it.

3. Start experimenting with more advanced analytics applications such as statistical analyses and data mining aimed at helping business units with their requirements involving “what will happen?” questions.

Taking into account the existing business plan of the Division (i.e., the CDO Office) and the resource constraints, there would be need for a staggered approach for these new actions, so a prioritisation would be required.

Considering the evolving nature of business and banking in general with a shift towards digital and mobile in many aspects of our lives, and the Bank’s contemporaneous digitalisation initiatives in line with the internal client perspectives by which we had been informed through the interviews, the first of these areas to act on has been decided as the mobile and self-service visual analytics. As a very first step, taking into account the limitations of our existing BA platform, QV, in terms of mobile and self-service analytics capabilities, the first action would be to make an updated review of the tools in the market, and to hold POC workshops with the shortlisted vendors. This initial process was planned to be completed in the second half of the year 2018 at the latest so that the actual implementation could start in 2019.

As for the second and third initiatives (i.e., a new framework for governing the reporting and analytics efforts, and taking action to work on more advanced analytics), these would need to be planned for 2019 onwards, according to the business priorities and existing business plan. Depending on the realisation of these actions, these could even provide adequate grounds for additional action research cycles, which could likely extend beyond the timespan of this research project.

4.3.3. Taking Action

4.3.3.1. Visual Analytics

Action was taken immediately after the decision to prioritise mobile and self-service analytics initiative. Following a market search and initial meetings with selected vendors, including that of Qlik, which is the vendor of our existing BA platform, QV, during the third quarter of 2018, POC workshops were held with the three shortlisted vendors throughout the last quarter of 2018.

Each tool had its own pros and cons; however, our overall evaluation criteria normally included our own internal dynamics a well. Qlik had an obvious advantage in that sense as we had been working with QV, their prominent BA tool, for around 6 years by that time, so we had a good

level of knowledge and experience with that technology not only in our teams but also on the IT and business user sides, and also we had a significant data layer tailored exclusively for access via QV, as an intermediary layer between the raw data in EDW and the front-end dashboard applications.

The existing relationship with the vendor provided a pricing advantage as well. Qlik had a new-generation visual analytics tool on offer, which it was marketing as a separate platform along with its existing QV, with the most powerful aspects being mobile and self-service analytics. Under these circumstances, we would need to provide some exceptional justification to the Bank management if we were to select a vendor other than Qlik, in terms of either the tool's capabilities or advantageous pricing. In the end, among the platforms with similar capabilities and their own pros and cons, we opted for the next generation BA platform of our existing vendor, Qlik, which is Qlik Sense.

Once the decision had been made and the Investment Committee approval had been given, there would be technical and information security-related preparations prior to setup and implementation. Although the vendor was the firm we had been working with for years, the information security tests and evaluations lasted for months, on top of the already lengthy contract and procurement process. In the end, we were ready to start with the dashboard application design and development efforts as of February 2019.

In the meantime, in a contemporaneous effort with the technical and information security-related preparations by IT, multiparty requirements analysis workshops were held with all the three business lines, with attendance not only from the head office but also from the selected regional directorates and branches. The idea was to be on the same page with the users on the requirements and priorities of the Bank, with an emphasis on developing the capability to be able to enable visual analytics via mobile devices. Another emphasis, mostly for some of those users from the head office, was also on being able to provide them with more autonomy (i.e., self-service analytics) so that they would be able to generate and interactively analyse their own visuals in a guided environment, all supporting further democratisation of data (Díaz, Rowshankish & Saleh 2018).

This new platform[11], which was planned to co-exist with the QV across the Bank for at least three years, was expected to support our ongoing endeavour towards transforming into an analytics-driven Bank through better adoption of visual analytics applications. This was because of two main reasons:

[11] It is worth noting that although by the same vendor, Qlik, Qlik Sense is truly a new platform and not a version upgrade of QlikView.

- With the availability of interactive visual analyses via mobile devices (i.e., business iPhones and iPads), it would further reduce the need to print out reports to take together when going to customers, meetings, or home.

- With the availability of a more autonomous analysis environment for the selected business users, enabling more flexible self-service analytics, it would further reduce the need to extract and process data manually through other mediums such as spreadsheets to customise the analysis and/or the output.

In light of the information obtained through the requirements analysis workshops and the existing experience within the team on similar change initiatives, this new implementation was planned to proceed in phases as outlined below:

1. Filling the Gap: Design and develop whole new, mobile-oriented dashboard applications on Qlik Sense for each of the business lines as per their specific requirements, aimed to be used by the relevant managers and C-level executives at the Head Office. Along with these, design and develop self-service analytics applications for the selected Head Office staff from each of the business lines, where required.

2. Rolling out: Considering the requirements analysed through the workshops, design and develop a new, mobile-oriented dashboard application on Qlik Sense for widespread usage across the Bank, primarily for the regional directorates and branches as well as the head office business lines.

3. Migration: Design and develop new dashboard applications on Qlik Sense with a renewed, mobile-oriented approach to cover the existing content on QV, leading to the migration of the user traffic from QV to Qlik Sense.

Considering the duration of the DBA programme on one hand and the scope of the workplace actions mentioned above on the other (Please see Figure 4.11 below for the time plan of these three steps, as they have taken place.), the first two of the three steps listed above are included within the scope of this research project, with the last one to continue as part of the workplace project only. This would be a justifiable approach as the new mobile and self-service-oriented dashboard applications involving all the target users would have been delivered throughout the first two steps, with the migration of the existing QV content left as a part of the business-only project.

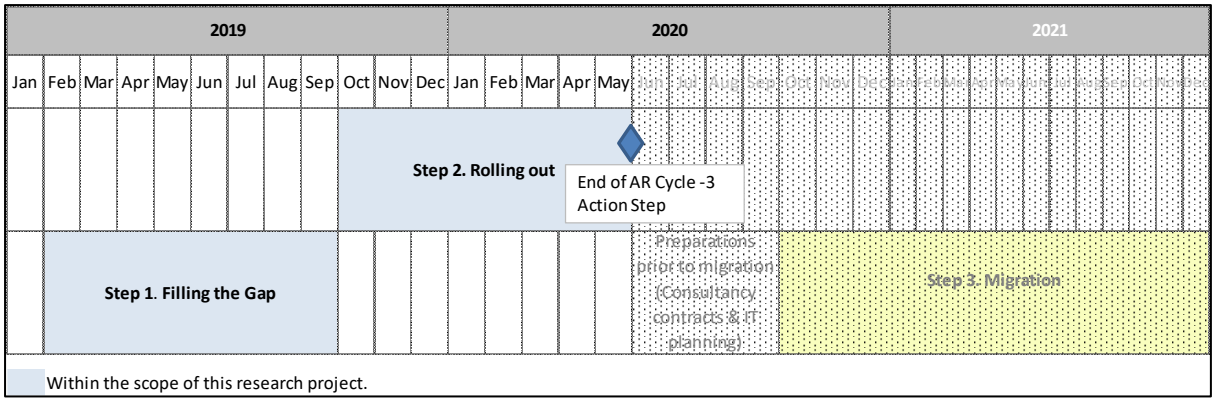

Figure 4.11. The time plan of the AR Cycle-3 actions concerning visual analytics

It could still be argued that the entire migration could have been subject to an exploration from an insider researcher perspective as it would also likely be a significant change effort affecting thousands of users; however, the practicality of this approach would be limited due to the large scope and relatively long timespan (i.e., 1 year) of this step, when considered together with the current stage of the research project and the time left for completion.

4.3.3.2. Reporting and Analytics Governance

This initiative was aimed at establishing the necessary organisational structures, policies, procedures, and an inventory of reports, dashboard applications, and analytical models across the Bank to ensure proper governance of information generation. As such, it would align well with the visions and change proposals derived through the interviews in the "Diagnosis" step.

As we had already set up and put in effect a similar framework with the data governance programme that was carried out throughout the last four years (Please refer to Figure 3.1 for the positioning of the contemporaneous effort along with this research project), this new framework would also benefit from that experience and complement the existing data governance framework.

This initiative has been given the initial start in May 2019 and proceeded with a Bank-wide assessment step conducted in collaboration with a big, global consultancy, and also with the support of the Group, which is the Bank's international shareholder. One-week workshop series was performed with participants from across the entire Head Office. However, after the assessment report and the proposed road map had been presented, the following steps were put on hold by the upper management, considering the more urgent priorities of the Bank, only to be given the approval to

proceed again from 2021 onwards. Consequently, no more details on the reporting and analytics governance initiative will be included in this research project.

4.3.3.3. Advanced Analytics

Although one project aimed at identifying the cash management products which have the most positive impact on the demand deposit volume of the Bank was completed with the relevant business lines in the year 2019, these efforts were not able to be progressed further due to resource constraints and a top-down organisational re-structuring concerning advanced analytics. Consequently, no more details on advanced analytics initiative will be included in this research project.

4.3.4. Evaluating

Throughout the first step of actions, which lasted from February 2019 to September 2019 (Please see Figure 4.11 for the time plan), the following visual analytics applications were developed and given access to their respective target users:

- A mobile analytics application for the Head of the CIB, the C-level executive responsible for the CIB, and the directors and senior managers within the CIB Group,
- A mobile analytics application for the Head of Retail Banking, the C-level executive responsible for retail banking, and the directors and senior managers within the Retail Banking Group,
- A mobile analytics application for the Head of SME Banking, the C-level executive responsible for SME banking, and the directors and senior managers within the SME Banking Group,
- A self-service analytics application for selected users at the Retail Banking Group,
- A self-service analytics application for selected users at the ALM Group,
- A self-service analytics application for selected users at Performance Management Department within the Finance Group.

All of these new applications were to serve the two requirements that could not be addressed properly before, the mobile and self-service analytics. These all, designed and developed in close collaboration with the relevant teams, have been met with great enthusiasm at the beginning.

However, although the self-service analytics apps' usage stayed stable in time, the mobile analytics apps' usage declined over time. With the benefit of hindsight, two main reasons can be identified for this outcome:

- The quick-win approach, which we had to accept due to the business dynamics of the Bank despite our explicit concerns, which prevented the necessary data infrastructure preparations being prioritised. This led to issues with the information architecture of the applications with consequences on UX, only to be realised by the users once the initial enthusiasm had faded away.

- People sticking to printouts instead of mobile, digital means of information access. The tendency to have an A-4 sheet with tiny-font tables prevails to some extent. This was in stark contrast with the feedback we had received upon the launch of the mobile applications, which, for example one from CIB dated September 2019, expressed thanks for helping them getting rid of the necessity to carry spiral-bound books to meetings.

In the second step of the actions, which lasted from October 2019 to May 2020 (Please see Figure 4.11 for the time plan), a much larger-scoped and multi-purpose application was designed and developed for widespread usage across the Bank, replacing the most frequently used and well-established QV Dashboard application. This would become the new single source through which all the performance-management-oriented reporting and analyses could be performed.

The development of this first application for widespread usage on Qlik Sense coincided with the culmination of another, years-long, separate project, which was aimed to replace the entire data infrastructure concerning performance management with newly built data structures on an entire new technology. This would come as a mixed blessing: On one hand, we as the BA team would be able to provide much deeper and wider insights which used not to be possible with the previous data infrastructure while on the other hand there would be many changes delivered to the users all at once, including the changes in the performance management terminology and product hierarchy, along with the replacement of the most frequently used application, which had been their trusted source for years. That the launch was scheduled for the start of the new year, 2020, possibly the busiest time for many of our users, during which they would also rush to analyse their budget and actual figures for the new year, also did not help.

The new application was completed and the users were enabled access in January 2020. It was designed for usage via both mobile devices and laptop/desktop computers, with three categories of sheets for three purposes:

- Dashboard sheets, which were mobile-friendly, but also suitable for usage via laptop/desktop computers,
- Tabular view sheets, which were mainly for monitoring purposes via computers, involving limited interaction,
- Analysis sheets, which were for in-depth interactive visual analyses mainly via computers.

A user-guide in pdf format was also provided as an attachment to the related email announcement, and an e-learning module followed in due course, informed by our prior experience and initial feedback from the users.

In the meantime, the new platform was launched with a new, in-Bank brand, BankAnalytics (name altered for privacy purposes), in an effort to facilitate internal marketing and to detach the front-end from the underlying technology so that in the case of a change in the underlying technology, the in-Bank platform could continue to be used with the same name.

The initial feedback was mixed, some questioning the timing of the launch where some others were questioning the reason behind the replacement of the most frequently used application at all. Much of the feedback was also related to the impact of the other, infrastructure changes, without the users -normally- being aware of that distinction. At a time when people across the Bank were impatiently looking forward to reporting and analysis of their annual performances of the previous year, along with the new year's targets, and when almost every division across the Bank was in need of preparing presentations and reports to the top management on these topics, the change in their fundamental source of data and information was not received with warm welcome. The timing if not the essence of the change was being questioned, which was understandable given the context.

In order to be able to provide a more complete account of the evaluation of this change, the following sub-sections will focus on the research activities performed for this purpose.

4.3.4.1. Research Planning

By the time the first new widespread-usage application on the new platform was rolled out with continuous improvements based on user feedback and technical requirements, it had been some 5 months throughout which the users had been using it.

Having been hit by the COVID-19 (Coronavirus Disease) pandemic from March 2020 onwards (World Health Organisation 2020), life had changed significantly, and so had the priorities and modus

operandi of the Bank, with a shift towards working remotely via digital means for most of the time where possible. From this perspective, the new application with its mobile-oriented features could be expected to be a boon to many users, who were by then confined to their iPhones and iPads.

Considering the multiple factors which potentially had an impact on the users' attitudes towards the new platform, a decision has been made within the Division to delve deeper into the users' perspectives to evaluate the outcome of the initiative as of that time and to gather insights to inform the future actions.

It was judged too early for a new questionnaire, of which data could be comparable to the one that was used in 2016, as the users had a mere 5-month experience with the new platform and under exceptional circumstances thanks to COVID-19, whereas in 2016 the users had been using QV for over three years as of the date of the questionnaire distribution. Interviews were another alternative; however, they were deemed relatively difficult to administer under the remote working conditions and with the users under unprecedented challenges concerning their significantly changing business agendas thanks to COVID-19. Moreover, a wider-scoped user perspective analysis was preferred for the launch, in parallel with the approach concerning QV back in 2016. Consequently, a decision has been made within the Division to use the already flowing e-mail data for the analysis of user perspectives.

4.3.4.2. Research Action/Fieldwork

The Division's inbox dedicated to user correspondence has been used as the data source. In line with the launch and rolling-out of the first new widespread-usage application, the emails including the name of the application and dated from January 2020 to May 2020 have been collected and consolidated in a Word document, where all the sender information of emails have been replaced by higher-level categories indicating the workplace unit of the sender so that the sender information would be one from this list: Head Office, Region, Branch, Performance Management, IT Support, BA Team. All the references to persons, usernames and similar information have also been removed so that the qualitative data to be analysed would not include any words or phrases that could lead to the identification of the sender.

Once the data had been anonymised as explained above, it was saved as a pdf, and then copied and pasted to an Excel file to facilitate the grouping of emails into conversations. All the replies in a given correspondence with the same subject line have been grouped as a conversation. Then, this data has been imported into a new NVivo project for analysis.

Throughout the qualitative data analysis on NVivo, each of the conversations has been coded as a case. As such, a total of 85 cases have been coded, comprising a total of 316 emails, including the replies from my team.

The initial coding has been performed by immersing myself in the data, generating codes while reading over and questioning the emails, so the codes have been generated in an emergent manner (Stroh 2000a; Thornberg & Charmaz 2013). However, I did have three dimensions under which to generate codes beforehand as well. These dimensions, included in the coding, were: Mood, Sender, and Content.

Mood has been used to identify the overall mood of the sender, which could be helpful to have a better understanding of his/her attitude towards the new initiative. Mood comprised the following nodes, which were again obtained in an emergent manner: Complaining, Confused, Happy, Satisfied, Upset. Sender nodes were quite straightforward, indicating whether the sender was from a branch or a region etc. as explained above. Content has been the dimension for all the other codes emerging throughout the analysis.

Once the initial coding had been completed, focused coding (Thornberg & Charmaz 2013) has been performed over the initial codes to finalise the code structure, through the generation of two aggregated, higher-level nodes under the Content dimension, and recoding of three references into more nodes deemed more suitable.

4.3.4.3. Research Evaluation

The contents of the user emails under investigation coalesced around three major themes, which were issue, inquiry, and feedback, ordered by the number of references coded at each of these themes.

- Issue

  Most of the content coded under this main theme was related to the problems experienced by users when they were trying to log in to the new platform, BankAnalytics, either via computers or mobile devices, or about a technical issue which would cause their session to be ended only after a very short period of inactivity.

  - Issue – Access Related

    "Hello, how can we obtain the username and password to log in to BankAnalytics; is

that with the employee id and system [name of the core banking system] password?" (CS02, Reference 1, my translation)

- Issue – mobile app related

  "Hello, when logged in via iPad, the system kicks me out shortly after the log in and displays a 'refresh' message. When refresh has been done, it removes all selections and starts again right from the beginning. Your help requested."
  (CS58, Reference 2, my translation)

- Inquiry: Inquiries were the emails where the users sought information on how to perform specific tasks on BankAnalytics or how to find specific information.

  - Inquiry – Content Related

    "There used to be the review flows, which had an impact on our performance scorecards and which we used to monitor via [the previous app on QV]. How can we see that on BankAnalytics? Your support requested."
    (CS1, Reference 1, my translation)

  - Inquiry – Usage Related

    "(…) Is there a way to save bookmarks like we used to do on QV so that we can save our selections?" (CS46, Reference 8, my translation)

  - Inquiry – Lack of Awareness

    "How can I see my 2020 targets as per each item?"
    (CS49, Reference 2, my translation)

- Feedback

  Feedback was mostly data-related, no matter whether or not the user was aware of the distinction between data and the application. Second most common topic was the usability.

  - Feedback – Data-related

    "The application still shows the mid-February figures. Is there anything we must do for an update? [dated 03 March 2020]" (CS53, Reference 2, my translation)

  - Feedback – Usage-related

    "Hello, the new application is very difficult [to use] and very complicated. We have been working to discover since yesterday. I just want to see the total working volume of my branch, but I can't find. RMs have been utterly confused. We had already

struggled to get used to QV. This application has to be made leaner and easier [to use]. For your information." (CS23, Reference 1, my translation)

As for moods of the senders as perceived by myself through the rhetoric of the emails, a majority was coded as "neutral", with few "complaining" or "confused" moods perceived in the emails giving data-or-usage-related feedback or those about the issues experienced by the users.

A breakdown of the content major themes according to the mood is given in Table 4.26 below. For example, concerning the "Feedback Data Related" content theme, 7 references were coded as "Neutral", 2 references were coded as "Complaining", and 1 reference was coded as "Confused".

Table 4.26. Most common email content themes vs perceived moods

#	Content Theme	Complaining	Confused	Happy	Neutral	Satisfied	Upset
1	Feedback Data Related	2	1	0	7	0	0
2	Feedback UX issue Complicated	2	0	0	2	0	0
3	Inquiry Content Related	0	1	0	11	0	0
4	Inquiry Lack of Awareness	1	0	0	4	0	0
5	Inquiry Usage Related	0	4	0	12	0	0
6	Issue Access Related	1	3	0	48	0	1
7	Issue mobile app related	4	0	0	5	0	0
8	Info Resolved	0	0	2	0	11	0

4.3.4.4. Research Conclusions from Fieldwork

These results are important not only in relation to the change delivered directly in the way people across the Bank interact with data to make decisions but also the further changes happening or expected through this initiative such as the minimisation of the need to take printouts, minimisation of the requirement to be at the office to analyse data thanks to the enablement of access through a dedicated mobile app on mobile devices, and also the significant change that has been triggered

externally by the COVID-19 pandemic, which is the significant shift towards remote working where possible.

The results of the email data analysis suggest that users have been trying to adapt to the new platform, since they were informing the BA team of the issues they faced in most of the cases. This could be seen as an indication of responsiveness on the user side, as a sign of activity on the platform. It could be argued that they did not have any other choice as their single source, which used to be the most frequently used dashboard application on QV, had been replaced with this new application on BankAnalytics; however, other teams working on generating static reports from the same data source on Excel sheets could be an incentive for the users to choose those reports instead, leading to reluctance in adapting to the new platform.

Notwithstanding the explanations above, reluctance was being observed to some extent, as can also be derived from the relatively small number of emails received in 5 months, given the number of target users is above 4.000, though not all of them would be active every month. One important factor on this might have been the lags in feeding the new application with fresh data due to some significant technical challenges experienced by the team which was providing the data to us, which was related to the coinciding changes in the data infrastructure. Some users' feedback concerning the data not being up to date may support this argument.

When considered together with the usage statistics, it becomes obvious that users were only partially active on the new platform during the first months following the launch. Figure 4.12 and Figure 4.13 below show the trend of number of clicks and number of users[12], respectively, on the new platform, BankAnalytics. Both figures start to rise with the roll-out of the new platform, BankAnalytics, in January 2020, as both more senior managers (represented by the red lines) and staff below the senior manager level (represented by the blue lines) have started to use the new platform, particularly with the new performance management app, which has replaced the most frequently used app on the former platform, QV. On the other hand, the total number of users on this new platform remains below 1.500, around or just over 1.000 throughout the year 2020, which is well below the number of users for the previous QV app which has been replaced. Furthermore, the trends given in Figure 4.12 and Figure 4.13 also display significant peaks in January 2020, the start of the roll-out of the new platform, in May 2020, and then again in March 2021, plateauing at relatively lower levels in between these peak months. This pattern reflects the issues with the source data of the platform, which caused significant delays in feeding the new performance management app with fresh data. Following the

[12] The "unidentified users" in the chart are the users whose ids and organisational information could not be extracted form the log records due to a technical problem.

roll-out in January 2020, the first update could be made only in May 2020, then continuing with irregular and infrequent updates with the data having other quality issues as well. We managed to start to update the new performance management app on a daily basis with fresh and quality data only in March 2021, after which usage levels started to increase and stayed at relatively higher levels, though still not at on a par with the previous most used app on QV.

As for a further analysis of this partial first-stage activation by the users of this new platform, Figure 4.12 shows approximately similar numbers of clicks from both more senior manager and other users with the number of clicks by the lower-level users slightly higher at the start, then the number of clicks by senior managers becoming higher from April to September 2020, then the higher number alternating between the two groups at relatively lower levels, and finally, from April 2021, number of clicks by lower-level users starting to become higher, as would normally be expected, as their total number across entire set of target users is also higher than more senior managers.

The delayed increase of the number of users in Figure 4.13 may be due to they being more reluctant to start using the new platform in the face of the aforementioned data quality issues given their higher operational burdens, gaining pace particularly from March 2021 onwards, when the application was started to be updated regularly with fresh data.

Figure 4.14 shows that the number of users for the most frequently used app on QV had remained within the 2.500 – 3.000 range on a monthly basis throughout most of the time period during which it remained actively in use, until its replacement in January 2021, when it has made a dip, expectedly. This range is clearly more in line with the initially planned user coverage of QV, as discussed in Section 4.1.3. As for the usage statistics given in Figure 4.14, one interesting point can be that the number of users of the app in question does not show an increase following the implementation of the new, UX-improved version of this app in May 2017, rather staying in a declining trend till January 2018 where it starts an upwards trend again, then declining gradually again and plateauing between July 2018 and May 2019. On the other hand, when considered together with the findings of AR Cycle-2 on the evaluation of these UX improvements, this trend looks in line with the limited awareness or impact on the use side of these renovations, perhaps helping us sustain the number of users but not to increase them.

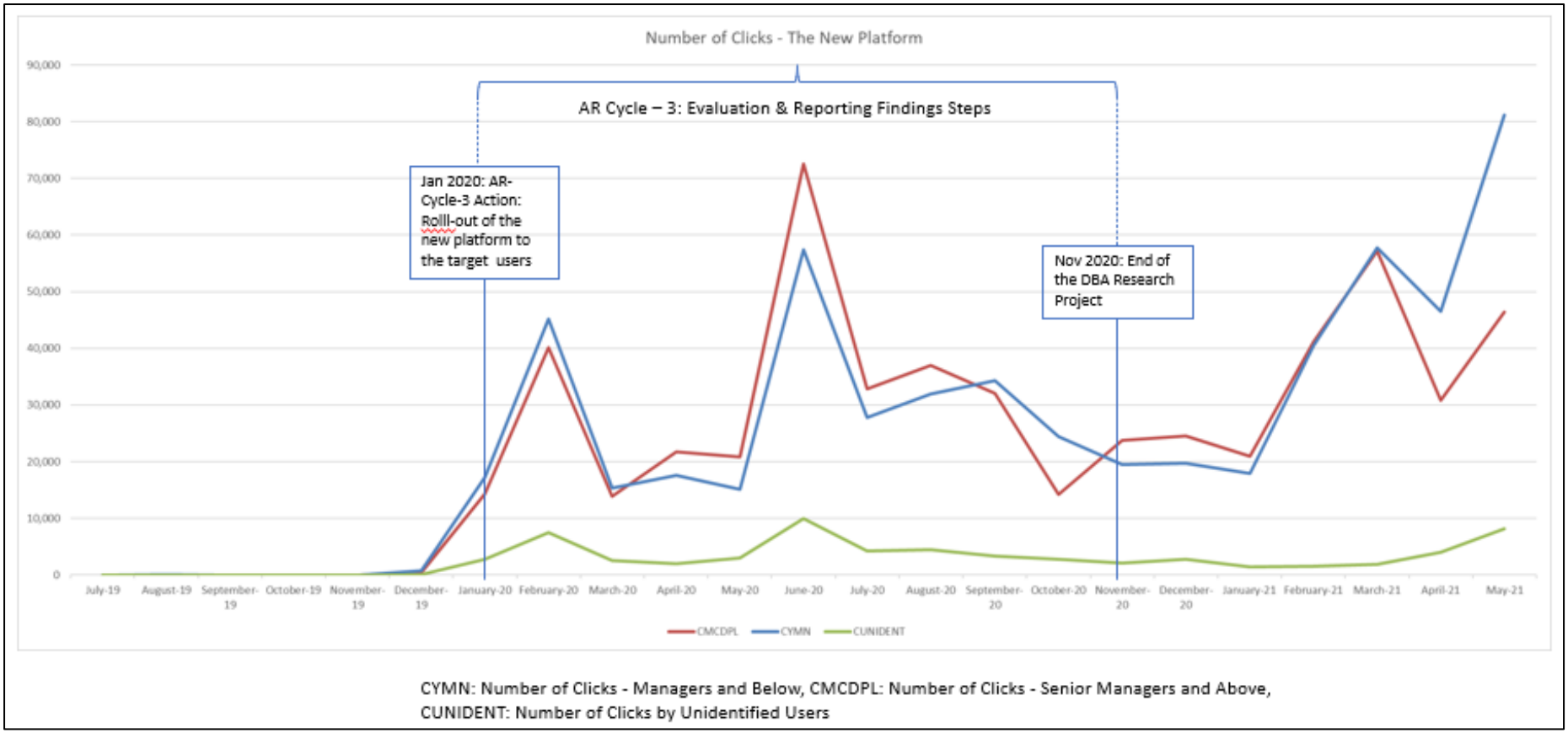

Figure 4.12. The trend chart of number of clicks – BankAnalytics

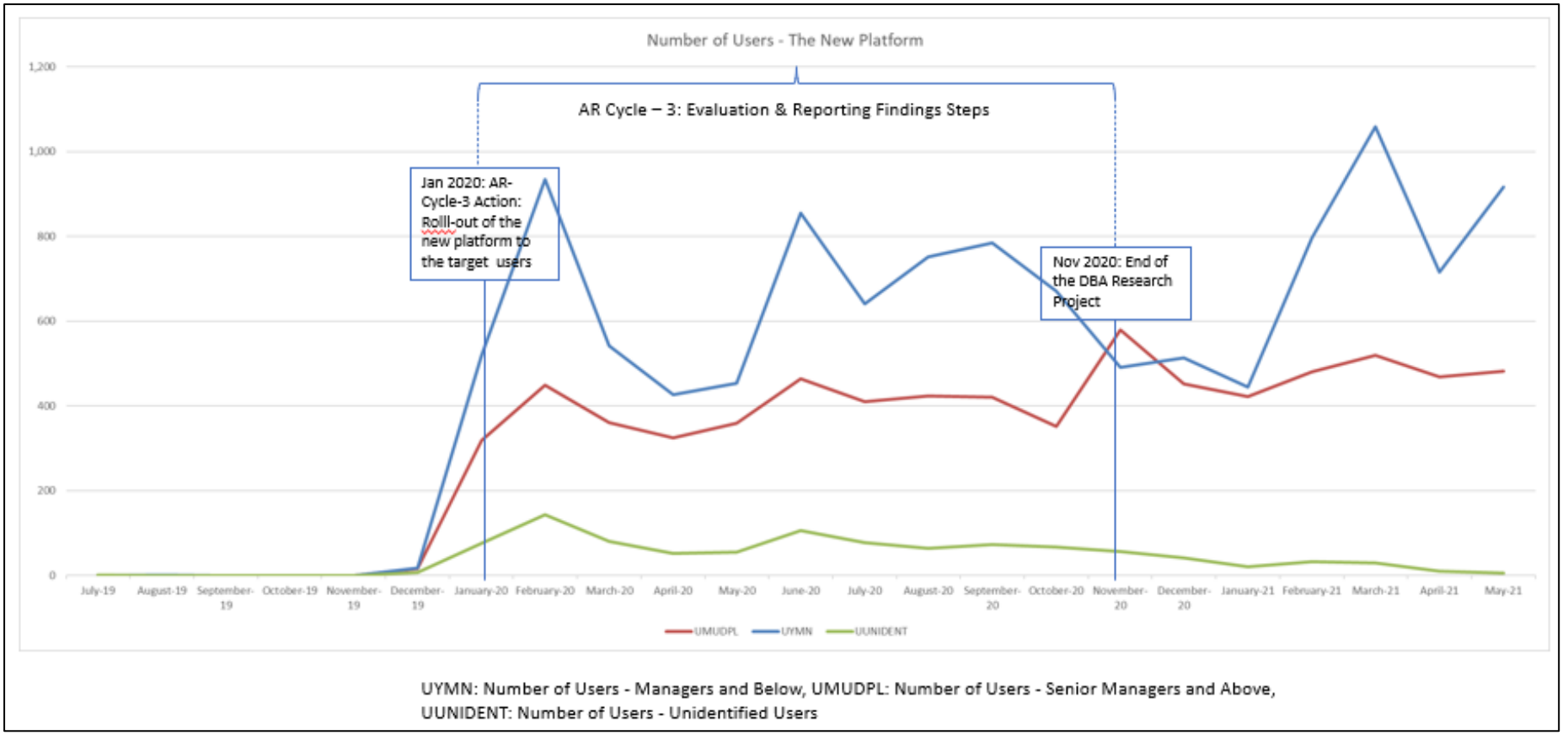

Figure 4.13. The trend chart of number of users - BankAnalytics

Still, the number of clicks for the most used QV app given in Figure 4.15 show a significant upwards trend starting from some 6 months after the implementation of the new version, between January 2018 and May 2019, which can reflect a delayed impact of the UX-improvements on existing users, perhaps only having become more visible once all the QV applications had been renovated. This increase on the usage of this particular app, which was the most used QV app, was in-line with our expectations in that particularly the more interactive-analysis oriented sheets of the app would become more user-friendly, triggering more interactive analyses rather than only dashboard views on the user side.

This limited change in the behaviour of users concerning their data and information access throughout the first year of the roll-out could be considered as an outcome not in line with the initial expectations, particularly when the shift towards remote working with the impact of the COVID-19 pandemic is taken into account, and when compared with the shift in usage levels during the implementation and roll-out of the previous platform, QV, as explained in Section 4.1, which is also visible on Figure 4.14 below.

On the other hand, changing priorities thanks to the pandemic combined with the data-related issues on the platform might have made such an impact on the users' willingness to use a newly launched application, with performance targets having lost their place as a top priority amid health concerns and the challenges of adapting to the pandemic-related changes. Replacement of their most frequently used QV dashboard application also might have triggered a resistance to some extent.

An interesting point worth mentioning is that almost all of the issues and inquiries the users emailed on already had their explanations in the user manual and in the e-learning module. Many of these were simple issues like misspellings (e.g., writing "/" instead of "\") or asking for the purpose of one specific object (e.g., a button) on the screen. This could -at least partially- be a reflection of some characteristics of a majority of our internal users, who are marketing and sales staff (Please see Table 4.6 for more information), combined with an overall negative attitude towards learning by reading or watching across the Bank. Of the 16 personality types given by The Myers & Briggs Foundation (n.d.), sales and marketing staff are generally expected to be of those with "extraversion" as the identified type for the "favourite world" dichotomy, as research has that extroversion as a personality type is a significant predictor of higher job performance for sales employees (e.g., Frieder, Wang & Oh 2018; Vinchur, Schippmann, Switzer, et al. 1998). Considering some relevant characteristics associated with the eight "extrovert" personality types given by The Myers & Briggs Foundation (n.d.) (e.g., spontaneous, learn by doing/trying, quick, outspoken, practical), it could be argued that a majority of

our internal users would not be willing to take time to refer to the user manual or the e-learning module, or this would not be an effective method for them to get familiar with something new.

To all its limitations in its first year, as discussed above, still a significant shift in the users' usage levels of the new platform has started to take place, with the usage statistics showing an upward trend from January 2021 onwards, including the emergence of mobile analytics as an alternative means of information access. As mobile access to a visual analytics platform via a dedicated mobile app has been enabled only with the new platform, the number of mobile sessions[13] on the new platform started to rise, as can be seen in the Figure 4.16 below. Although desktop and laptop PCs are still the dominant means of access, the emergence of mobile sessions with over 1.000 sessions in this new era still indicates at least a start of the shift in usage levels, as we could expect people to use mobile access mostly when they are out of office or when it is out of normal office hours, which were both impossible prior to the roll-out of BankAnalytics[14].

[13] A "session" is each of the periods of activity starting with a user's log in to the system.
[14] "Number of sessions" statistics were not available in our QV log data source, so a comparison between the QV and BA will not be possible in this aspect.

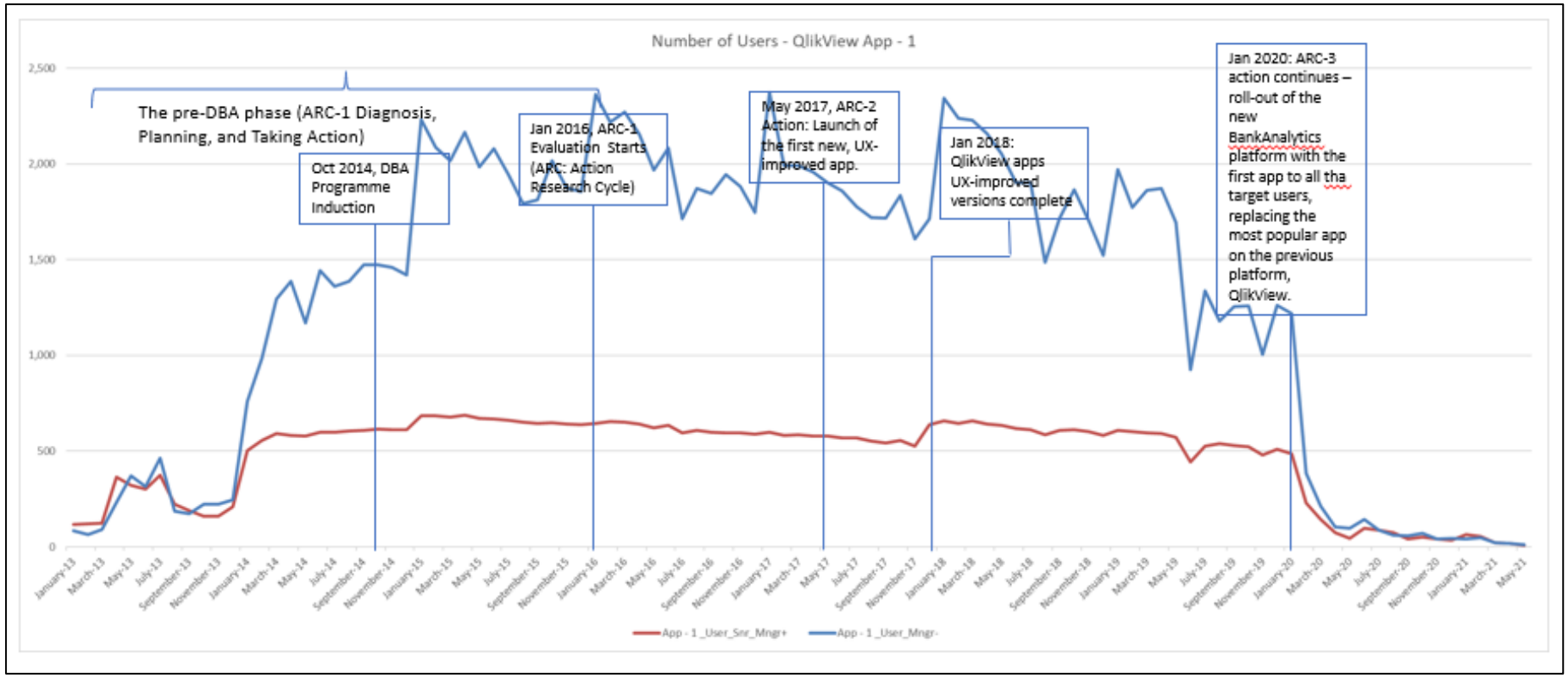

Figure 4.14. The trend chart of number of users – most frequently used QV app

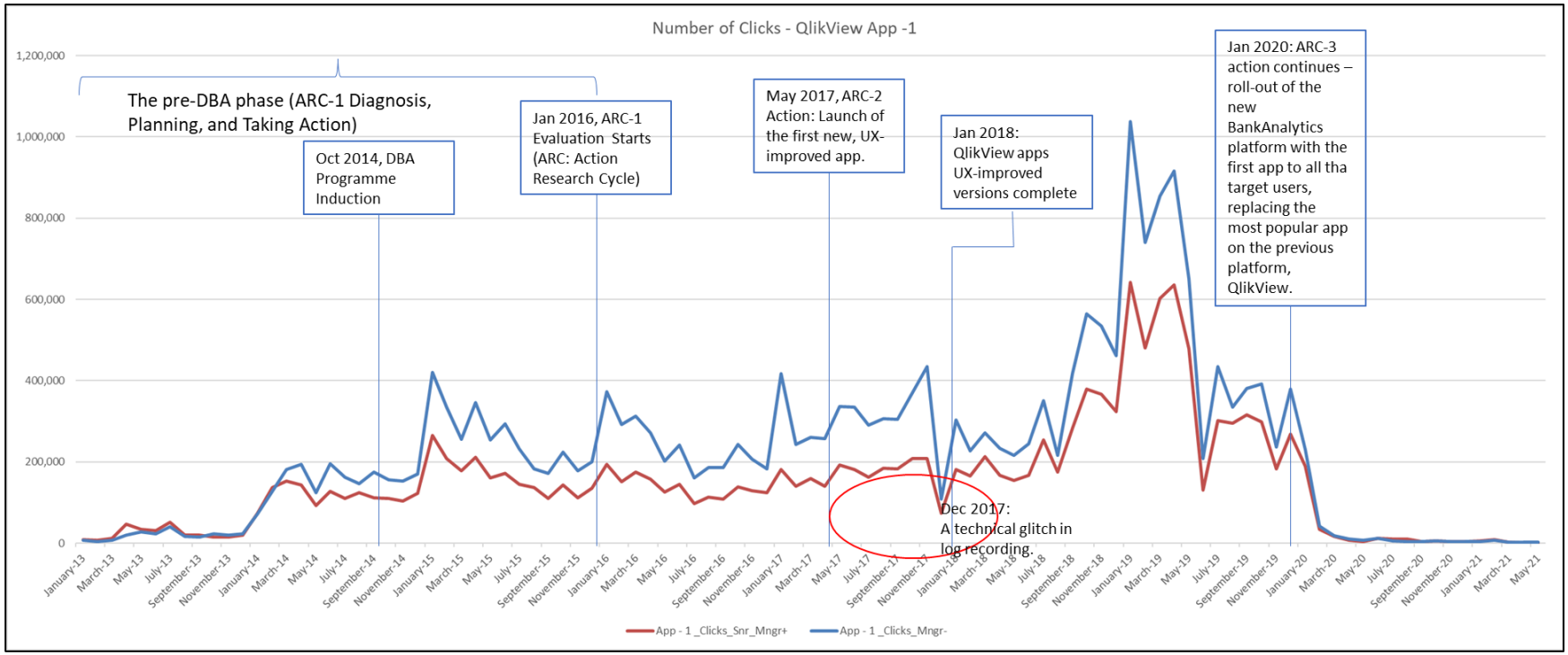

Figure 4.15. The trend chart of number of clicks – most frequently used QV app

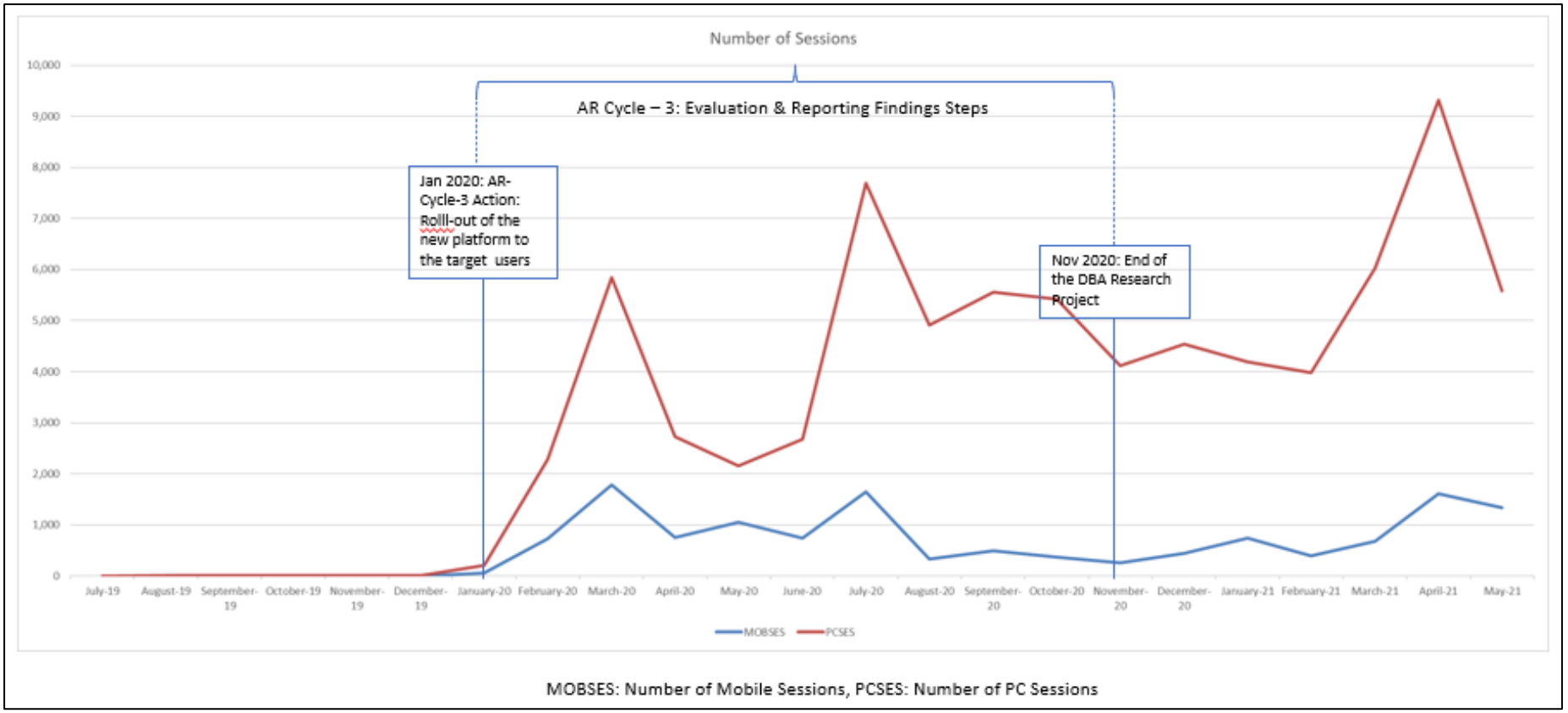

Figure 4.16. The trend chart of number of mobile vs desktop/laptop PC sessions - BankAnalytics

A Brief Examination of the Adoption of BankAnalytics from an Innovation Diffusion Perspective

The apparent differences which were explained above between the usage levels of the first platform, QV, and the second one, which replaced it, the BankAnalytics, led me to consider taking a deeper look at this issue with another lens, that of the IDT (Innovation Diffusion Theory) (Rogers 2003). The aim of this brief examination is to help us better understand and explain the usage levels of BankAnalytics vis-à-vis the usage levels at the beginnings of the QV implementation.

Rogers (2003, p.26) defines innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption". Here the emphasis is on the perception of the receiving side rather than the objective newness of the idea or the practice itself. With this approach, if an idea or practice is perceived as being new, then it is an innovation. In this sense, it can be considered as a concept closely related to the concept of change and the management of it, which was discussed extensively throughout this thesis. All innovations entail uncertainty to some extent on the receiver side as they are perceived as something new, similar to what is called a foreign element in the change management literature (Weinberg 1997).

Diffusion (of innovation), the other concept in the name of IDT, refers to the process of communicating an innovation through various channels to potential adopters over time (Rogers 2003). In this sense, diffusion is a process of social change among the members of a social system -like an organisation-leading to changes in the structure and functioning of the relevant aspects of that social system. This process is one that consists of information exchange activities about the innovation, with an aim of reducing the perceived uncertainty on the potential adopters' minds concerning the innovation and its consequences so that they can decide whether to adopt or reject the innovation (Rogers 2003).

In light of the conceptualisations above, implementation of any new information technology is also considered as an innovation worthy of exploration from an innovation diffusion perspective by various researchers (e.g., Karahanna, Straub & Chervany 1999; Puklavec, Oliveira & Popovic 2018). As the process of information technology adoption and use is of great importance in order to be able to reap the expected benefits from the implementation of the information technology, the factors having an impact on the usage of the new technology by the members of the social system in which it is implemented has been an area of investigation for researchers (Karahanna, Straub & Chervany 1999). Within the broader concept of information technology, implementation of business intelligence systems in organisations is a specific type of technology-related innovation on which extant research is relatively scarce (Puklavec, Oliveira & Popovic 2018). As such, a brief evaluation of the

implementation of BankAnalytics vis-à-vis the implementation of QV from this perspective can improve our understanding of the ongoing change process across the Bank.

The five characteristics of innovations given by Rogers (2003) can provide a helpful ground for this brief exploration, therefore brief descriptions of these characteristics are given below:

1) Relative Advantage

Relative advantage is the extent to which an innovation is perceived as more advantageous than the existing technology or tools by its potential adopters. Here, too, the emphasis is on the perception of the potential adopters rather than whether it is objectively more advantageous or not. The higher this perception of relative advantage the more rapidly the innovation is expected to be adopted.

2) Compatibility

Compatibility is the extent to which an innovation is perceived as being in line with the existing values, experiences, and requirements of the potential adopters. The more compatible an innovation is perceived to be the more likely it is to be adopted rapidly.

3) Complexity

Complexity is the degree to which an innovation is perceived as being difficult to comprehend and use by its potential adopters. Innovations which are perceived as not being complex are expected to be adopted more rapidly.

4) Trialability

Trialability is the degree to which an innovation can be used with a limited scope for trial purposes. When potential adopters are able to try an innovation, the uncertainty around the innovation can be reduced so that adoption can take place more rapidly.

5) Observability

Observability is the extent to which the results of an innovation are visible across the potential adopters. Peers already using the innovation provide a good incentive for the potential adopters to follow suit, hence the higher the observability of an innovation the more rapidly it is expected to be adopted.

Along with the characteristics of innovations as briefly explained above, the IDT has established a common pattern for how the diffusion of innovation takes place for most innovations across the members of a social system: It follows a bell-shaped curve (i.e., the normal distribution curve), leading to an S-shaped curve in cumulative distribution terms, with 5 generally accepted

categories of adopters with common adoption behaviours (Rogers 2003). These 5 categories of adopters are: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards (Please see Figure 4.17 and Figure 4.18 below for illustrations of these typical patterns).

It should be noted that although IDT establishes this S-shaped pattern for most innovations, Rogers state that this is not the absolute fact for all innovations as the diffusion of innovations should be analysed empirically for each individual innovation, as the diffusion pattern is dependent on the specific features of the innovation itself (Rogers 2003). As such, this general pattern will be used in the following paragraphs as a ground on which to examine the implementation of BankAnalytics in comparison with the previous implementation, that of QV.

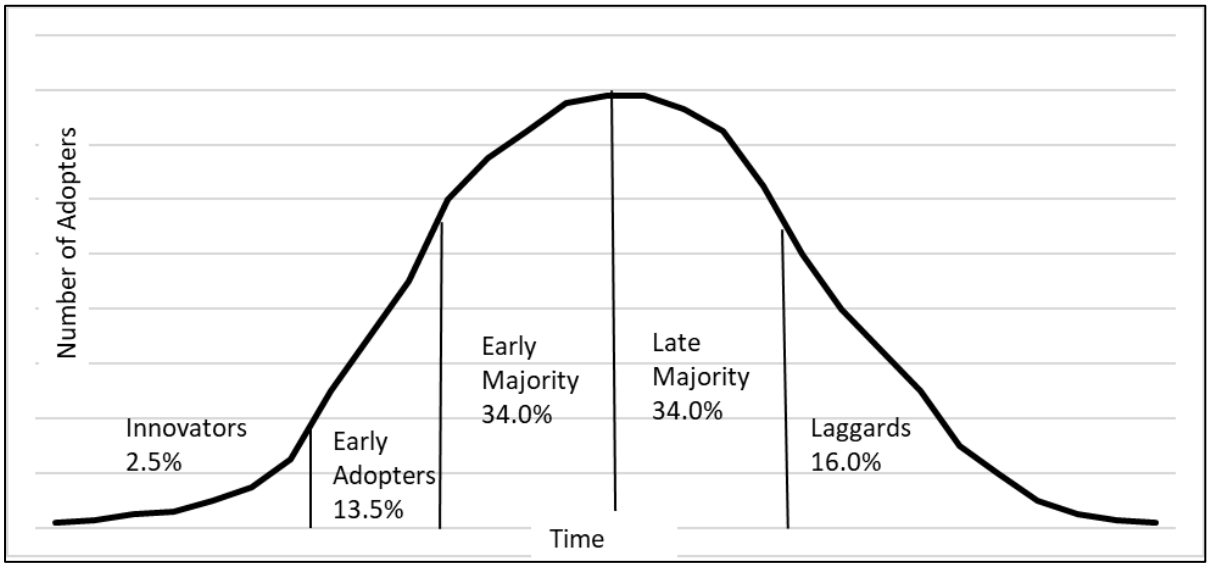

Figure 4.17. Diffusion of an Innovation - Number of Adopters vs. Time (Illustrative) (Rogers 2003)

The criterion forming the basis for this adopter categorisation is innovativeness, which can be defined as the extent to which a potential adopter is willing to adopt new ideas or practices relatively faster than the other members of the same social system. As such, innovativeness decreases as we move from innovators to early adopters and so on towards laggards.

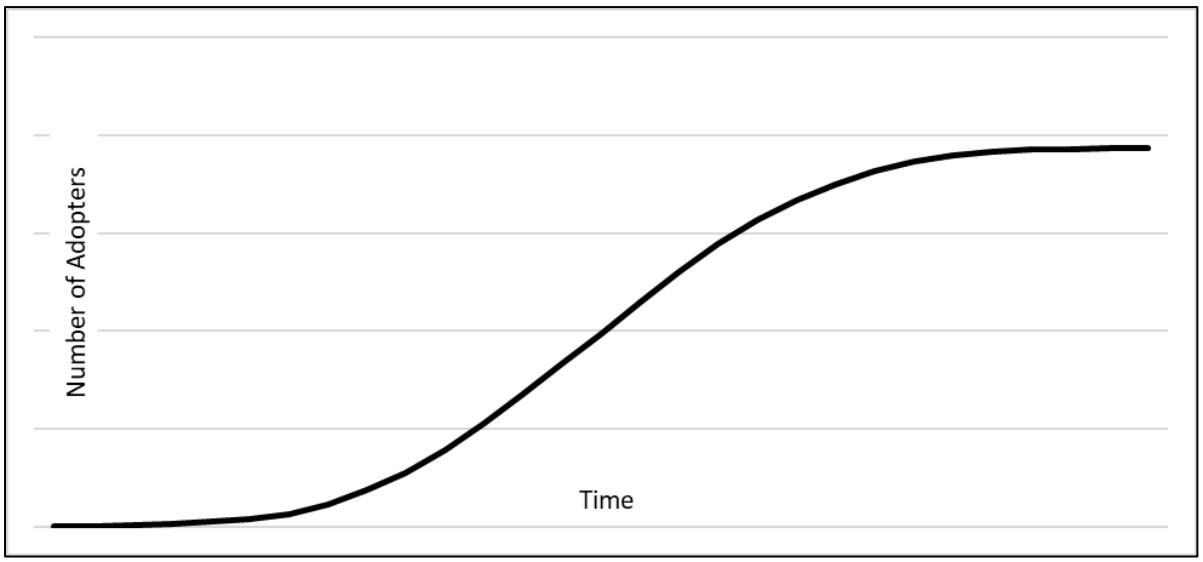

Figure 4.18. Diffusion of an Innovation – Cumulative Number of Adopters vs. Time (Illustrative) (Rogers 2003)

When the usage levels of BankAnalytics (Figure 4.13) following the roll-out is examined with this lens, it can be discerned that the innovators, early adopters, and early majority have started to use the platform as of May 2021 given the total number of users per month stands around 1.500 (circa 1.000 staff and 500 more senior managers), which is roughly 50% of what could be expected based on the number of users per month for the most frequently used QV app, which has been replaced (Figure 4.14). When these figures are examined across time, from January 2021 to May 2021, the trend of the number of users of BankAnalytics seems to diverge from the typical pattern given by Rogers (2003) as almost all the circa 1.500 users per month have started to use the platform right from the first month, with fluctuations but no significant increase over this figure in this period.

On the contrary, the number of users per month given for the most used application on the previous platform, QV, seems to have followed a different pattern, one more similar to the typical pattern given by Rogers (2003), with the monthly user numbers remaining relatively lower and flat in the first few months following the roll-out in January 2013, then continuing with a steep increase from November 2013 to January 2015, then generally plateauing until around March 2019 when it starts to decrease until its eventual dip starting by January 2020. These discrepancies may reflect the differences between the characteristics of these two implementations as well the business actions taken and some other factors in the organisational context. In the following a few paragraphs, these discrepancies will be examined in more detail primarily as per the characteristics of innovations given by Rogers (2003), as briefly explained earlier in this section. A subjective, quantified evaluation by the researcher will also be provided on a 5-point scale to facilitate interpretation (Table 4.27). The higher

the score the more relatively advantageous, more compatible, more complex, etc. each platform is perceived to be as per these characteristics.

Relative Advantage: QV was implemented in a context where there were legacy methods of data processing and reporting, like report generation through database queries which we can call traditional business intelligence. As such, it brought obvious advantages at that time in terms of data accessibility, analysis capabilities and performance, as explained in detail in Section 4.1 and supported by the questionnaire results discussed in the aforementioned section. BankAnalytics, on the other hand, has been implemented as the next step forward in an organisational context where QV was already the established enterprise platform for visual analytics. It has brought advantages mainly in terms of mobiles access and improved self-service capabilities along with better visualisation and governance; however, these advantages, as good as they are in themselves, were relatively less significant for the end users when compared with QV's advantages back in its day of implementation, particularly in the immediate aftermath of the implementation. As such, QV can be given a 5 for the relative advantage it provided in its time of implementation, whereas BankAnalytics can get a 2 in that sense.

Compatibility: QV was mostly an unknown territory for most if not all of the internal users when it was implemented. Target users were mainly used to generating static reports through legacy reporting menus or being sent reports via emails. Much information used to be invisible to them, let alone being accessible in seconds at their fingertips. However, there was a good emphasis on the importance of data in business decisions, at least in terms of rhetoric across the organisation. Additionally, the new platform brought a level of transparency which was unprecedented for the Bank at that time, as even the granular details of high-level reports (e.g., customer and transaction-level details) were made accessible with a few clicks, making it look like kind of a mixed blessing: good in the sense of democratisation of data, but somewhat worrying for some in the sense that there would be little room left to escape from scrutiny. As for BankAnalytics, on the other hand, compatibility could hardly be an issue as all the target users were already using QV when it was implemented. As such, QV can get a 3 in terms of compatibility, whereas BankAnalytics gets 5.

Complexity: As discussed in Section 4.1, complexity was the most prominent area of improvement for QV as evidenced through the questionnaire data analysis results in AR Cycle-1. As such, at least in the eyes of its target users, QV was relatively complex as a platform, when compared to their legacy tools for data processing and reporting. As for BankAnalytics, although can be perceived as complex as another new platform, particularly considering the roll-out having been made with an app fed by an entirely new data set, at least target users were used to working with a similar platform, which is QV,

at time of its implementation. Therefore, it could be argued that complexity has been less of an issue than with QV. Therefore, QV can be judged as 5 for this characteristic, whereas BankAnalytics can be given a 3.

Trialability: Both platforms offered limited trialability for the majority of the target users at the time of their implementation as most of the users were introduced to the platforms with the roll-outs. This is due to the fact that the decision to put the platforms into use had already been taken by the Head Office and top management. This does not necessarily mean that the decision process concerning these implementations were purely an authority innovation decision, where the decision to adopt is made by those in the authority and/or having the technical expertise (Rogers 2003). The adoption of these platforms can be deemed to be more of the type of contingent innovation decisions (Rogers 2003), in that although the decision to implement was taken by the head office and the top management, adoption by each individual user was down to themselves, not fully free-choice as there was no alternative with the same capabilities, but still there was no formal obligation for them to use, as these were analytics platforms in the end, and not core banking systems that the staff use for essential banking transactions. In a nutshell, both of these platforms could be considered as offering some trialability to more or less the same extent, which can be judged as 3 over 5.

Observability: QV was highly promoted by the users at the Head Office and regional directorates, setting example for a wider range of users across the branches. As they were being informed and questioned based on the results taken from the QV, they were being directed to the platform for further investigation of their figures. The number of users was rising fast, as can be seen on Figure 4.14, pointing at a relatively higher level of observability. As for BankAnalytics, observability was relatively lower throughout the first one year following the roll-out. This was mainly due to the problems related to data quality, including the freshness of data, of the single application that was rolled out to all the target users, as was also mentioned earlier in this section. Considering that organisational data environment, which refers to the quality, availability, etc. aspects of the data being fed into an analytics system in the context of business intelligence implementation (Rehman & Ali 2014; Puklavec, Oliveira & Popovic 2018), is a factor on the success of the analytics platform implementations (Puklavec, Oliveira & Popovic 2018), the problems with this part of organisation's data have played a major role in the relatively limited observability of BanAnalytics in its first year. Overall, QV can be judged to receive a score of 5 in this aspect, whereas BankAnalytics can be given a 2.

Table 4.27. Subjective Scores as per the Innovation Characteristics of QV and BankAnalytics

Innovation Characteristic	QV Score by the Researcher	BankAnalytics Score by the Researcher
Relative Advantage	5	2
Compatibility	3	5
Complexity	5	3
Trialability	3	3
Observability	5	2

The relatively lower perceptions of relative advantage and observability for BankAnalytics following the roll-out could be considered as the factors that led to a slower pace of adoption when compared to that of the QV, despite relatively more favourable perceptions of complexity and compatibility. Having been introduced to replace an already established platform of more or less the same kind, this has been a different experience for the researcher and his team when compared to the QV implementation, which had replaced some legacy reporting tools and nothing of its own kind back at the time of its implementation. This view is also visible on Figure 4.19 below, which shows that part of the users of the most frequently used QV app, though not the majority, have yet to switch to the new platform despite the previous one being discontinued (i.e., around 1.800 users on QV App-1 in Jan. 2020 vs. around 1.400 users on BankAnalytics in May 2021.).

To conclude, the new platform, BankAnalytics, with an emphasis on mobile and self-service analytics, has been implemented and rolled out to all the target users across the Bank in 2020. The first visual analytics application for widespread usage on that platform has replaced the most frequently used QV dashboard application, which had been used for seven years for the purposes of performance-management-related decision support. The initiative as a whole, including not only the design and development of the applications but also the process thereof, has been informed by the findings of this research project as explained earlier in this section. It has been received by the users with less of an enthusiasm when compared with the QV launch back seven years ago; however, it has been integrated into the users' work-related decision-making processes with gradually increasing usage and made it possible to monitor and visually analyse data from anywhere through mobile devices, aligning well with the wider-scoped digitalisation efforts across the Bank and the shift towards remote working thanks to the COVID-19 pandemic.

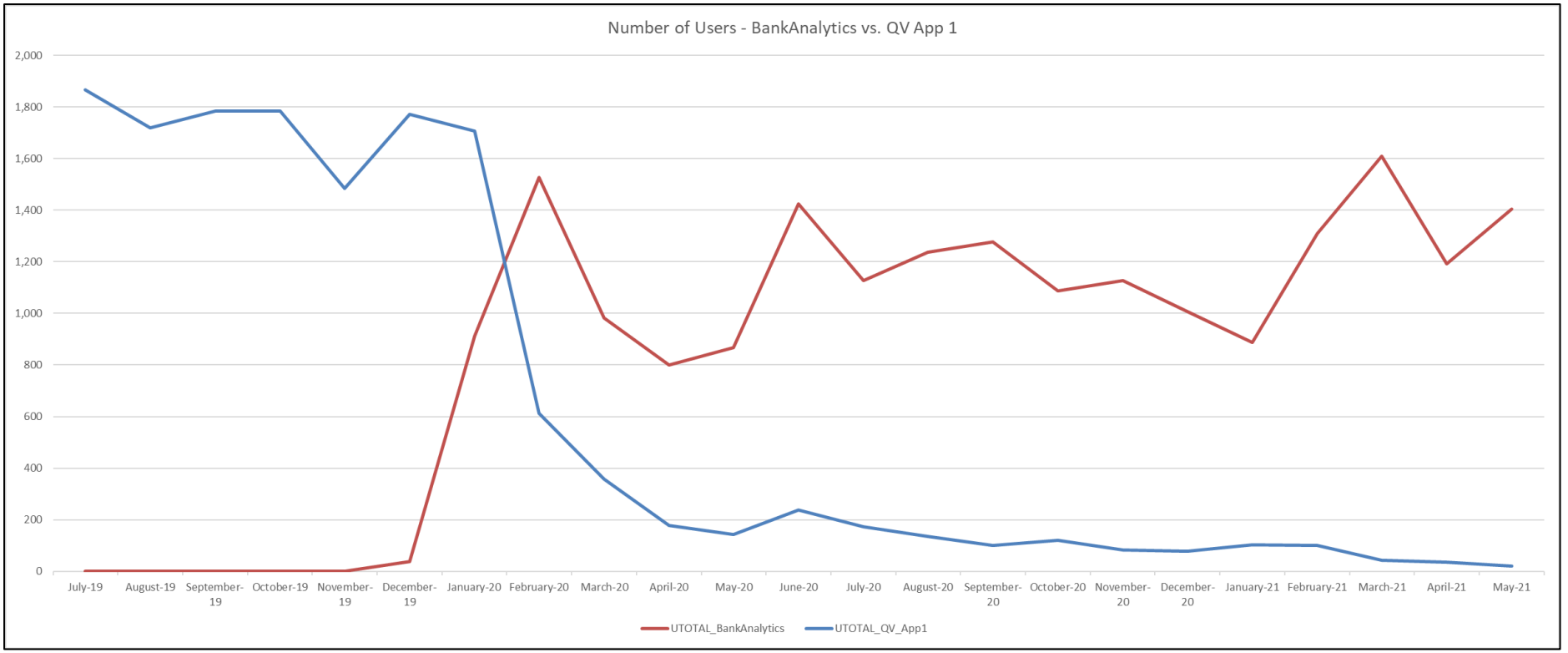

Figure 4.19. The trend of number of users on BankAnalytics and QV App-1 during the roll-out of BankAnalytics

4.3.5. Reporting Findings

4.3.5.1. Academic and Business Outcomes

From an academic perspective, the findings from this research cycle may indicate a relatively muted response across the Bank in the face of the changes delivered into the users' means of information access as part of their decision-making processes, particularly for the purposes of performance management as the first rolled-out application for widespread usage was aimed to support performance management decisions. On the other hand, when the relatively small number of emails received in this context is considered together with other feedback raised through phone calls, during the meetings between the field staff and business lines (i.e., meetings with different purposes, which we do not attend, but this topic is also discussed and then transmitted to us verbally), a more significant impact on users' lives at the workplace can be visible.

That a good majority of user responses focus on the access-related or usage-related issues and inquiries hint at users making trials to get themselves familiar with the new platform. This can be taken as a positive sign that not a significant resistance is observed. On the other hand, the limited positive reactions lacking enthusiasm despite the new platform, with its mobile capabilities, aligning well with the users' new, remote working practices, is worth consideration. As discussed earlier in the previous sub-section, this may -at least partially- be related to the shifting priorities due to the COVID-19 health crisis. Another factor might have been the issues related to the freshness of the data, which was due to the contemporaneous change effort on the data infrastructure.

That in most cases the solutions to users' issues were already provided in the user manual and/or the e-learning module was another interesting point that could be related to the personality types of the users, a majority of whom are sales and marketing staff, as discussed in the previous sub-section.

It could be helpful to revisit the dimensions of change given by Lientz and Rea (2004), which were used as a lens to evaluate the change efforts in the previous cycles in Section 4.2.5, this time including the changes delivered in this third cycle. As such, a subjective self-evaluation concerning the changes in this cycle is provided in Figure 4.20 and Table 4.28 below.

From a business perspective, a new visual analytics platform has been implemented and rolled out to all the target users, without any technical issues and not facing any significant resistance from the users in such a critical period during which year-end performance pressures and workload was

combined with the changing priorities of the COVID-19 pandemic era. This new initiative has been informed by the findings of this research project right from the beginning and has been carried out with careful planning in many aspects from the user requirement workshops to technical requirements analysis and related actions to user training and support. Against a backdrop of tightening market conditions, the shift towards remote working, and the Bank's digitalisation efforts in a more general sense, it is aligned well with the Bank's agenda through further democratisation of data with the enablement of mobile and self-service analytics for end users. While the mixed feedback from the users at all levels remains an issue, normally, for us to deal with as part of our business as usual, the upward trend of usage and the improved adoption particularly at the head office can be considered as encouraging signs to continue with improvements and scope extension.

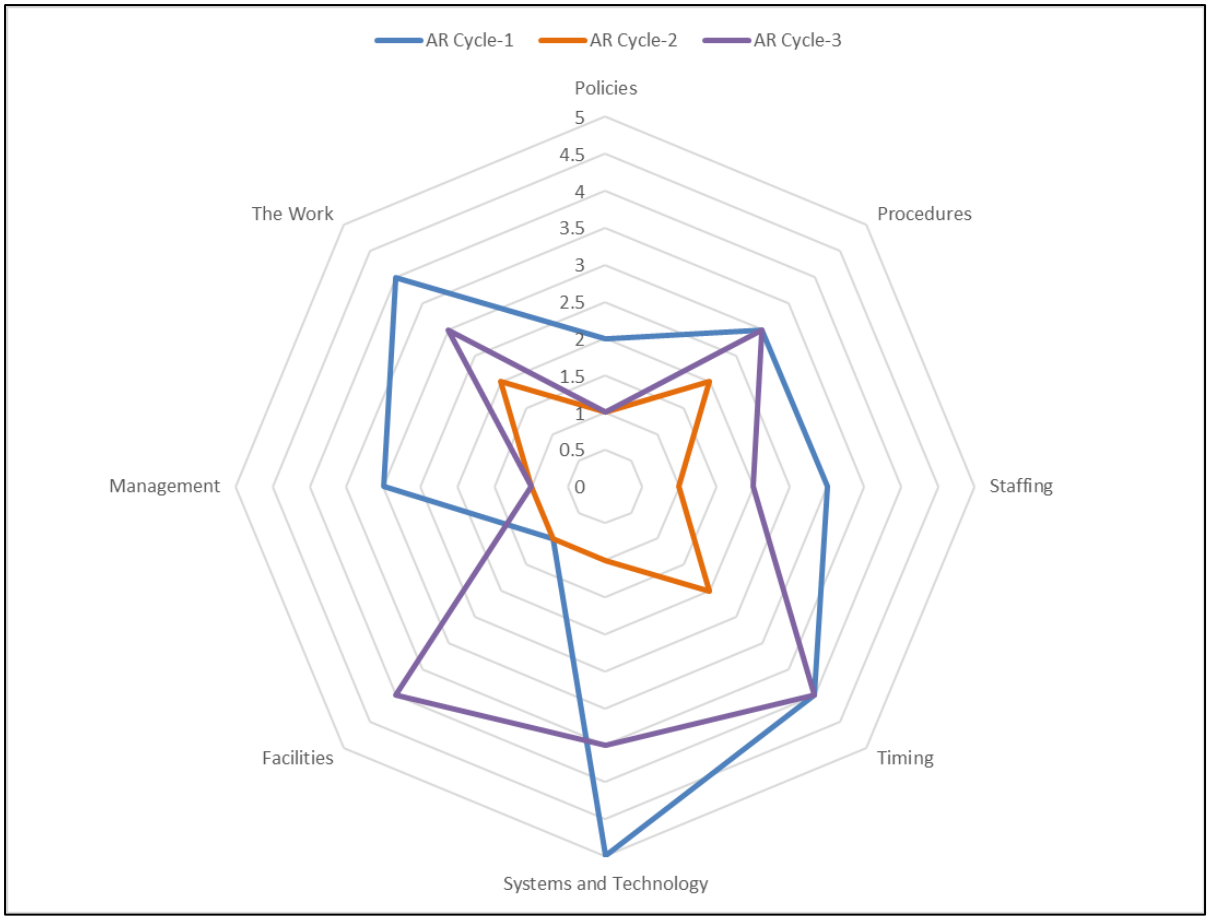

Figure 4.20. AR-1, AR-2, and AR-3 changes by the dimensions of change

Table 4.28. A critical evaluation of the AR cycle-1, AR cycle-2, and AR cycle-3 change initiatives

Dimensions of Change	Definition	AR Cycle-1	AR Cycle-2	AR Cycle-3	Status Quo (Pre-AR Cycle 1)	AR Cycle-1 (Change & Status)	AR Cycle-2 (Change & Status)	AR Cycle-3 (Change & Status)
Policies	How the work is governed: Regulations imposed internally by the organisation or externally through government, union, other agreements, etc.	2	1	1	No formal data analytics and reporting policy. De facto policy of financial consistency.	De facto policy of centralised design and development of visual analytics applications. CDO Office's (formerly Management Reporting) intermediary role between IT and Business.	Limited or no change.	Limited or no change.
Procedures	How the work will be done: Detailed methods that describe step by step how the work is to be handled.	3	2	3	No formal data analytics and reporting procedures. Efforts distributed across the Bank, carried out mostly manually via legacy tools. Very limited analysis capability on the end-user side. High IT dependency.	Data modelling, design, and development solely by CDO Office, with only raw data provided by IT. Democratisation of data: Dramatically increased interactive visual analysis capability on the user-side.	Limited change due to UX improvements, replaced or removed applications.	Democratisation of data: Further enablement of end-users through mobile and self-service analytics.
Staffing	Who does the work: FTE allocation & organisation	3	1	2	Reports and static dashboards prepared by HQ staff. Manual efforts by Regional Directorate staff.	Visual analytics applications are developed and distributed solely by the CDO Office. Manual reports eliminated at the CDO Office; however, continue and/or evolve across the Bank.	Limited or no change.	Selected end-users allowed more autonomy to generate their own visuals to analyse.
Timing	When the work is done	4	2	4	Daily, weekly, monthly periodic reports. Takes long time, as work is labour-intensive.	Most of the visual analytics applications are updated automatically on a daily basis. End users are able to interact with data momentarily.	Partial improvements in updateness thanks to data model and update procedure improvements as	7/24 access enabled through mobile devices. (Temporary issues with freshness due to another,

Dimensions of Change	Definition	AR Cycle-1	AR Cycle-2	AR Cycle-3	Status Quo (Pre-AR Cycle 1)	AR Cycle-1 (Change & Status)	AR Cycle-2 (Change & Status)	AR Cycle-3 (Change & Status)
						Issues concerning data update frequency for some data.	part of UX effort.	infrastructure-related project)
Systems and Technology	How the work is to be done: Software & hardware for the work	5	1	3.5	Traditional BI tool (querying and reporting). In-house report menus, developed by IT. Spreadsheets. Non-IT controlled databases (e.g. MS Access).	New enterprise business analytics platform for visual analytics in place. Spreadsheets and legacy reports co-exist with the new platform.	Limited or no change.	A new platform with advanced mobile and self-service capabilities has been delivered.
Facilities	Where the work is done	1	1	4	Always on premise.	Mostly on premise. Mobile access to visual analytics applications is enabled; however, not very user-friendly.	Limited or no change.	7/24 mobile access enabled, allowing for many analyses to be performed anywhere with internet access.
Management	How the work is directed	3	1	1	Regular line management, included in the BaU of staff and managers.	Visual analytics efforts managed by the CDO Office. Apart from that, regular line management, included in the BaU of staff and managers.	Limited or no change.	Limited or no change.

Dimensions of Change	Definition	AR Cycle-1	AR Cycle-2	AR Cycle-3	Status Quo (Pre-AR Cycle 1)	AR Cycle-1 (Change & Status)	AR Cycle-2 (Change & Status)	AR Cycle-3 (Change & Status)
The Work	The work itself: What work is performed	4	2	3	Performance reports, Status reports (mostly financials), Operational reports, CRM-oriented reports, All static reports, with the exception of spreadsheet dashboards with very limited interaction capability.	Interactive visual analyses on a wide range of topics such as performance management, CRM, daily status, etc.	Limited change due to UX improvements, replaced or removed applications.	The end-users' interaction has significantly changed thanks to new mobile and self-service capabilities.

4.3.5.2. What Have I Learned?

Identification

In this section, I will reflect on my AR Cycle-3 activities. Throughout the AR Cycle-3, a new enterprise analytics platform has been implemented and rolled out, covering over four thousand internal users. This new initiative has been informed by the findings from the "diagnosis" step of this cycle. The research methods employed in this cycle were semi-structured interviews for the "diagnosis" step, and secondary data (anonymised emails) analysis for the "evaluation" step.

The timeframe for these activities is from November 2017 to May 2020, with the business actions having taken place from September 2018 forward.

Description

In this third research cycle, the aim was to have a deeper understanding of the users' perspectives concerning both the changes they have experienced so far and their future visions on how information to support business decisions and actions is to be generated through data analytics across the Bank. This was aimed to guide our further actions in the journey towards becoming an analytics-driven bank.

For this purpose, as the research activity of the "diagnosis" step, I conducted semi-structured interviews with selected participants from the business lines, employees of which constitute a majority of the users of our services. These interviews have led to the generation of rich qualitative data, which I then transcribed in full and analysed by using the NVivo software.

Informed by the findings from the interview data analysis, three areas to take action in were identified: Visual analytics (with a focus on mobile and self-service), reporting and analytics governance, and advanced analytics, with the first one having continued as the main focus of this research project in terms of business actions. Throughout a circa 2-year period from early 2018 to early 2020, a new visual analytics platform, which was particularly aimed at mobile and self-service analytics, has been implemented and rolled out to co-exist with the existing platform, QV, for at least three years.

Also, within the same time period, a Bank-wide assessment towards reporting and analytics governance has been completed; however, that project was put on hold by the top management, only to be given the green light to proceed from 2021 onwards.

Actions on the advanced analytics were also very limited, with only 2 projects having been completed but then discontinued thanks to a top-down organisational re-structuring, which itself has yet to be put into effect in full.

Having completed the business actions on the visual analytics area, a secondary data analysis (i.e., analysis of anonymised emails) was conducted for the purposes of the "evaluation" step of this cycle.

Evaluation

Personal Development as a Researcher and a Professional

The research activities embedded in the "diagnosis" step of this third research cycle had a span of around eight months, which was longer than what was initially planned. The process turned out to have taken longer than planned due to two reasons:

1. The interviews had to be set well in advance of the actual dates due to the busy agendas of the participants. Notwithstanding this, significant postponements still happened.

2. The full transcription and analysis of the rich qualitative data, which required significant time commitment, coincided with my own over-busy business agenda, which included the increasingly busy data governance programme as well as visual analytics. This led me to spread this activity across a longer timespan than initially planned.

This delay in the completion of research activities introduced another challenge at the workplace: There were decisions to be made concerning the actions to be taken in the months and one or two years ahead in the context of the ongoing evolution of reporting and analytics landscape

across the Bank, as represented in Figure 2.1. If investment decisions were to be made, be that for consultancy or new technology, these needed to be done early in the year so that the necessary committee approvals could be secured in time, and the procurement process, including the auction and bargaining, could progress.

What I was facing as an insider researcher was an issue arising from a pace gap between the business and research. This led us to base our initial decisions on the partially-completed interviews and the data analysis thereof, as it would not be possible to wait for the completion of the last interview in May 2018 and the analysis afterwards. However, as the practicalities of business facilitates prompt action in this kind of situations, we were able to proceed on what information was already available to us from the completed interviews, even if the full data analysis was yet to be completed. With the benefit of hindsight, I can now see that the results of the complete data analysis are also in-line with the partial results which informed our actions. This entire experience meant that I personally went through one of the various dilemmas insider researchers may face when doing action research in their organisations, when the business would require prompt decisions and actions whereas the researcher would need more and deeper analyses and reflection before coming to any conclusions, as explained by Coghlan and Brannick (2014) through the example of the study by Roth, Sandberg, and Svensson (2004).

This pace gap between research and business did not always occur in the same form (i.e., the business side being faster and research following behind). In another case, for example in the roll-out of the BankAnalytics platform, which was the business action of this research cycle, there happened significant delays in the initial plan. This led me to experience delays in the "evaluation" step of this research cycle, which would normally take place once the "taking action" step was completed. Consequently, these challenges led the entire research cycle to have a longer-than-expected timespan.

Another challenge for me was the transcription and analysis of qualitative data. With a quantitative background, the entire literature on the approaches and techniques employed by qualitative researchers was a new area for me to explore. Although the software, NVivo, significantly helped deal with both the management and analysis of this qualitative data, I first needed to get myself familiar with the tool itself as well, which also required some time and effort. Afterwards, however, it was not only a self-enriching experience for me but also very enjoyable as well. I felt surprised with the joy and satisfaction I felt dealing with this kind of data analysis, towards which I would most probably take a rather doubtful stance if I had not taken the opportunity of this research project to learn these methods and approaches.

Team Development and Change

My team had already been split into two units within the same department, a decision informed partially by the AR Cycle-1 and partially by the dynamics of the business. As one of these two units was dedicated to R&D activities, the research activities in this cycle also progressed in close collaboration with one of my colleagues in that unit, who is the senior member of my team. With a similar background to that of mine, my colleague has also gained experience in a new area of research with her exposure to interviews as a qualitative research method thanks to her participation in the activities throughout the entirety of the interviews.

In this context, I have experienced new issues with the members of my team as well, sometimes those in the other unit feeling isolated from the new initiatives as they were focusing on maintaining and improving the existing work, interacting with thousands of users. Although this proved to be only a temporary situation as everyone has become involved in the new initiative once the diagnosis step and initial implementation of the new platform had been completed, I also needed to find remedies to keep my team members motivated and involved throughout the process, such as adjusting the agendas of our weekly team meetings accordingly, assigning new responsibilities, and supporting the team with collaborative activities and one-to-one discussions.

Thanks to exposure to new technology and approaches, and to the need to face up to the change-related challenges we have all dealt with throughout the process, the team has continued to develop their awareness on the non-technical aspects of our business as well as their technical competencies.

Organisational Change and Collaboration

The semi-structured interviews conducted for the purposes of the “diagnosis” step of this research cycle constituted a new experience not only for me as the insider researcher but also for the participants, all of whom were my colleagues with varying levels of rapport between us. As opposed to my initial expectations, all of them were very willing to participate in the interviews, feeling sincerely sorry in the cases of unavoidable re-schedules, despite their very busy agendas, which I am closely aware of. Moreover, they were really talkative during the interviews with no objection to being recorded, all of them promptly having agreed to being recorded at the beginning of the interviews.

This led me to question my own presumptions concerning the willingness to collaborate and participate in such new initiatives, no matter whether they could be seen as only loosely connected to their short-term business agendas. This positive attitude, which was beyond my own expectations, can be connected to the participants’ feelings of hope towards the realisation of a better future as an

outcome of this research project, since these interviews aimed to inform actions in the organisation they are a member of could have triggered such expectations on the participants' side (Coghlan & Brannick 2014).

This experience with the interviews encouraged us to proceed with further collaboration for the business actions of the cycle as well, resulting in the involvement of not only head office but also region and branch staff -through selected colleagues- in the requirements analysis workshops for the new visual analytics implementation.

Along with this, an assessment was performed concerning reporting and analytics governance also with a series of collaborative workshops spanning a week, during which between 20 and 30 participants per day attended these workshops.

Although the business action informed by this research was taken in the area of visual analytics, other two proposed -or even started- actions were put on hold by upper-level management, in that sense hindering the organisational change in these other areas, particularly related to reporting and analytics governance. However, the recommendation of working towards the implementation of a reporting and analytics governance framework has been given the approval later on, to proceed from 2021 onwards. This means that at least one more workplace project informed by this research project will be performed across the Bank, reflecting an impact of this research project with a time span extending well beyond that of this research project.

On the management of change related to visual analytics, the research process, the findings of this third research cycle which indicate a relatively limited enthusiasm towards the new mobile and self-service analytics solution, and my experiences at the workplace led me to consider from a wider perspective the model established in AR Cycle-1. Considering the discrepancies between our expectations from our business actions in light of the aforementioned model, which have been explained in the previous sections, I have come to think about some additional components for the success of analytics-related organisational changes.

The accounts of my personal sensemaking on these points are provided below, culminating in an enriched model for the transition towards a more analytics-driven organisation through successful adoption of visual analytics applications:

- With job performance, which is an important focus of research in organisational sciences (Frieder, Wang & Oh 2018), having been taken as the measure of the impact of our analytics-related organisational changes thus as the dependent variable in AR Cycle-1, openness-to-change, usefulness, and usability have been established as the significant factors (Please refer

to Figure 4.7 for the model). Usability and Usefulness have significant impacts on Openness-to-Change as well.

- Although having been integrated into the workplace activities of staff across the Bank to support decisions and actions, just above half (56%) of those users who responded to the questionnaire in AR Cycle-1 stated that QV was their first preferred source for access to data and information, indicating -at least to some extent- the ongoing dependence on legacy systems and methods, as explained in Section 4.1.4.1.

- Informed by these findings, usability improvements were made on all of the QV dashboard applications to support better adoption of these applications in the users' decision-making processes. These changes were received with a weaker-than-expected and mixed response, with limited awareness on the user side and interviewees' comments on the need for further enhancements in usability along with those comments appreciating the improvements made (AR Cycle 2).

- Informed by the findings from the "diagnosis" step of this cycle, a new mobile and self-service analytics platform has been implemented and rolled out, to co-exist with QV for some time and then to replace it. This new initiative was met with a limited welcome on the user side in general; however, there was also a backlash among some of the users questioning the underlying reasons and timing of the action. There was also criticism concerning the issues related to data infrastructure changes, which were thanks to another, independent project by another team with a significant impact on our new platform. This relates closely to the overall organisational data environment, aspects of which were also mentioned throughout this thesis, such as consistency, freshness, and update frequency of data.

- The findings from the "diagnosis" step of this circle also pointed to two other major aspects of the future vision of the participants: the standards and internal regulations concerning the reporting and analytics efforts across the Bank, and more advanced analytics. These two were the other most significant areas to take action in to achieve the dreamed future state in terms of the applications of data and analytics across the Bank; however, two proposed -and even started- actions have been put on hold by management decisions.

- The change objectives, among which could -or should- have been the future vision concerning those staff working with report generation and distribution across the Bank, could not be made clear once again, due to the fact that action on this topic lies beyond the authority of

the researcher's team, even beyond that of the CDO Office and the CFO Office (Please refer to Table 4.1 for an account of the same issue for AR Cycle-1).

- The findings from the "evaluation" step of this research cycle indicate, among other things, a tendency on the user side towards either ignoring or not internalising the support materials such as a user manual, an e-learning module, email tips, etc.

Following from these points, I have reckoned that the model in Figure 4.7 could be put into larger context, which would include potential contextual factors of success in the journey towards becoming an analytics-driven Bank. Figure 4.21 below presents this model, based on the findings summarised above, integrating the model in Figure 4.7 and additional contextual factors into the three-step model given by Lewin (1947a), carrying forward from Figure 4.2.

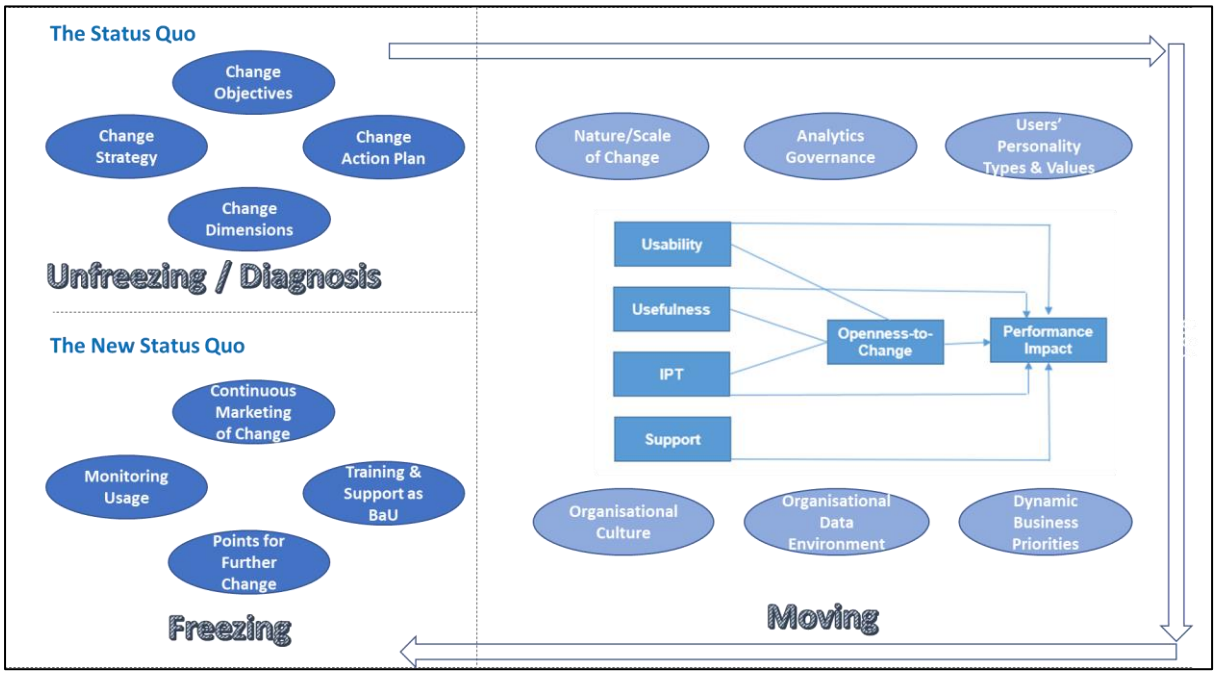

Figure 4.21. An enriched model for the visual-analytics-related organisational change

Action

The workplace project will continue towards establishing the new platform, BankAnalytics, as the single platform for visual analytics, and as the first -if not only- reliable source of data, information, and insights across the Bank.

Informed by the findings from this research cycle, and provided the management support continues, the reporting and analytics governance project will proceed from where it was paused – the assessment results.

Throughout the process from this point forward, I will adopt an even more questioning stance concerning our efforts in support of the workplace project, trying to diversify the means support is provided with a view to better addressing the requirements of users with different personality types. Additionally, we will need to keep a closer eye on the contemporaneous projects being carried out across the Bank in an effort to be able to foresee their potential impact on our workplace project so that necessary actions can be taken in time.

To conclude, considering the enriched model given in Figure 4.21, I believe the guidelines given below will be helpful in delivering organisational changes through data analytics initiatives not only for me and my team but also for other researchers and professionals working in similar contexts:

1. **UnFreezing / Diagnosis:**

    1.1. Positioning: Call it by the right name. When you are introducing a new means of information access in an organisation, put it as an "organisational change" initiative in the first place, as your actions will likely have a significant impact on the organisational members' working habits in a broader sense. This will help in defining the objectives, proper planning, resource allocation for focusing on non-technical aspects of the job, and ensuring management buy-in, starting from the "Unfreezing" phase in Figure 4.21.

    1.2. Vision: Try to envisage and define a "target state" or the "new status quo" properly. This will help in setting out the change strategy (e.g., top-down or bottom-up, pacing, etc.) and in identifying the change objectives, dimensions, and action plan clearly so that the results of your actions can be judged against the target state and further actions can be specified accordingly.

2. Moving:

    2.1. Usability and Usefulness: These two concepts are paramount to success in delivering organisational change through data analytics. The more useful and usable the users find the new means of information access the more welcoming they will be towards the change, supporting adoption and reducing the risk of reversion. Keep in mind that improvements on these two aspects will be an ongoing, open-ended journey.

    2.2. IPT: Ensure the organisational members who are the receivers of the change initiative are engaged in the change process, enabled to have their say, feel that they are heard, and that they trust those who are delivering the change. Open and participatory communication will be the key here.

2.3. Contextual Factors: Pay due attention to the contextual factors such as the organisational data environment, organisational culture, and the internal regulations concerning the data analytics efforts across the organisation. For example, if there are problems with the quality of the data, resist the temptation to hurry and ensure the correctness, consistency, and freshness of the data in the first place. As organisational members will access the data through the new platform, they will access the data quality problems through the same platform, too. This can be seriously damaging for the perception of the new status quo and eventually hinder adoption.

3. Freezing:

3.1. Proactivity: A better version is always possible. Identify points for improvements and further changes proactively and continually, listening to users' feedback.

3.2. Communication: This is as important as ever even if the new status quo has been established. Always stay close to the users, keep the new platform and its contribution high on the users' agendas and relevant for their business priorities.

3.3. Monitoring & Support: Do keep a close eye on the usage levels of you're the new platform and take action to support those users who cannot exploit it adequately through field visits, trainings, and UX improvements.

CHAPTER 5. Conclusions & Reflections

This chapter will provide an overview of the academic and business outcomes and impact of this research project in relation to the research questions, the limitations thereof, and my personal reflections on the research project as a whole.

5.1. Back to the Research Questions

This research project was aimed at exploring the ways for the successful management of the organisational changes towards becoming an analytics-driven Bank through the implementation of visual analytics applications.

Concerning the factors affecting the users' attitudes towards the changes they are experiencing with the implementation of these applications, which is the topic of my first research question, a model has been established in AR-Cycle-1 representing the statistically significant impact of the usability and usefulness of the implemented visual analytics applications on the users' openness-to-change, along with two other factors (Figure 4.7). Considering openness-to-change as a value state (Skimina et al. 2019) in the face of specific change initiatives rather than a character or value trait, this finding has informed the following business decisions and actions with a view to supporting or stimulating the users' openness-to-change towards the upcoming analytics-related change initiatives.

The second research question, which was about how the users' decision-making processes were affected by the implementation of visual analytics applications as the new means of information access, has also been addressed with the efforts towards establishing the model mentioned above. More than half of the users (56%) have responded to the related questionnaire item that QV, which had not existed as part of the Bank's decision support landscape previously, had become their primary choice of information access. This finding is also supported by the relatively higher usefulness (BAPUS) score, which is 81 over 100 (Please refer to Figure 4.3 for all the overall scale scores), and the higher-than-average score of the scale item dedicated specifically on this topic: The item "I can make informed decisions by using the QlikView applications." has a score of 4.09 over 5, indicating the users' tendency to agree or strongly agree with the statement (Please see Appendix 9. Statistical Analysis for BAPUS for details).

The third research question was about the potential impact of our change initiatives on the users' job performances. Considering job performance as one of the major focus areas as a goal (or dependent variable) in organisational sciences research (Frieder, Wang & Oh 2018) as well as in the Bank in which this research has been undertaken, the model built in AR Cycle-1 (Figure 4.7) included job performance as the ultimate dependent variable, which consequently established the statistically significant impact of the users' openness-to-change, along with the statistically significant impacts of usefulness, usability, IPT, and Support on the users' job performance. This finding has then informed the following business actions and their prioritisations, significantly affecting -and changing- the way visual analytics applications were delivered and used across the Bank for the purposes of supporting business decisions and actions.

The fourth research question was about a critical exploration of the way we had been delivering analytics-related organisational change across the Bank in comparison with the approaches established in the change management literature. A number of approaches have been considered together for this purpose, mapping their processes onto each other, with Lewin's 3-step model forming the base for this study (Lewin 1947a). Then, a critical self-evaluation of our own initial change initiative followed, with our own actions having been mapped onto and judged according to the framework given by Lientz and Rea (2004) (Please refer to Section 4.1.4.1 and Table 4.1 for details).

The fifth -and last- research question was about investigating a suitable approach for our implementation of analytics-related organisational changes, which has been addressed throughout this research project. Following from the model developed in AR Cycle-1 (Figure 4.7), deeper and wider insights were gained into the users' perspectives through the second and third research cycles. The findings pointed to a need for a more holistic view of the analytics-related change initiatives, including but also going beyond the success in supporting openness-to-change and job performance directly via the design and implementation approaches, by considering the wider contextual factors such as the governance of analytics-related efforts, the separate but contemporaneous change efforts, the personality types of the users as well as the objectives and dimensions of change (Please see Figure 4.21 for an overall view).

5.2. The Quality and Rigour of This Research Project

Considering the uncertainties and fuzziness inherent in action research (Coghlan & Brannick 2014) and the emergent nature of the research thereof (Reason & Bradbury 2008), demonstrating quality and rigour is particularly important for the research carried out with this approach (Coghlan & Brannick 2014).

In order to make a credible evaluation of the quality and rigour of this research project, the respective frameworks given by Coghlan and Brannick (2014) will be used.

5.2.1. Quality

According to Levin (2003)'s approach given by Coghlan and Brannick (2014), the following criteria could be employed to judge the quality of and action research project:

- Participation: To what extent the research demonstrates a collaboration between the researcher and other organisational members.
- Real-life problems: Whether there is a concern for generating real-life outcomes and whether critical reflection is employed throughout the process.
- Joint meaning construction: Whether there has been collaborative sensemaking between the researcher and other organisational members.
- Workable solutions: Whether the project led to significant work and sustainable outcomes in practice.

It could be worth noting that Reason (2006) advise in relation to another, similar set of criteria for the same purpose, a research project is not necessarily expected to be rated equally highly for all of these criteria, but rather these should be seen as the choice points which the researcher needs to be aware of and transparent about.

Participation

This research project has been carried out as an insider research in the researcher's real business setting, with the insider researcher being myself. The participants in this research project can be grouped into three higher level categories:

1. My team members and the CDO, to whom I directly report,
2. The Responsible Department, with which we have collaborated for the purposes of the AR-Cycle-1 questionnaire,
3. Our internal clients (or users) who have participated through the questionnaire, the interviews, and the workshops which were held as part of the related business actions.

For the first group, collaboration was maintained through our team meetings where we would discuss our expectations vis-à-vis the outcomes of the research actions, make the decisions concerning the target population, sampling method, and interview participants. We would also do the planning of our related business actions together and work accordingly. In addition to this, senior members of my team have made further contributions, such as the preparation and proofreading of the questionnaire in AR Cycle-1, back-to-back translations when required, preparation, implementation, and recording of the interviews in AR Cycle-2. Together with these, most of the participation of my team members have taken place in our business actions as a part of our business as usual.

The second group, the Responsible Department, collaborated with us for the purposes of distributing the online questionnaire in AR Cycle-1, also making contributions in the finalisation of the questionnaire items and the communication strategy, notwithstanding this having been a highly contentious process as explained previously.

The third group, which consists of the internal users of our visual analytics applications, have participated in this research through their responses to the questionnaire in AR Cycle-1, which included an open-ended response as well, through the semi-structured interviews of the selected participants for the purposes of AR Cycle 2 and AR Cycle 3, through their emails, which were analysed as anonymised secondary data, for the purposes of AR Cycle-3, and through their participation in the business-actions-oriented workshops.

In light of the explanations above, it could be argued that participation throughout this research project was in a relatively limited form than what would be expected in an action research project, given the lack of components such as action research / learning sets. This has been due to the research approach adopted and choices made accordingly by myself as the researcher. This research has been carried out with an AR and not a PAR approach, with myself as the insider researcher being the only person really involved in the research purposes of this project. As such, this research project could be considered in the 3rd quadrant in terms of the two axes given by Coghlan and Brannick (2014), where the researcher is involved in self-study in action but not the organisation, with the organisation involved and interested only in the business outcomes of the project. This context, combined with my personal values, which have an emphasis on self-enhancement, might have led me into a tendency towards securing almost full control on the research aspect of this project, in an effort to avoid any uninformed and/or political impact on the research process from the business side.

All in all, considering that both interviews and questionnaires are deemed suitable methods for giving the participants an opportunity to have their say on matters they are involved in or affected

by (e.g., Wanous, Reichers and Austin 2000; Armenakis, Harris and Feild 2000; Coghlan and Brannick 2014), that the business decisions and consequent actions have been formed with the participants' contributions having been taken into account throughout this action research project, and that action research as a research methodology embraces a diversity of approaches in various aspects, including approaches to participation (Dick 1999), with no one single correct way of doing action research set out (Coghlan & Brannick 2014), the participation established throughout this research project could be deemed to stand somewhere towards the more researcher-focused end of the participation levels which can be adopted for an action research project.

Real-Life Problems

The focus of this research project has been the organisational changes delivered and/or intended through the implementation of visual analytics applications as a new means of information access to support business decisions and actions across the Bank. The Bank is the real business setting of the insider researcher (i.e., myself).

Perhaps one of the strongest points of this research project is that it has been an exploration into a real, ongoing, open-ended, and large-scale workplace project for which the insider researcher has a management responsibility, in-line with the advice given by Shepherd (2014a). As such, all the points for improvement or more significant change, as well as the wider-scoped actions planned throughout the project (such as the action proposal to introduce a framework for the governance of reporting and analytics efforts), have been based on real-life business experience, activities, and feedback.

Consequently, the decisions made and actions taken -or not taken- throughout the project have had a real impact on the course of the real business, on the team working on the business project, and on the internal users of our visual analytics applications, who also have had contributions through their participations by the means explained above under the "Participation" criterion.

Throughout this process, as the research aspect of the project was carried out by myself as the insider researcher, critical reflection has been performed and reported as per each of the research cycles within the "Reporting Findings" steps, mainly in the "What Have I Learned?" sub-sections, where the IDEA framework (Shepherd 2014b) has been used as a guide to provide structure. Additionally, personal views of the researcher and a comparison of the outcomes with initial expectations have been provided throughout the thesis, and a higher-level critical reflection on the entire research project has also been provided in Section 5.3.

Joint Meaning Construction

Collaborative sensemaking between myself as the insider researcher and other organisational members have taken place mainly through the means of our team meetings and the interviews with the participants, where we openly talked about not only the existing strengths and improvement opportunities but also about the dreams for the future and the proposed changes in relation to those dreams.

Another means of collaborative sensemaking took place through the requirements-analysis workshops that were held as part of the "taking action" step of the AR Cycle-3, with attendance from both the head office and the field (regional directorates and branches).

On the other hand, in parallel with the situation in terms of participation, it could be argued that collaborative sensemaking has also been limited as the analysis of the research data has been performed almost solely by the insider researcher, with only the results being presented and discussed with the team and other selected organisational members. As explained previously, this is a result of the choices made by myself as the insider researcher, considering the positioning of this research project within the Bank and with the potential impact of my own values.

Workable Solutions

This is another aspect which could be considered as a strong point for this research project. Throughout the research cycles, the research findings informed business decisions and actions that led not only to significant efforts by the team working on the design, development, and maintenance of visual analytics applications, but also to significant changes in relation to these efforts.

Among these are the collaboration with a UX consultancy, reflecting a new awareness of and a shift towards a UX-oriented approach in design and leading to a significant, collaborative usability testing effort (Please refer to Section 4.2.3 for details), and the implementation of an entire new mobile and self-service analytics platform across the Bank (Please see Section 4.3.3 for details), both of which resulted in permanent changes towards becoming an analytics-driven Bank through better adoption of visual analytics applications for decision support, with an impact on over 4.000 internal users.

There have also been actions proposed but not progressed to the desired maturity before the culmination of this research project, which were the implementation of a reporting and analytics governance framework and delivering advanced analytics solutions through specific projects. Of these two, reporting and analytics governance project was initiated with highly collaborative assessment

workshops together with an external consultancy; however, it was put on hold by a management decision, only to be given the approval to proceed some two years later. As for the advanced analytics, efforts on this aspect could not progress further than a few exceptional projects thanks to another management decision concerning an organisational re-structuring, specifically for advanced analytics (Please see Section 4.3.3 for details).

When considered all together, the visual analytics aspect of this research project has been the prominent one with a significant impact on the real business context, which has also been the main focus from the beginning, with the other two aspects mentioned above having emerged during the course of the research project as potential areas of action.

5.2.2. Rigour

Referring to Dick (1999), Coghlan and Brannick (2014) lay out the following aspects to be considered when judging the rigour of an action research project:

- Demonstration of the use of action research learning cycles,
- Use of multiple data sources for confirmatory or contradictory interpretations,
- Demonstration of challenging and testing of the researcher's own assumptions and interpretations during the course of the research project,
- Comparing the findings and interpretations against the existing literature to present how they are supported or disconfirmed.

The following few paragraphs will provide an evaluation of this research project from the insider researcher's own perspective.

This research project has been performed through three action research cycles, as can be observed throughout the Chapter 4 of this thesis. The cycles consist of the steps adapted from the typical steps of an action research cycle, informed by the relevant literature (e.g. Coghlan and Brannick 2014). These research cycles represent the flow of the business decisions (i.e., the "diagnosis" and "planning" steps), actions (i.e., the "taking action" steps), and evaluations (i.e., the "evaluation" steps). An overview of the outcomes and critical reflection have been presented through the "reporting findings" steps.

Along with these action research cycles, embedded within these cycles are the research intervention cycles, which themselves represent the similar, cyclical structure followed for the

research interventions made throughout the research project. These research intervention cycles are also explicitly observable throughout the Chapter 4 of this thesis, with the headings of these sections provided in a different (blue) font colour.

In line with a mixed methods approach in action research, different research methods have been employed throughout the project. These are: a comprehensive online questionnaire in AR Cycle-1, which includes an open-ended response as well, semi-structured interviews for purposes of AR Cycle-2 and AR Cycle-3, and anonymised secondary data (emails) analysis for the purposes of AR Cycle-3. Even within the questionnaire in AR Cycle-1, the results from the analysis of the qualitative data of the open-ended response have been interpreted in relation to the quantitative data analysis results, turning out to be in support of the quantitative data analysis results (Please refer to Section 4.1.4.4.2 for details).

Both for the quantitative and qualitative research methods employed, all the research activities have been informed by the relevant literature as cited throughout the relevant sections of this thesis. The insider researcher's and the team's expectations and interpretations have been mentioned in light of the research outcomes where deemed meaningful by the researcher such as in a few examples below:

> "Regarding the functions across the Bank where they work, the distribution of the answers of the respondents were in line with our expectations, as we would expect a good majority to be from sales and (…)" (When interpreting Table 4.5)

> "This evaluation concerning the usability of our QV dashboard applications was also more or less in line with our expectations on this topic. During our team meeting on 10 May 2016 to exchange our expectations from this survey (…)" (When interpreting the usability results in Section 4.1.4.4.2)

> "This can partly be due to that we could have put our expectations a bit too high about the changes in this cycle, despite their incremental and narrower-focused nature, (…)" (When reporting findings in Section 4.2.5.1)

In addition to these connections to the researcher's and the team's expectations and interpretations, more holistic accounts of such evaluations have also been provided through the critical reflections in the "reporting findings" steps of each action research cycle. Attention has been paid throughout the thesis to ensure that these subjective accounts and interpretations are clearly distinguishable from the objective data analysis results, apart from the subjectivity inherent in the analysis of qualitative data.

In order to be able to connect the research findings to the relevant literature, research materials, mainly academic journal articles from various subject areas, such as organisational change management, business analytics, and user experience, have been consulted and cited throughout the thesis.

Considering the scarcity of research on the adoption of business analytics platforms (Puklavec, Oliveira & Popovic 2018) and the suitability of action research for the information systems discipline (Baskerville & Wood-Harper 1996), the findings achieved from this research project throughout 3 action research cycles and holistically displayed through the enriched model given in Figure 4.21 contribute to the management literature both in terms of how to successfully deliver organisational changes via visual analytics and as an application of action research for this purpose in the context of a private-sector Bank in Turkey. Although findings from this research are primarily applicable in the context of this research project, which is an inherent feature of action research and WBL in general, the model given in Figure 4.21 and the following practical guidelines provided in Section 4.3.5.2 will likely be applicable in other similar business contexts, mainly in banks and other financial institutions. This is because banking industry around the globe has similar functions in the economy, and is subject to similar if not the same local and global regulations and competition as mentioned earlier in Section 2.2, requiring them to consider their data as a valuable asset and to take initiatives to manage and exploit that data to support their business decisions and actions.

5.3. My Insider Action Research Experience

This section will provide a higher-level reflection on my overall experience as an insider action researcher throughout this entire research project. To maintain structural consistency with the reflections provided at the end of each action research cycle previously, the IDEA framework (Shepherd 2014b), again, will be used for the purposes of this higher-level reflection. On the other hand, considering the reflective accounts provided previously throughout the thesis, the structuring and content of the sections of the aforementioned framework will be adjusted to reflect the higher-level intent of this overall reflection and to avoid duplications, to the extent possible.

Identification

I have undertaken this research project as part of the requirements of my DBA degree at Middlesex University, London, critically exploring and doing research within my own workplace where I hold the role of a senior manager in business analytics and information management, with a view to delivering significant improvements and changes into the way data is utilised to support business

decisions and actions across the organisation so that wider-scoped organisational benefits can also be realised.

Description

This research has been undertaken within my organisation, the Bank, which is a mid-scale private Bank in Turkey, operating as a member of a major global financial services group. Action research has been adopted as the research methodology, with the research activities and business actions throughout the project formulated in a cyclical structure, which is reflected throughout this thesis as dedicated sections in Chapter 4 for each of the action research cycles.

The research process spanned four years, from 2016 to 2020, comprising three research cycles, with two relatively larger research cycles and one smaller research cycle. The first action research cycle includes a pre-DBA phase as well, bringing a retrospective component into that cycle.

The workplace project into which this research project has been undertaken has been the project aimed to transform the way data is used across the Bank to support business decisions and actions, mainly through the implementation and adoption of visual analytics applications as the new means of information access (Figure 2.1).

Evaluation

Personal Perspective:

The DBA as a whole, and this research project in particular, have been a truly transforming journey for me personally, professionally, and academically. The following are the main aspects of my aforementioned transformation:

- Significant new learning on the concepts of work-based learning and research, insider research, and action research, all of which used to be completely alien to me prior to this DBA programme, and this research project in particular. This learning started with and has gone beyond factual and conceptual knowledge (Eraut 1994; Krathwohl 2002), with me practising what I have been learning throughout the programme, leading to the development of procedural or process knowledge (Eraut 1994; Krathwohl 2002). Furthermore, engaging in critical reflection, spotting further learning requirements and acting accordingly throughout the process as per the requirements of each of the research cycles, development of metacognitive knowledge has also taken place by me as the insider researcher (Eraut 1994; Krathwohl 2002).

- Having started the programme with an almost fully quantitative background as a statistician and a finance professional, getting myself familiar with rather different approaches of research including qualitative and mixed methods, coming to terms with the diversity of approaches even when considering the quality and rigour of research, preparing myself at an adequate level to perform research by using the most suitable means and embracing this diversity have been both enriching and challenging. Considering that my previous self would question the validity of even any sampling method other than the probabilistic sampling methods, coming to be convinced into the applicability of a diverse range of research approaches and methods mentioned above has taken some significant learning and improvement by myself as the insider researcher throughout the process.

- Improvement in critical thinking skills through engagement in critical reflection throughout the process. Particularly when engaging in critical reflection, I needed to significantly improve following my initial attempts, as my academic advisor guided me towards avoiding a memoir-style writing, which would not qualify as critical reflection.

- Awareness and new learning in organisational change management and the related concepts such as openness-to-change and cynicism (in the face of an organisational change). Having previously focused mostly -if not only- the work itself, I have raised my awareness of the organisational change aspect of my own workplace activities and the management of that change. This has been reflected by the inclusion of and emphasis on the openness-to-change in AR Cycle-1 survey and the efforts towards deriving or adapting a model for the management of analytics-related organisational change initiatives within my own organisation, the Bank. On the other hand, fully practising what I have been learning in terms of change management has not always been possible in my real business setting due to conflicting opinions or decisions from colleagues or my superiors, limited availability of resources, time pressure to deliver with a focus mostly on short-term benefits, and a perception of some of the change management practices as “too conceptual or theoretical” or not being aligned with the practicalities of our real business setting.

- New understanding on and new attitude towards organisational politics, embracing the concept as a fact and a usual part of professional life in organisations that an insider researcher cannot opt out from but rather should deal with and engage in, while retaining his/her integrity and that of the research (Costley, Elliott & Gibbs 2010), and learning to be “street-smart” to be able to “get things done” (Coghlan & Brannick 2014, p.153).

- New learning on the concepts, approaches, and practices of higher education beyond my own country, particularly in the UK and particularly at the postgraduate level. This learning has taken place as a knock-on effect of this doctoral research project through my endeavours to fully understand the framework in which this doctoral research was being carried out, either through the Middlesex University's sources available to research students or through other means such as the websites of relevant official institutions, so that I could proceed in accordance with the framework and particularly with the specified learning outcomes.

- Gaining a new habit of keeping a learning journal and a research diary, both of which proved very helpful throughout the research process. Particularly my learning journal, which has now been a go-to reference for me on the topics related to this research project and my DBA programme in a broader sense, have led me to adopt it as a very useful tool for my other professional and personal learning purposes as well, extending its initially intended purpose to well beyond this research project.

- New learning or refreshing of existing knowledge in various areas related to this thesis such as questionnaire design, qualitative data analysis and the use of NVivo software for this purpose, UX, multivariate statistics, use of standard scales to measure constructs, etc.

- Similar to the case with my learning journal as mentioned above, another habit gained thanks to this research project has been the use of a referencing software, again with the usage extending well beyond the purposes of this research project, becoming something to continue after the end of this project as well.

Organisational Perspective:

This research project has informed business decisions made and actions taken by the CDO Office throughout the timespan of the research, concerning the implementation and adoption of visual analytics applications across the Bank and other related initiatives, as detailed throughout the previous chapter. A summary and higher-level evaluation of these outcomes are provided below:

- AR Cycle-1 survey provided a first-ever, comprehensive insight into the users' perspective concerning the adoption of visual analytics applications developed by the CDO Office, their usefulness and usability for the purposes of supporting business decisions and actions, and their impact on users' decision making and job performances. Considering Coghlan and Brannick's words that the acts of data generation in insider action research are also interventions (Coghlan & Brannick 2014), even this survey itself could be considered as an intervention into the researcher's own business context, as it is the researcher and the team

themselves who are asking the questions to their own internal users, with its potential impact on users' perceptions of and attitudes towards the team behind the decision support tools they use.

- Informed by the findings from AR Cycle-1, the focus of the visual analytics efforts by the CDO Office shifted -or extended- from content-only towards UX, with a view to improving the overall UX to better support business decisions and actions. This has been reflected by the first-ever collaboration with an external third party, a UX consultancy, prior to working on new applications or new versions of existing applications.

- The CDO Office team behind the visual analytics applications have gained knowledge and experience in UX and usability research thanks to the external trainings we attended, which were offered by the same consultancy and billed separately, all of which were funded by the Bank.

- The team, particularly the team members who contributed to the research activities, have raised their awareness of the change management aspect of our work, extending their vision beyond the design and development of visual analytics applications. Prior to this action research project, the team would focus almost solely on how to make a specific application work, how to improve its performance (i.e., response time per click, time required to update, etc.), without paying significant attention to the wider impact of our applications on the users' work activities, business plans, priorities, strategic, tactical, and operational decisions.

- On the other hand, the team's involvement in the research aspect of this project has been limited, which was due to my approach and choices as the insider researcher, as discussed previously.

- Informed by the findings from AR Cycle-3, three new initiatives have been decided to be started: Implementing and rolling out a platform mainly to focus on mobile and self-service analytics, a new project aimed to design and put into effect a reporting and analytics framework, and to focus more intensely on advanced analytics. Of these three, only the first one could progress to complete or near-complete realisation during the course of this research project, as discussed in Section 4.3.3. However, the realised initiative, with the implementation and roll-out of another new platform for visual analytics, has had a real impact across the Bank with its over 4.000 users, though not having been met with enthusiasm or prevalent positive feedback due to a range of issues discussed earlier in Sections 4.3.4 and 4.3.5.

Academic Perspective:

- The main academic outcome of this research project has been this doctoral thesis. It reflects an understanding and adaptation of the action research process by the insider researcher. Based on the conceptualisations of action research in various resources (e.g. Coghlan & Brannick 2014; McNiff & Whitehead 2009; Reason & Bradbury 2008), the cyclical research structure with the diagnosis, planning, taking action, evaluating, and reporting finding steps for each cycle has been articulated and used throughout this research project. Upon feedback from my academic advisor over my initial adaptation of the action research cycles, a similar cyclical structure reflecting the research activities has been articulated and made explicitly observable throughout the thesis, with these research activity cycles having been integrated into the relevant steps of the action research cycles (Please refer to Figure 3.1 for an illustration of this structure).

- Throughout AR Cycle-1, a model has been proposed, tested and established for the purposes of analytics-related organisational change management, reflecting the impacts of usefulness and usability of the visual analytics applications along with IPT on the users' openness-to-change and then, together with openness-to-change, on the users' job performances, which is a major focus area in organisational sciences research (Frieder, Wang & Oh 2018) (Please refer to Figure 4.7 for the model).

- Throughout the following cycles, action has been taken based on the findings of both the AR Cycle-1 and the following steps, to be evaluated with a view to judging to what extent the actions were generating the outcomes as would be expected based on the proposed model. It is worth noting that not everything could be implemented as it should have been based on the research findings, such as the setting up of organisational change committee and task forces, due to the issues within the business context such as resource limitations, changes in the immediate business priorities and/or responsibilities of the insider researcher, and considerations on relations with other departments from a business political perspective.

- The initial model has then been put into a larger context through a process of reasoning and reflection by the insider researcher, based on the learnings and findings from the research process and the lived experience in the business context, reflecting the proposed approach for the management of analytics-related organisational changes (Figure 4.21).

- Perhaps as a side-product of this research project, a new scale aimed exclusively to measure the usefulness of business analytics platforms, BAPUS, has been set up and used for the first time, with a strong reliability score of ~96%.

Action

The business actions will continue in line with the findings of this research and following from the evaluations provided above, mainly with the scope expansion of BankAnalytics and the implementation of a reporting and analytics governance framework. As for the academic aspect, the researcher will focus on making further research on the topic, both to continue with the changes and improvements in the business context and to make publications concerning the academic aspect, once this thesis has been concluded.

5.4. Limitations & Further Research

This research has its limitations both from academic and business perspectives. Below is an account of these limitations as perceived, experienced, and judged by the insider researcher:

5.4.1. Limitations

Generalisability

Generalisability is a contentious issue in action research and in work-based research in a more general sense, with the issue having been discussed by various researchers (e.g. Coghlan and Brannick 2014; Costley, Elliott,and Gibbs 2010; McNiff and Whitehead 2009). This is understandable as this type of research is triggered by and performed to address some specific real-life problems in their specific contexts, in the context of organisations when it is work-based research. Additionally, its links to qualitative research (Dick 1999), which is inherently different from more traditional, quantitative research in terms of the relevance of generalisability (Stroh 2000b), also brings the generalisability of the findings from an action research investigation into greater scrutiny. As such, action research and/or work-based research does not aim to generate universal knowledge but rather focuses on context-dependent knowledge thus entails a subjectivity component as well (Coghlan & Brannick 2014); however, its findings can still be applicable in other similar contexts (Coghlan & Brannick 2014; Costley, Elliott & Gibbs 2010; Somekh 2006).

In light of the explanations above, this research has its own inherent limitations in terms of generalisability, as it has been conducted into the insider researcher's own workplace project in his own organisation, the Bank. As such, the findings from this research are primarily applicable for this specific context. However, considering the potential commonalities among similar-scale financial organisations, including the potential challenges they face in bringing about changes to improve the use of data and information for business decision support, findings from this research project can prove helpful for similar change initiatives in similar organisations as well.

Research Process

This research has been conducted with a mixed-methods approach, with a mostly quantitative questionnaire and the following statistical data analysis in the first cycle, and qualitative research methods (interviews and email data analysis) in the second and third cycles having been performed.

The sample used for the purposes of AR Cycle-1 was of adequate size with around 26% of the target population; however, it was a consequence of those members of the entire target population, with all of whom the online questionnaire link was shared, who responded to the questionnaire, rather than probabilistic sampling. Although this sample can be considered as capable of representing the target population by a number of indicators, as provided in Table 4.3, there might be a bias towards those who are relatively active users of QV as they might have had a stronger tendency to respond to the questionnaire. This point could not be checked as we did not have access to the identities of the respondents so that we could analyse the responses in comparison with the respondents' QV usage statistics.

As for the interviews conducted for the purposes of AR Cycle-2 and AR-Cycle-3, the participants were selected from the Head Office staff with close links to the field so that a higher-level vision than the direct requirements analysis could be achieved while at the same time the relevance to the field could be maintained. As this could have led to a limited representation of the field staff's experiences and visions, perhaps these interviews could have been supported by another set of interviews this time from the field staff. This path has not been followed due to the resource constraints on the researcher side, the researcher's sceptical approach concerning the potential depth and breadth of the contributions from the field staff who are generally too busy with their daily hustle and bustle, and the fact that representatives from the field had participated in the business-action-oriented workshops throughout the process.

Similar limitations are also present for the anonymised email data analysed for the purposes of AR Cycle-3. Although the resource from where these emails were taken is the dedicated inbox for

users' interaction with the researcher's team concerning the visual analytics platforms, there might be a bias inherent in the data towards those who at least try to use the new platform, BankAnalytics. The concentration of the users' feedback on logging-in and other mostly technical issues also support this perception. The reluctance of those target users who had not either used the platform in the first few months of the roll-out or had not given feedback via emails can be due to a number of reasons such as their disappointment with the significant issues with the freshness of the data, the nature of the complexity issues with their roots somewhere else so the users were contacting those other teams, or they were simply too busy with getting used to their new lives in the face of the COVID-19 pandemic to deal seriously with the analytics platform.

Business Outcomes

The findings from this research have led to the realisation of business outcomes concerning the visual analytics function of the CDO Office. The approach has shifted towards a UX-oriented one, new versions of tens of visual analytics have been developed to replace the existing ones to support the adoption of this new means in the users' decision-making processes, and a new visual analytics platform, mainly for mobile and self-service analytics, has been implemented and rolled-out to over 4.000 target users to enable better decision support in line with the ongoing, wider-scoped digitalisation across the Bank. On the other hand, the full impact of these changes on the users' wider context, including their continuing -at least to some extent- use of legacy means of information access, their internalisation of interactive visual analysis, their resource allocations and efficiency thereof, has yet to be realised or measured. The wide scope of these changes, in terms of the number of users, the diversity of their workplaces (hundreds of branches, different line managements, etc.), and the nature of these potential changes, mean that the decisions towards the realisation of all of these changes -at least partially- lie beyond the authority of not only the insider researcher but also that of the CDO Office and even the CFO Office, of which the CDO Office is a part. It could be argued that the CDO Office has played its part in this endeavour, making the impact it is capable of making, while continuing towards the wider benefits under the constraints of the business context in terms of roles and responsibilities and business politics.

Another limitation in terms of the business outcomes is that two other business actions which emerged through the findings of this research project, which could potentially reflect the emergent nature of action research (Reason & Bradbury 2008) as well, could not have been brought to fruition during the course of this research project. One of these two projects, the implementation of a reporting and analytics governance framework, had started but then put on hold by a management decision, only to be resumed later on, from 2021 onwards. The other one, advanced analytics, have

been stopped due to an organisational re-structuring on that topic, thanks to another, top-down management decision. Particularly the lack of progress in the governance of reporting and analytics efforts during the course of this research project might have limited the positive impact to be realised from the visual analytics implementation.

5.4.2. Future Research

Future research can be suggested in the following areas in relation to this research project:

- The model which established the linkage between usefulness, usability, IPT, openness-to-change, and job performance could be tested for expansion to include the users' personality types. This could potentially be an extension of the model established in this research as a further contribution to the literature. Additionally, if verified, this could help professionals working in this field by guiding them to enable tailoring of the solutions and supporting materials in accordance with the prevalent user characteristics.

- Research can be performed by bringing together IDT and Organisational Change Management, investigating to what extent potential adopters' OTC can have an impact on the rate of adoption of an innovation in the context of new analytics platform implementations in organisations, and how it relates to the adopter categories given by (Rogers 2003).

- A research into the openness-to-change scale (Miller, Johnson & Grau 1994) used in this research project in comparison with PVQ5X (Schwartz et al. 2012) could be performed in different business contexts to analyse the extent to which the expression of personal values under specific change situations reflects the more general value traits of employees. This could help identify the situations and stimuli which lead to either expression of or divergence from people's personal value traits through their attitudes and behaviours in the face of specific organisational change initiatives.

- Recalling that some interview participants were reluctant to talk about their future visions (dreams) when it came to matters related to organisational structuring, research can be conducted to explore the relation of this observed reluctance to the concept of voice, which is the employees' expression of their ideas, opinions and suggestions to trigger or deliver change in any specific aspect of the organisational status quo or to make improvements in the functioning of the organisation, team, or individual (Bashshur & Oc 2014). As extant research has that perceived organisational formalisation positively impacts voice behaviour of employees in the national contexts with high uncertainty (Fischer, Ferreira, Van Meurs, et al.

2019), research can be performed to explore whether business analytics initiatives like the one explored here in this research might play a role in facilitating voice in similar national contexts through giving the employees access to rich data thus helping reduce uncertainty in certain areas at least within the organisational context.

- The implementation of the reporting and analytics governance framework itself could be carried out as an action research project across the Bank, the timespan of which will lie beyond that of this research project.

- The usefulness scale which has been created and used for the purposes of this research project, BAPUS, could be tried and tested in various contexts for the purposes of measuring the usefulness of business analytics platforms with a view to maturing it into an established scale in the literature.

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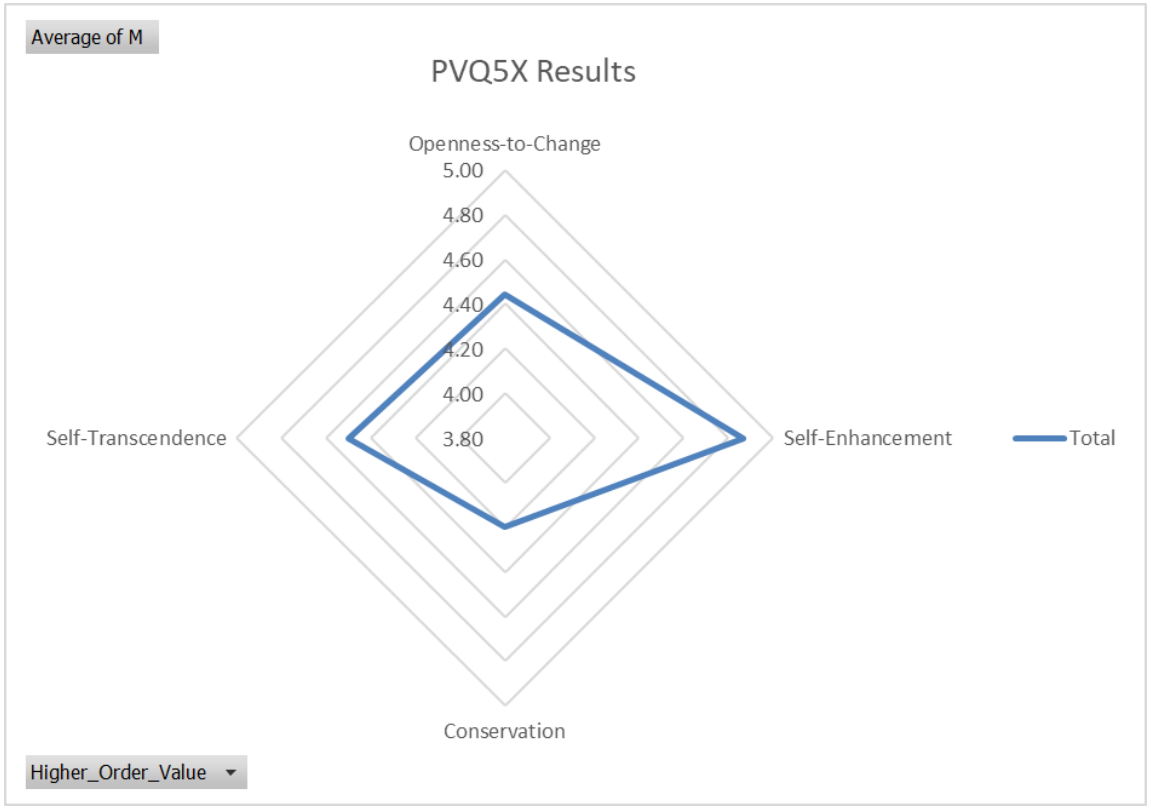
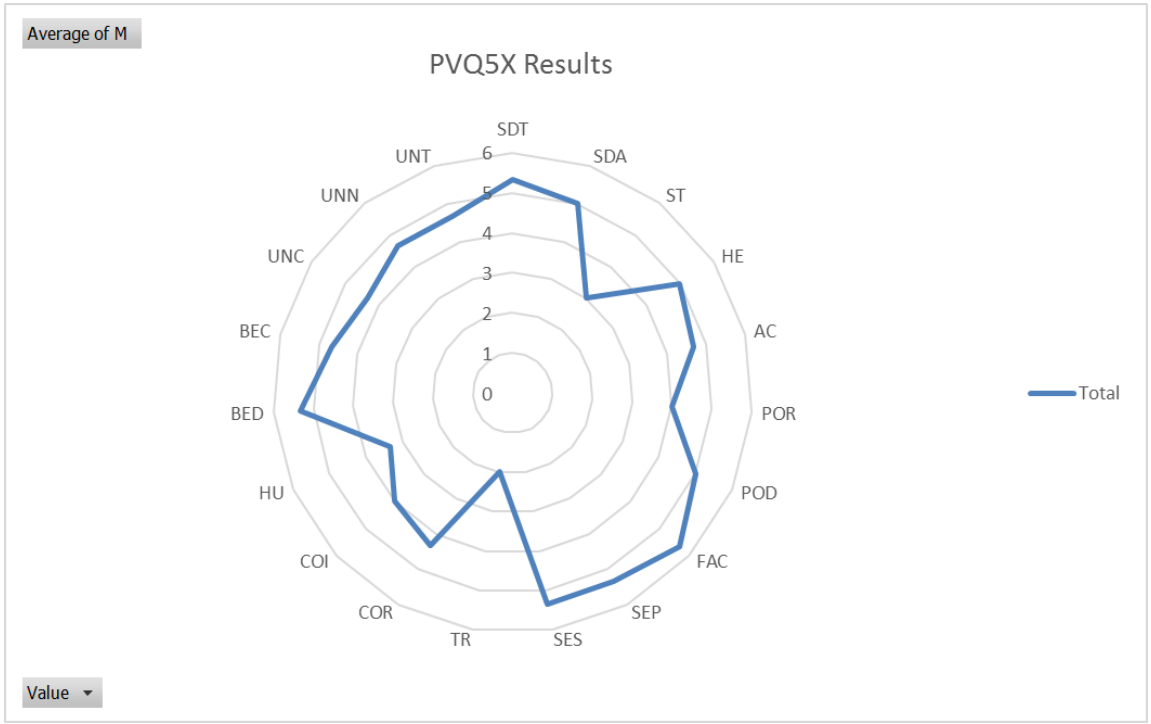
APPENDICES

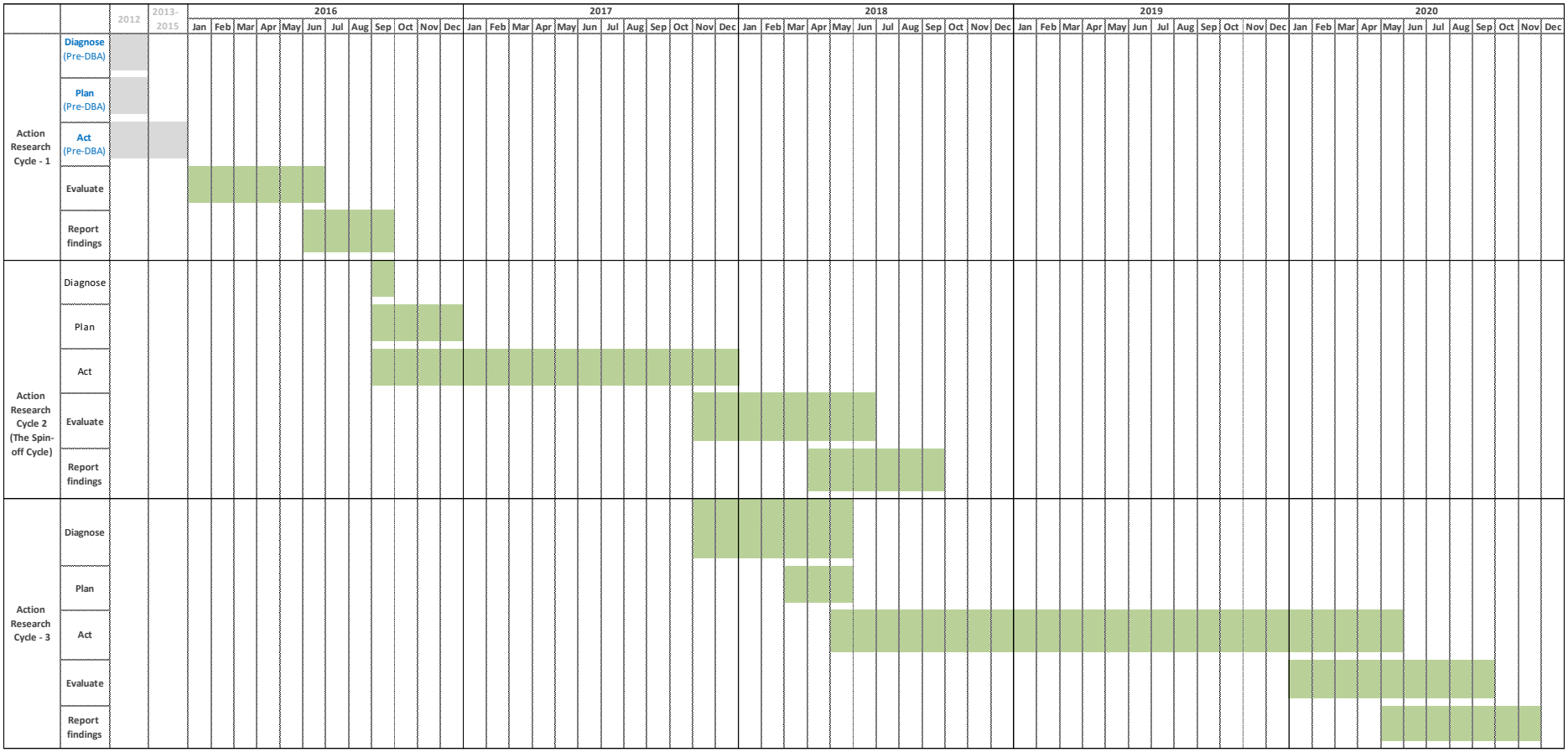
Appendix 1. My Personal Values According to the PVQ5X





SDT: Self-Direction-Thought, SDA: Self-Direction-Action, ST: Stimulation, HE: Hedonism, AC: Achievement, POR: Power-Resources, POD: Power-Dominance, FAC: Face, SEP: Security-Personal, SES: Security-Societal, TR: Tradition, COR: Conformity-Rules, COI: Conformity-Interpersonal, HU: Humility, BED: Benevolence-Dependability, BEC: Benevolence-Caring, UNC: Universalism-Concern, UNN: Universalism-Nature, UNT: Universalism-Tolerance (Schwartz et al. 2012)

Appendix 2. Action Research Cycles GANTT Chart



Appendix 3. Email Correspondence with the Research Ethics Support Team

From: ***** <*****@mdx.ac.uk> on behalf of MORE Support <MoreSupport@mdx.ac.uk>

Sent: Friday, March 5, 2021 5:37 PM

To: Murat Özel <murozel@yahoo.com>

Cc: Nathalie Van Meurs <N.Van-Meurs@mdx.ac.uk>

Subject: Re: Help Request - Research Ethics Submission (M00510819, DBA, Business School)

Hello Murat

Sorry for the delay in getting back to you.

Like other professional doctoral students that undertake the PAP process, it seems that you have followed the requirements of your programme and the research ethics issues were considered prior to your data collection. I'm assuming that you have continued to follow your research plans as discussed at your PAP. If these have deviated, then it is best to discuss these changes with your supervisor. The MORE form system allows for amendments to be made and reviewed once a research project starts, so further review and approval can be gained before changes to data collection processes are underway. As you haven't submitted a MORE form (your PAP was prior to the use of the MORE online system), it would be better to discuss any changes with your supervisor and the PAP process, to check on any specific issues.

If you or your supervisor have any further worries, please come back to me.

Best wishes

From: Murat Özel <murozel@yahoo.com>

Sent: 02 March 2021 19:34

To: MORE Support <MoreSupport@mdx.ac.uk>

Cc: Nathalie Van Meurs <N.Van-Meurs@mdx.ac.uk>

Subject: Re: Help Request - Research Ethics Submission (M00510819, DBA, Business School)

Dear More Support Team,

This is a kind reminder regarding my email below. Could you possibly help me clarify whether I need to take any action?

Thank you & Best regards,

Murat Özel

On Wednesday, 6 January 2021, 23:03:29 GMT+3, Murat Özel <murozel@yahoo.com> wrote:

Hello,

I am writing this email to seek your advice on research ethics submission via MORE.

I am a DBA (Doctor of Business Administration) research student at the Business School. I have started my programme in October 2014. Following the first two modules, I submitted my programme plan and then attended my PAP (Programme Approval Panel) in October 2015.

As part of my PAP submissions package, I have also submitted my Research Ethics Form (submission screenshot is attached.). Having my programme plan, which includes my research project proposal and Research Ethics Form, approved by the PAP, I started to work on my doctoral research project in 2016. I have performed three research cycles since then, and I am now working on my thesis to finalise it.

Throughout this process, I have not taken any additional action to submit any other form regarding research ethics, nor have I ever had a doubt or worry, as my Research Ethics Form was a part of my submissions as explained above, upon which I had already been given the green light by the PAP to proceed with my research project in October 2015. However, this topic was brought to my attention for the first time by my academic advisor, Dr Nathalie van Meurs, more recently (in May 2020) so that I could double-check. By that time, my data collection and analyses had already been completed apart from only the anonymised secondary data (anonymised emails) for my third -and last- research cycle, which has then been completed as well.

In light of my explanations above, could you possibly help me clarify whether I should still submit a research ethics application via MORE?

Best regards, Murat Özel (M00510819, DBA Research Student, Business School)

Appendix 4. AR Cycle-1 Questionnaire Items with Details

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
1	In general, I can say that QlikView applications have been very useful for me to access the information I need.	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.	H1b, H2b	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
2	Overall, I can say that the content coverage of the QlikView applications is adequate for my information requirements.	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.	H1b, H2b	Adapted: Larcker and Lessig (1980). (I have found this resource via LaLomia and Sidowski (1990), then requested and obtained the original resource via inter-library loan facility of MDX)
3	Overall, I can say that the information to which I have access via QlikView applications is necessary for me.	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions	H1b, H2b	Adapted: Larcker and Lessig (1980). (I have found this resource via LaLomia and Sidowski (1990), then requested and

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.		obtained the original resource via inter-library loan facility of MDX)
4	Overall, I can say that the information I have access via QlikView applications is updated with adequate frequency.	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.	H1b, H2b	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
5	I can make informed decisions by using the QlikView applications.	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.	H1b, H2b	Self-generated
6	I can take actions based on the information I have access via QlikView applications.	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions	H1b, H2b	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.		
7	I can effectively monitor my budget realization performance by using the QlikView applications.	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.	H1b, H2b	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
8	I can effectively spot new sales/cross sales opportunities by using the QlikView applications.	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.	H1b, H2b	Self-generated
9	I can effectively monitor my loan, deposit, mutual funds, etc. product volumes and pricing information by using the QlikView applications. *(Pricing: Interest rates, FTP rates, spread)*	Usefulness	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To collect data on overall evaluation of our apps. In line with the principle of "general before specified" (Brace, 2008). b) To investigate the relationships between this overall evaluation and evaluations of Openness-to-Change and Job Performance. c) To examine whether questions	H1b, H2b	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					from 1 to 10 can provide a basis for a new usefulness scale to be developed, exclusively for interactive Business Analytics platforms and/or applications on these platforms.		
10	I think that QlikView applications have been helpful for me to improve my job performance.	Job Performance	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get information on whether our applications lead to tangible benefits in terms of results i.e., improved job performance, based on self-reports. b) To examine whether questions 10, 30, and 50 can provide a basis for a new "Self-report Performance Impact" scale.	H2a, H2b, H2c, H2d, H2e	Self-generated
11	Please indicate the top three QlikView applications that you find the most useful.	Usefulness	Ranking	Three textboxes to be filled with one app. name each.	To get information on the most useful subject areas and applications according to the users' opinions.	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
12	I think that I would like to use the QlikView applications frequently.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of the SUS score with Openness to Change and Job Performance.	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor (2013), Uxservices (n.d.)
13	I find the QlikView applications unnecessarily complex.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of the SUS score with Openness to Change and Job Performance.	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor (2013), Uxservices (n.d.)
14	I think that the QlikView applications are easy to use.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					the SUS score with Openness to Change and Job Performance.		(2013), Uxservices (n.d.)
15	I think that I would need the support of a technical person to be able to use the QlikView applications.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of the SUS score with Openness to Change and Job Performance.	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor (2013), Uxservices (n.d.)
16	I think that the various functions in the QlikView applications are well integrated.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of the SUS score with Openness to Change and Job Performance.	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor (2013), Uxservices (n.d.)

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
17	I think there is too much inconsistency in the QlikView applications.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of the SUS score with Openness to Change and Job Performance.	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor (2013), Uxservices (n.d.)
18	I would imagine that most people would learn to use the QlikView applications very quickly.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of the SUS score with Openness to Change and Job Performance.	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor (2013), Uxservices (n.d.)
19	I find the QlikView applications very awkward to use.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					the SUS score with Openness to Change and Job Performance.		(2013), Uxservices (n.d.)
20	I feel very confident using the QlikView applications.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of the SUS score with Openness to Change and Job Performance.	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor (2013), Uxservices (n.d.)
21	I needed to learn a lot of things before I could get going with the QlikView applications.	Usability (SUS)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To calculate the System Usability Scale (SUS) score of our applications, in general. b) To analyse the relationship of the SUS score with Openness to Change and Job Performance.	H1a, H2a	Brook (1996), Brook (2013), Bangor, Kortum and Miller (2009), Kortum and Bangor (2013), Uxservices (n.d.)

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
22	I can find the information I need on QlikView applications easily.	Usability (Specific)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	(22-28): Specific question about the usability of our applications, to collect information on the perceived usability of specific features. These; a) Can help us spot the points for improvement, depending on the responses, b) Can be used to analyse the relation between the users' feedback on these points and the SUS score.	N/A	Adapted: Lewis (1995).
23	The terminology used in the QlikView applications is clear. *(Terminology: Product names and categories, other row and column names, button labels, etc. all the wording in the applications)*	Usability (Specific)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	(22-28): Specific question about the usability of our applications, to collect information on the perceived usability of specific features. These; a) Can help us spot the points for improvement, depending on the responses, b) Can be used to analyse the relation between the users' feedback on these points and the SUS score.	N/A	Adapted: Chin, Diehl and Norman (1988)

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
24	The graphical views in the QlikView applications are easily understood.	Usability (Specific)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	(22-28): Specific question about the usability of our applications, to collect information on the perceived usability of specific features. These; a) Can help us spot the points for improvement, depending on the responses, b) Can be used to analyse the relation between the users' feedback on these points and the SUS score.	N/A	Self-generated
25	The tabular views in the QlikView applications are easily understood.	Usability (Specific)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	(22-28): Specific question about the usability of our applications, to collect information on the perceived usability of specific features. These; a) Can help us spot the points for improvement, depending on the responses, b) Can be used to analyse the relation between the users' feedback on these points and the SUS score.	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
26	The buttons that enable adding and removing columns to tabular views facilitate usage.	Usability (Specific)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	(22-28): Specific question about the usability of our applications, to collect information on the perceived usability of specific features. These; a) Can help us spot the points for improvement, depending on the responses, b) Can be used to analyse the relation between the users' feedback on these points and the SUS score.	N/A	Self-generated
27	Please indicate the level of simplicity or complicatedness, in your view, of the usage of QlikView applications below.	Usability (Specific)	Application List: Please indicate the level of simlicity or complicatedness.	5-point Likert Scale	(22-28): Specific question about the usability of our applications, to collect information on the perceived usability of specific features. These; a) Can help us spot the points for improvement, depending on the responses, b) Can be used to analyse the relation between the users' feedback on these points and the SUS score.	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
28	The time I need to spend on QlikView applications in order to access the information I need is:	Usability (Specific)	Please select the option which best represents your QlikView experience.	5-point Likert Scale	(22-28): Specific question about the usability of our applications, to collect information on the perceived usability of specific features. These; a) Can help us spot the points for improvement, depending on the responses, b) Can be used to analyse the relation between the users' feedback on these points and the SUS score.	N/A	Adapted: Lewis (1995).
29	In general, I am satisfied with the performance of QlikView applications. *(Performance: The response time when you click to make selection(s).)*	Performance	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	To get information on whether we need to take actions to improve performance or not.	N/A	Adapted: Chin, Diehl and Norman (1988)
30	QlikView applications help me to better fulfil the formal requirements of my job.	Job Performance	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get information on whether our applications lead to tangible benefits in terms of results i.e., improved job performance, based on self-reports. b) To examine whether questions	H2a, H2b, H2c, H2d, H2e	Adapted: Williams and Anderson (1991, p.606).

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					10, 30, and 50 can provide a basis for a new "Self-report Performance Impact" scale.		
31	Please indicate the level of your satisfaction or dissatisfaction with the performance of the QlikView applications below.	Performance	Application List: Please indicate the level of satisfaction or dissatisfaction.	5-point Likert Scale	To see whether we need to take action to improve the performance of any of our QlikView applications.	N/A	Self-generated
32	I can get adequate support regarding my questions about QlikView usage, by e-mail from the QlikViewDestek inbox or by contacting the Business Analytics / Business Intelligence teams.	Support	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To see whether we need improvements in the support we provide. b) To examine the relationship of Support with Openness-to-Change and Job Performance.	H1d, H2d	Adapted: Wanberg and Banas (2000)
33	I can get support in a timely manner regarding my questions about QlikView usage, by e-mail from the	Support	Please indicate to what extent you agree or disagree	5-point Likert Scale	a) To see whether we need improvements in the support we provide.	H1d, H2d	Adapted: Wanberg and Banas (2000)

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
	QlikViewDestek inbox or by contacting the Business Analytics / Business Intelligence teams.		with the statements below.		b) To examine the relationship of Support with Openness-to-Change and Job Performance.		
34	I think it can be useful if staff from the Business Analytics and Business Intelligence teams visit the branches and regional directorates periodically to provide on-the-job support for QlikView usage.	Support	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	To get users' opinion on whether we should take action to be able to visit the field staff periodically.	N/A	Self-generated
35	It would be useful to have "how to" guides for each and every QlikView application in order for me to use the applications more easily and effectively.	Support	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	To get users' opinion on whether we should take action to prepare "how to guides" for each application.	N/A	Self-generated
36	If "how to" guides for each QlikView application are to be prepared, my top three preferences would be the guides in the following	Support	Ranking	Rank the first three choice among a	To get information on users' preferences regarding the format of how-to guides,	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
	formats. *(Tip: Write "1" in the box over your first choice, write "2" in the box over your second choice, and write "3" in the box over your third choice.)*			total of 6 options.			
37	Have you attended any classroom-based, e-learning, or any other training course on how to use QlikView applications? *(If your answer is "No", please skip question 38 and continue from question 39.)*	Training	Yes / No	Yes / No selection	To get information on what percentage of our users have attended any type of QV training.	N/A	Self-generated
38	Please select the option(s) that represents the training course you have attended. *(You can select one or more options.)*	Training	Select option(s).	Selection from 5 options	To get more detailed information on the type of training the users attended.	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
39	A specific training is required for each and every QlikView application so that it could be used easily and effectively.	Training	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	To get specific information on the general coverage of training desired so that we can plan our actions accordingly.	N/A	Self-generated
40	A general QlikView training is required so that the QlikView applications could be used easily and effectively.	Training	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	To get specific information on the general coverage of training desired so that we can plan our actions accordingly.	N/A	Self-generated
41	I think that I have had adequate training to be able to use the QlikView applications easily and effectively.	Training	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	To get information on the extent to which our users thought they had received adequate training to help us with future training planning.	N/A	Self-generated
42	I think that I can use QlikView applications more easily and effectively if I attend a QlikView training course.	Training	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	To get information on the extent to which our users thought attending a QlikView training would help them with more effective and efficient usage to help us with future training planning.	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
43	If you were to take a training course about QlikView usage, which ones of the below would be your top three choices? Please answer by **ranking your top three** choices **from 1 to 3.** *(Example: If your first three choices are e-learning, webinar, and classroom-based training respectively, then write "1" in the box over e-learning, write "2" in the box over* ***webinar, and write "3" in the box over classroom-based training.)***	Training	Ranking	Rank the first three choice among a total of 5 options.	To have guidance for our future actions regarding training.	N/A	Self-generated
44	Which of the options below best describes your **main purpose** for using QlikView applications?	Purpose	Select option(s).	Selection from 6 options	To have an initial view on users' purpose for using QlikView application so that we can examine this further in the following cycle(s).	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
45	Please indicate to what extent you find QlikView applications useful or not useful in supporting your business decisions. (If "Not useful", then please skip question 46 and continue with question 47)	Purpose	Select option(s).	5-point Likert Scale	Straightforward question to collect data on a specific purpose in our own business context.	N/A	Self-generated
46	For what type of your business decisions do you think QlikView applications are useful? *(You may select one or more options.)*	Purpose	Select option(s).	Selection from 6 options	Straightforward question to collect data on a specific purpose in our own business context.	N/A	Self-generated
47	When compared to my situation prior to QlikView applications, the number of the manual reports I prepare has…	Change (Outcomes)	Please select the option which best represents your view to complete the sentences in the questions below.	5-point Likert Scale	Straightforward question to collect data on a specific change outcome in our own business context.	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
48	When compared to my situation prior to QlikView applications, the number of the manual reports that are sent to me has…	Change (Outcomes)	Please select the option which best represents your view to complete the sentences in the questions below.	5-point Likert Scale	Straightforward question to collect data on a specific change outcome in our own business context.	N/A	Self-generated
49	Please indicate your top three choices for the method of information access regarding your reporting & analysis needs. *(Please write 1 in the box over your first choice, 2 in the box over your second choice, and 3 in the box over your third choice.)*	Change (Outcomes)	Ranking	Rank the first 3 choice among a total of 6 options.	Straightforward question to collect data on a specific change outcome in our own business context.	N/A	Self-generated
50	When compared to my situation before QlikView applications, I think that I have a better performance in performing the tasks expected of me	Job Performance	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get information on whether our applications lead to tangible benefits in terms of results i.e. improved job performance, based on self-reports. b) To examine whether questions 10, 30, and 50 can provide a basis	H2a, H2b, H2c, H2d, H2e	Adapted: Williams and Anderson (1991, p.606).

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					for a new "Self-report Performance Impact" scale.		
51	I would consider myself open to the changes that the implementation of QlikView brought to my method of information access.	Change (Openness-to-Change)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get a measure of openness-to-change of our users. b) To examine the relations of Openness-to-Change with Usability, Usefulness, Support, IPT, and Job Performance.	H1a, H1b, H1c, H1d, H2e	Adapted: Susskind, Miller and Johnson (1998); Miller, Johnson and Grau (1994).
52	Right now, I am somewhat resistant to the changes regarding my method of information access.that has come with the implementation of QlikView applications.	Change (Openness-to-Change)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get a measure of openness-to-change of our users. b) To examine the relations of Openness-to-Change with Usability, Usefulness, Support, IPT, and Job Performance.	H1a, H1b, H1c, H1d, H2e	Adapted: Susskind, Miller and Johnson (1998); Miller, Johnson and Grau (1994).
53	In light of the implementation of QlikView applications, I am quite reluctant to consider changing the way I now	Change (Openness-to-Change)	Please indicate to what extent you agree or disagree	5-point Likert Scale	a) To get a measure of openness-to-change of our users. b) To examine the relations of Openness-to-Change with	H1a, H1b, H1c, H1d, H2e	Adapted: Susskind, Miller and Johnson (1998); Miller,

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
	access information accordingly.		with the statements below.		Usability, Usefulness, Support, IPT, and Job Performance.		Johnson and Grau (1994).
54	I think the implementation of QlikView positively affects how I access information.	Change (Openness-to-Change)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get a measure of openness-to-change of our users. b) To examine the relations of Openness-to-Change with Usability, Usefulness, Support, IPT, and Job Performance.	H1a, H1b, H1c, H1d, H2e	Adapted: Susskind, Miller and Johnson (1998); Miller, Johnson and Grau (1994).
55	From my perspective, QlikView implementation was for the better.	Change (Openness-to-Change)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get a measure of openness-to-change of our users. b) To examine the relations of Openness-to-Change with Usability, Usefulness, Support, IPT, and Job Performance.	H1a, H1b, H1c, H1d, H2e	Adapted: Susskind, Miller and Johnson (1998); Miller, Johnson and Grau (1994).
56	The changes as a result of the QlikView implementation has negatively affected how I access information.	Change (Openness-to-Change)	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get a measure of openness-to-change of our users. b) To examine the relations of Openness-to-Change with Usability, Usefulness, Support, IPT, and Job Performance.	H1a, H1b, H1c, H1d, H2e	Adapted: Susskind, Miller and Johnson (1998); Miller, Johnson and Grau (1994).

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
57	I think that I have been adequately informed about the implementation of QlikView applications.	Information, Participation, Trust	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get information on whether our users think that they have been informed adequately and timely, so that we can plan new actions and/or strategies accordingly. b) To see whether the questions 57-61 can provide a basis for the creation of a new IPT (Information, Participation, Trust) scale, particularly for the new Business Intelligence & Analytics platform implementations. c) To examine the relation of this IPT scale with Openness-to-Change, Job Performance, Usefulness, and Usability.	H1c, H2c	Adapted: Wanberg and Banas (2000)
58	I think that I have been adequately informed about what would change in my workplace activities with the implementation of QlikView applications.	Information, Participation, Trust	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get information on whether our users think that they have been informed adequately and timely, so that we can plan new actions and/or strategies accordingly. b) To see whether the questions	H1c, H2c	Adapted: Wanberg and Banas (2000)

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					57-61 can provide a basis for the creation of a new IPT (Information, Participation, Trust) scale, particularly for the new Business Intelligence & Analytics platform implementations. c) To examine the relation of this IPT scale with Openness-to-Change, Job Performance, Usefulness, and Usability.		
59	I think that I am being adequately informed about the latest new developments and improvements on QlikView.	Information, Participation, Trust	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get information on whether our users think that they have been informed adequately and timely, so that we can plan new actions and/or strategies accordingly. b) To see whether the questions 57-61 can provide a basis for the creation of a new IPT (Information, Participation, Trust) scale, particularly for the new Business Intelligence & Analytics platform implementations. c) To examine the relation of this	H1c, H2c	Adapted: Wanberg and Banas (2000)

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
					IPT scale with Openness-to-Change, Job Performance, Usefulness, and Usability.		
60	I believe that my suggestions about QlikView applications are valued and considered seriously.	Information, Participation, Trust	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get information on whether our users think that they have been informed adequately and timely, so that we can plan new actions and/or strategies accordingly. b) To see whether the questions 57-61 can provide a basis for the creation of a new IPT (Information, Participation, Trust) scale, particularly for the new Business Intelligence & Analytics platform implementations. c) To examine the relation of this IPT scale with Openness-to-Change, Job Performance, Usefulness, and Usability.	H1c, H2c	Adapted: Wanberg and Banas (2000)

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
61	I have confidence in that the Business Analytics / Business Intelligence teams in charge of the QlikView applications in our Bank have sufficient expertise and experience in their job.	Information, Participation, Trust	Please indicate to what extent you agree or disagree with the statements below.	5-point Likert Scale	a) To get information on whether our users think that they have been informed adequately and timely, so that we can plan new actions and/or strategies accordingly. b) To see whether the questions 57-61 can provide a basis for the creation of a new IPT (Information, Participation, Trust) scale, particularly for the new Business Intelligence & Analytics platform implementations. c) To examine the relation of this IPT scale with Openness-to-Change, Job Performance, Usefulness, and Usability,.	H1c, H2c	Adapted: Simoes and Esposito (2014), Devos and Buelens (2007).
62	Please write below any feedback that you may want to give us regarding QlikView applications and/or the way we serve you in a more general sense. Comments on both	Open-ended response	Open-ended response.	Open-ended response.	To receive qualitative feedback so that we can have a better understanding of any issues which may not be covered by the structured questions and inform the following research cycle(s).	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
	the points you think we do well and the points you think we need to improve are more than welcome.						
63	Please indicate your age :	Categorical	Indicate	Fill in the textbox	Business focused statistics.	N/A	Self-generated
64	Please indicate your gender: Male Female	Categorical	Select option(s).	Select from two options	Business focused statistics.	N/A	Self-generated
65	Please indicate the highest level of educational qualification you have achieved.	Categorical	Select option(s).	Select from 5 options	Business focused statistics.	N/A	Self-generated
66	Please select the option which best describes the subject field of your educational qualification, which you selected in Question 65.	Categorical	Select option(s).	Select from 4 options	Business focused statistics.	N/A	Self-generated

Item #	Item	Section (Key Concept)	Respondent Action	Response Format	Purpose	Hypotheses	Source
67	How long have you been working at TEB?	Categorical	Select option(s).	Select from 4 options	Business focused statistics.	N/A	Self-generated
68	How long have you been using QlikView applications at TEB?	Categorical	Select option(s).	Select from 4 options	Business focused statistics.	N/A	Self-generated
69	Please select the option which best describes your area of work at our Bank.	Categorical	Select option(s).	Select from 5 options	Business focused statistics.	N/A	Self-generated

Appendix 5. Invitation to Survey for AR Cycle-1 Questionnaire

From: survey-noreply@smo.surveymonkey.com [mailto:survey-noreply@smo.surveymonkey.com] **On Behalf Of** [redacted] via surveymonkey.com
Sent: Thursday, March 10, 2016 12:01 PM
To: [redacted]
Subject: Yönetim Raporlaması Anketi

Yönetim Raporlaması Anketi

Değerli [redacted] Ailesi Üyesi,

QlikView platformumuzun bir kullanıcısı olarak sizlerin Qlikview uygulamalarımız ile ilgili detaylı görüşlerinizi almak ve ihtiyaçlarınızı belirlemek amacıyla bir anket hazırladık.

Anketimize katılarak değerli görüşlerinizi bizimle paylaşmanız, platformdaki güçlü yönlerimizi ve gelişim noktalarımızı belirleyebilmemiz ve sizlere daha iyi hizmet sağlayabilmemiz açısından çok önemli.

Bunun yanı sıra, anket çalışmasından elde edeceğimiz bazı sonuçlar, Middlesex Üniversitesi'nde (Londra, İngiltere) doktora çalışması kapsamında da kullanılacaktır.

Anketimizde doğru ya da yanlış bir cevap bulunmamaktadır. Cevaplarınız, alacağımız aksiyonlara karar verebilmemiz ve araştırma projemizin bundan sonraki adımlarını planlayabilmemiz açısından kritik derecede önemli olacaktır. Bu nedenle, tüm soruları açıklık ve samimiyetle cevaplamanızı özellikle rica ediyoruz.

Ankete vereceğiniz cevap ve görüşleriniz kesinlikle gizli tutulacak, asla bireysel olarak kullanılmayacak ve raporlanmayacaktır. Cevaplarınız yalnızca toplu olarak analiz edilerek raporlanacaktır.

Yaklaşık 15-20 dakikanızı alacak anketimize **22 Mart Salı günü saat 18:00'e kadar** aşağıda yer alan size özel bağlantıya tıklayarak ulaşabilirsiniz.

Not: Bu link sadece sizin eposta adresinize tanımlanmıştır. Lütfen bu mesajı başkaları ile paylaşmayınız.

Anket ile ilgili herhangi bir soru veya sorununuz olduğunda [redacted] ([redacted].com.tr) ile iletişime geçebilirsiniz.

Değerli vaktinizi ayırarak çalışmamıza yapacağınız önemli katkılardan dolayı teşekkürlerimizi sunuyoruz.

Saygılarımızla,

Yönetim Raporlaması Bölümü & [redacted]

Ankete Başla

Anket bağlantısı size özel olduğu için bu e-postayı lütfen iletmeyin. Bu göndericiden gelen anketleri [redacted]

Sağlayan SurveyMonkey

Appendix 6. Reminder for Invitation to Survey

Appendix 7. Statistical Analysis Results for the Openness to Change Scale

Case Processing Summary

		N	%
Cases	Valid	1035	100.0
	Excluded[a]	0	.0
	Total	1035	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.746	.751	6

Item Statistics

	Mean	Std. Deviation	N
I would consider myself open to the changes that the implementation of QlikView brought to my method of information access.	4.19	.829	1035
Right now, I am somewhat resistant to the changes regarding my method of information access that has come with the implementation of QlikView applications.	3.44	1.180	1035
In light of the implementation of QlikView applications, I am quite reluctant to consider changing the way I now access information accordingly.	3.75	1.083	1035
I think the implementation of QlikView positively affects how I access information.	4.25	.826	1035
From my perspective, QlikView implementation was for the better.	4.28	.822	1035
The changes as a result of the QlikView implementation has negatively affected how I access information.	3.92	1.085	1035

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
23.82	15.312	3.913	6

Appendix 8. Statistical Analysis Results for the SUS

Case Processing Summary

		N	%
Cases	Valid	1035	100.0
	Excluded[a]	0	.0
	Total	1035	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.838	.834	10

Item Statistics

	Mean	Std. Deviation	N
I think that I would like to use the QlikView applications frequently.	3.12	.820	1035
I find the QlikView applications unnecessarily complex.	1.81	1.142	1035
I think that the QlikView applications are easy to use.	2.30	1.091	1035
I think that I would need the support of a technical person to be able to use the QlikView applications.	1.98	1.110	1035
I think that the various functions in the QlikView applications are well integrated.	2.71	.878	1035
I think there is too much inconsistency in the QlikView applications.	2.51	.952	1035
I would imagine that most people would learn to use the QlikView applications very quickly.	2.43	1.051	1035
I find the QlikView applications very awkward to use.	2.17	1.130	1035
I feel very confident using the QlikView applications.	2.51	.913	1035
I needed to learn a lot of things before I could get going with the QlikView applications.	1.81	1.008	1035

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.334	1.807	3.116	1.309	1.725	.169	10

Appendix 9. Statistical Analysis Results for the BAPUS

Case Processing Summary

		N	%
Cases	Valid	1035	100.0
	Excluded[a]	0	.0
	Total	1035	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.961	.963	9

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
36.43	56.048	7.487	9

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.048	3.724	4.228	.504	1.135	.023	9
Item Variances	.906	.807	1.096	.289	1.357	.008	9
Inter-Item Correlations	.741	.527	.892	.365	1.692	.011	9

Item Statistics

	Mean	Std. Deviation	N
In general, I can say that QlikView applications have been very useful for me to access the information I need.	4.23	.939	1035
Overall, I can say that the content coverage of the QlikView applications is adequate for my information requirements.	4.10	.943	1035
Overall, I can say that the information to which I have access via QlikView applications is necessary for me.	4.22	.912	1035
Overall, I can say that the information I have access via QlikView applications is updated with adequate frequency.	3.72	1.047	1035
I can make informed decisions by using the QlikView applications.	4.09	.898	1035
I can take actions based on the information I have access via QlikView applications.	4.11	.912	1035
I can effectively monitor my budget realization performance by using the QlikView applications.	4.02	.983	1035
I can effectively spot new sales/cross sales opportunities by using the QlikView applications.	3.97	.953	1035
I can effectively monitor my loan, deposit, mutual funds, etc. product volumes and pricing information by using the QlikView applications. *(Pricing: Interest rates, FTP rates, spread)*	3.98	.967	1035

Appendix 10. Statistical Analysis Results for the Support Scale

Case Processing Summary

		N	%
Cases	Valid	1035	100.0
	Excluded[a]	0	.0
	Total	1035	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.966	.966	2

Item-Total Statistics

	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I can get adequate support regarding my questions about QlikView usage, by e-mail from the QlikViewDestek inbox or by contacting the Business Analytics / Business Intelligence teams.	.622	.934	.873	.
I can get support in a timely manner regarding my questions about QlikView usage, by e-mail from the QlikViewDestek inbox or by contacting the Business Analytics / Business Intelligence teams.	.631	.934	.873	.

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.501	3.500	3.502	.003	1.001	.000	2
Item Variances	.626	.622	.631	.010	1.016	.000	2
Inter-Item Correlations	.934	.934	.934	.000	1.000	.000	2

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
7.00	2.424	1.557	2

Appendix 11. Statistical Analysis Results for the IPT Scale

Case Processing Summary

		N	%
Cases	Valid	1035	100.0
	Excluded[a]	0	.0
	Total	1035	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.893	.891	5

Item Statistics

	Mean	Std. Deviation	N
I think that I have been adequately informed about the implementation of QlikView applications.	3.54	.888	1035
I think that I have been adequately informed about what would change in my workplace activities with the implementation of QlikView applications.	3.57	.860	1035
I think that I am being adequately informed about the latest new developments and improvements on QlikView.	3.53	.883	1035
I believe that my suggestions about QlikView applications are valued and considered seriously.	3.57	.819	1035
I have confidence in that the Business Analytics / Business Intelligence teams in charge of the QlikView applications in our Bank have sufficient expertise and experience in their job.	3.86	.749	1035

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.614	3.534	3.858	.324	1.092	.019	5
Item Variances	.708	.561	.788	.227	1.404	.009	5
Inter-Item Correlations	.621	.511	.787	.277	1.541	.011	5

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.07	12.384	3.519	5

Appendix 12. Statistical Analysis Results for JPIS

Case Processing Summary

		N	%
Cases	Valid	1035	100.0
	Excluded[a]	0	.0
	Total	1035	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.649	.660	3

Item Statistics

	Mean	Std. Deviation	N
I think that QlikView applications have been helpful for me to improve my job performance.	4.10	.926	1035
QlikView applications help me to better fulfil the formal requirements of my job.	3.88	.754	1035
When compared to my situation before QlikView applications, I think that I have a better performance in performing the tasks expected of me	3.81	.946	1035

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.930	3.810	4.100	.290	1.076	.023	3
Item Variances	.774	.569	.895	.326	1.573	.032	3
Inter-Item Correlations	.392	.323	.474	.151	1.467	.005	3

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
11.79	4.092	2.023	3

Appendix 13. Statistical Analysis (Multiple Linear Regression) Results for the Step-1 Hypothesis Tests

Descriptive Statistics

	Mean	Std. Deviation	N
The Openness-to-Change Score over 100	79.4106	13.04353	1035
The Overall SUS Score	58.35	16.194	1035
The Usefulness (BAPUS) Score Over 100	80.9512	16.63668	1035
The Support Score over 100	70.0193	15.56790	1035
The Information-Participation-Trust Score over 100	72.2783	14.07633	1035

Model Summary[b]

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.400[a]	.160	.157	11.97632	.160	49.122	4	1030	.000	1.998

a. Predictors: (Constant), The Information-Participation-Trust Score over 100, The Usefulness (BAPUS) Score Over 100, The Support Score over 100, The Overall SUS Score

b. Dependent Variable: The Openness-to-Change Score over 100

According to the R-Square figure given in the model summary above, the model (i.e., Usability, Usefulness, IPT, and Support together) explains 16% of the total variation in Openness to Change. Although this may indicate the presence of various other potential factors that are not included in this analysis, this figure still represents an acceptable amount of explanation of the total variation, deemed within the range of a "medium" R-Square (Field 2017; Cohen 2013).

The Durbin-Watson test statistic, which is given as 1.998 in the table above, indicates no assumption violation concerning the issue of autocorrelation, as it is very close to 2, which is the figure when there is no autocorrelation (Field 2017).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28183.004	4	7045.751	49.122	.000[b]
	Residual	147735.257	1030	143.432		
	Total	175918.261	1034			

a. Dependent Variable: The Openness-to-Change Score over 100

b. Predictors: (Constant), The Information-Participation-Trust Score over 100, The Usefulness (BAPUS) Score Over 100, The Support Score over 100, The Overall SUS Score

The Sig. value, which is given as .000 <= α = 0.05 threshold, in the table above indicates that the model is meaningful at 95% confidence level. In other words, the null hypothesis "H0: None of the independent variables has an impact on Openness to Change" has been rejected.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	53.287	2.437		21.870	.000	48.506	58.068		
	The Overall SUS Score	.229	.027	.284	8.541	.000	.176	.282	.736	1.358
	The Usefulness (BAPUS) Score Over 100	.102	.025	.130	4.119	.000	.053	.150	.820	1.220
	The Support Score over 100	-.044	.027	-.052	-1.602	.110	-.097	.010	.769	1.300
	The Information-Participation-Trust Score over 100	.105	.032	.113	3.271	.001	.042	.168	.681	1.468

a. Dependent Variable: The Openness-to-Change Score over 100

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	The Overall SUS Score	The Usefulness (BAPUS) Score Over 100	The Support Score over 100	The Information-Participation-Trust Score over 100
1	1	4.885	1.000	.00	.00	.00	.00	.00
	2	.044	10.512	.04	.91	.01	.10	.01
	3	.033	12.155	.02	.03	.52	.46	.01
	4	.021	15.133	.08	.01	.25	.43	.59
	5	.017	17.101	.85	.05	.22	.01	.38

a. Dependent Variable: The Openness-to-Change Score over 100

According to the VIF scores in the "Coefficients" table above, there is no indication of the presence of a serious multicollinearity as an assumption violation as all the VIF values are well below the threshold of 10, and the corresponding Tolerance values are all well above 0.2 (Field 2017). The Condition Index figures also support this interpretation, as they are all well below the threshold of 30 for strong multicollinearity (Regorz 2020). As for the variance proportions, even for the last two dimensions where the condition indices are relatively higher, 15.133 and 17.101 respectively, there are no pairs of predictor variables with significantly high variance proportions (e.g., above 0.90) (Regorz 2020).

Casewise Diagnostics[a]

Case Number	Std. Residual	The Openness-to-Change Score over 100	Predicted Value	Residual
236	-3.410	36.67	77.5064	-40.83970
429	-4.778	23.33	80.5560	-57.22271
812	-3.094	40.00	77.0576	-37.05760
902	3.026	100.00	63.7617	36.23828
907	-3.538	30.00	72.3722	-42.37215
1004	-3.040	43.33	79.7406	-36.40726

a. Dependent Variable: The Openness-to-Change Score over 100

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	56.5478	94.2321	79.4106	5.22076	1035
Std. Predicted Value	-4.379	2.839	.000	1.000	1035
Standard Error of Predicted Value	.382	2.213	.779	.293	1035
Adjusted Predicted Value	55.9594	94.4100	79.4100	5.22060	1035
Residual	-57.22271	36.23828	.00000	11.95313	1035
Std. Residual	-4.778	3.026	.000	.998	1035
Stud. Residual	-4.812	3.044	.000	1.001	1035
Deleted Residual	-58.04581	36.66297	.00066	12.01922	1035
Stud. Deleted Residual	-4.865	3.056	.000	1.002	1035
Mahal. Distance	.051	34.294	3.996	4.404	1035
Cook's Distance	.000	.067	.001	.003	1035
Centered Leverage Value	.000	.033	.004	.004	1035

a. Dependent Variable: The Openness-to-Change Score over 100

Case Summaries[a]

	Standardized Residual	Studentized Residual	Cook's Distance	Standardized DFBETA Intercept	Standardized DFBETA USB_TOTAL_SCORE	Standardized DFBETA USF_Score_v2_100	Standardized DFBETA SUP_Score_100	Standardized DFBETA IPT_Score_100
1	-3.41004	-3.41564	.00767	-.02323	.11058	-.01302	.08792	-.12860
2	-4.77799	-4.81223	.06662	-.10486	-.30207	-.06826	-.22208	.53165
3	-3.09424	-3.09708	.00352	-.01162	.04132	.02990	-.08002	.00891
4	3.02583	3.04351	.02171	.29121	-.13011	-.02856	-.04135	-.14427
5	-3.53799	-3.55487	.02417	-.24209	-.08589	.31501	.00667	.01696
6	-3.03994	-3.05022	.01262	-.06554	-.07287	-.12493	.01336	.19964
Total N	6	6	6	6	6	6	6	6

a. Limited to first 100 cases.

There are 6 observations which have been identified as outliers based on their standardised residuals falling out of the default accepted range of [-3, 3] in SPSS 25; however, the following Residual Statistics and Case Summaries do not indicate the existence of any extremely influential observations, including the outliers, as all the Cook's Distance values and all the absolute Standardised DFBETA values are well below 1 (Field 2017). Therefore, a decision has been made to proceed with the analysis without taking any specific action concerning these outliers.

Appendix 14. Statistical Analysis (Multiple Linear Regression) Results for the Step-2 Hypothesis Tests

Descriptive Statistics

	Mean	Std. Deviation	N
Job Performance Impact Score Over 100	78.6023	13.48639	1035
The Overall SUS Score	58.35	16.194	1035
The Usefulness (BAPUS) Score Over 100	80.9512	16.63668	1035
The Support Score over 100	70.0193	15.56790	1035
The Information-Participation-Trust Score over 100	72.2783	14.07633	1035
The Openness-to-Change Score over 100	79.4106	13.04353	1035

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.820[a]	.672	.670	7.74528	.672	421.201	5	1029	.000	1.988

a. Predictors: (Constant), The Openness-to-Change Score over 100, The Support Score over 100, The Usefulness (BAPUS) Score Over 100, The Overall SUS Score, The Information-Participation-Trust Score over 100

b. Dependent Variable: Job Performance Impact Score Over 100

According to the R-Square figure given in the model summary above, the model (i.e., Usability, Usefulness, IPT, Support, and Openness-to-Change together) explains 67.2% of the total variation in Job Performance Impact Score. This figure represents a highly acceptable amount of explanation of the total variation, deemed above the minimum threshold of 26% for a "large" R-Square (Field 2017; Cohen 2013).

The Durbin-Watson test statistic, which is given as 1.998 in the table above, indicates no assumption violation concerning the issue of autocorrelation, as it is very close to 2, which is the figure when there is no autocorrelation (Field 2017).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	126337.786	5	25267.557	421.201	.000[b]
	Residual	61729.031	1029	59.989		
	Total	188066.817	1034			

a. Dependent Variable: Job Performance Impact Score Over 100

b. Predictors: (Constant), The Openness-to-Change Score over 100, The Support Score over 100, The Usefulness (BAPUS) Score Over 100, The Overall SUS Score, The Information-Participation-Trust Score over 100

The Sig. value, which is given as .000 <= α = 0.05 threshold, in the table above indicates that the model is meaningful at 95% confidence level. In other words, the null hypothesis "H0: None of the independent variables has an impact on Job Performance Impact Score" has been rejected.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	6.717	1.907		3.522	.000	2.975	10.458		
	The Overall SUS Score	.140	.018	.169	7.830	.000	.105	.176	.688	1.454
	The Usefulness (BAPUS) Score Over 100	.466	.016	.575	28.908	.000	.434	.498	.806	1.240
	The Support Score over 100	.072	.018	.083	4.083	.000	.037	.107	.767	1.303
	The Information-Participation-Trust Score over 100	.152	.021	.159	7.307	.000	.111	.193	.674	1.484
	The Openness-to-Change Score over 100	.125	.020	.121	6.189	.000	.085	.164	.840	1.191

a. Dependent Variable: Job Performance Impact Score Over 100

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	The Overall SUS Score	The Usefulness (BAPUS) Score Over 100	The Support Score over 100	The Information-Participation-Trust Score over 100	The Openness-to-Change Score over 100
1	1	5.862	1.000	.00	.00	.00	.00	.00	.00
	2	.044	11.485	.03	.88	.01	.06	.00	.01
	3	.036	12.707	.02	.01	.14	.56	.03	.12
	4	.026	14.916	.03	.00	.80	.01	.01	.24
	5	.020	17.043	.01	.03	.01	.30	.93	.05
	6	.011	22.928	.91	.08	.04	.07	.03	.59

a. Dependent Variable: Job Performance Impact Score Over 100

According to the VIF scores in the "Coefficients" table above, there is no indication of the presence of a serious multicollinearity as an assumption violation as all the VIF values are well below the threshold of 10, and the corresponding Tolerance values are all well above 0.2 (Field 2017). The Condition Index figures also support this interpretation, as they are all well below the threshold of 30 for strong multicollinearity (Regorz 2020). As for the variance proportions, even for the last two dimensions where the condition indices are relatively higher, 15.133 and 17.101 respectively, there are no pairs of predictor variables with significantly high variance proportions (e.g., above 0.90) (Regorz 2020). Although multicollinearity can normally be expected and can't be avoided in a mediation analysis due to the definition of mediation involving a significant relationship between the predictor and the mediator (Kenny 2021), there is no indication of such an assumption violation in this analysis, as explained above.

Casewise Diagnostics[a]

Case Number	Std. Residual	Job Performance Impact Score Over 100	Predicted Value	Residual
163	-3.879	20.00	50.0444	-30.04435
386	-3.541	26.67	54.0947	-27.42804
407	-4.395	46.67	80.7043	-34.03766
597	3.064	93.33	69.6050	23.72830
869	-3.601	66.67	94.5605	-27.89383
1008	-3.406	46.67	73.0447	-26.37800

a. Dependent Variable: Job Performance Impact Score Over 100

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	30.5035	102.2831	78.6023	11.05367	1035
Std. Predicted Value	-4.351	2.142	.000	1.000	1035
Standard Error of Predicted Value	.294	1.477	.557	.195	1035
Adjusted Predicted Value	30.8082	102.3046	78.6016	11.04942	1035
Residual	-34.03766	23.72830	.00000	7.72653	1035
Std. Residual	-4.395	3.064	.000	.998	1035
Stud. Residual	-4.418	3.075	.000	1.001	1035
Deleted Residual	-34.39359	23.91037	.00064	7.78613	1035
Stud. Deleted Residual	-4.458	3.088	.000	1.003	1035
Mahal. Distance	.489	36.581	4.995	4.784	1035
Cook's Distance	.000	.069	.001	.004	1035
Centered Leverage Value	.000	.035	.005	.005	1035

a. Dependent Variable: Job Performance Impact Score Over 100

Case Summaries[a]

		Case Number	Standardized Residual	Studentized Residual	Cook's Distance	Standardized DFBETA Intercept	Standardized DFBETA USB_TOTAL_SCORE	Standardized DFBETA USF_Score_v2_100	Standardized DFBETA SUP_Score_100	Standardized DFBETA IPT_Score_100	Standardized DFBETA OTC_Score_100
1		163	-3.87905	-3.92656	.06332	-.20737	.26747	.22217	.38331	-.35334	-.09137
2		386	-3.54126	-3.59746	.06901	-.00772	.47548	.23968	-.30702	-.21113	-.07840
3		407	-4.39463	-4.41755	.03401	.20552	.20239	.17005	-.01568	-.30412	-.23851
4		597	3.06358	3.07531	.01209	-.00518	-.17786	.00516	.01572	-.06423	.18112
5		869	-3.60140	-3.61837	.02062	.05415	-.27099	-.06184	.15087	.05341	-.02084
6		1008	-3.40569	-3.41473	.01034	-.17234	-.14247	-.01277	.05399	.07881	.17694
Total	N		6	6	6	6	6	6	6	6	6
	Minimum		-4.39463	-4.41755	.01034	-.20737	-.27099	-.06184	-.30702	-.35334	-.23851
	Maximum		3.06358	3.07531	.06901	.20552	.47548	.23968	.38331	.07881	.18112

a. Limited to first 100 cases.

There are 6 observations which have been identified as outliers based on their standardised residuals falling out of the default accepted range of [-3, 3] in SPSS 25; however, the following Residual Statistics and Case Summaries do not indicate the existence of any extremely influential observations, including the outliers, as all the Cook's Distance values and all the absolute Standardised DFBETA values are well below 1 (Field 2017). Therefore, a decision has been made to proceed with the analysis without taking any specific action concerning these outliers.

Appendix 15. Statistical Analysis (SEM) Results for the Hypothesis Tests

Notes for Group (Group number 1)

The model is recursive.

Sample size = 1035

Variable counts (Group number 1)

Number of variables in your model:	78
Number of observed variables:	35
Number of unobserved variables:	43
Number of exogenous variables:	41
Number of endogenous variables:	37

Parameter Summary (Group number 1)

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	40	0	3	0	0	**43**
Labeled	0	4	0	0	0	**4**
Unlabeled	41	22	38	0	0	**101**
Total	81	26	41	0	0	**148**

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	630
Number of distinct parameters to be estimated:	105
Degrees of freedom (630 - 105):	525

Result (Default model)

Minimum was achieved

Chi-square = 2832.405

Degrees of freedom = 525

Probability level = .000

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Dependent	Independent	Estimate	S.E.	C.R.	P	Label
OTC	SUS	0.485	0.214	2.265	0.024	par_38
OTC	BAPUS	0.116	0.027	4.22	***	par_40
OTC	Support	-0.016	0.027	-0.614	0.539	par_41
OTC	IPT	0.394	0.056	7.085	***	par_44
JPIS	SUS	0.29	0.13	2.237	0.025	par_37
JPIS	BAPUS	1.017	0.024	41.543	***	par_39
JPIS	Support	-0.01	0.016	-0.613	0.54	par_42
JPIS	IPT	-0.038	0.033	-1.148	0.251	par_43
JPIS	d1	0	5.71413E+16	0	1	par_45
JPIS	OTC	0.04	0.022	1.795	0.073	par_46
USB10_Score	SUS	1				
USB9_Score	SUS	4.347	0.942	4.613	***	par_5
USB8_Score	SUS	3.108	0.581	5.351	***	par_6
USB7_Score	SUS	5.163	1.118	4.619	***	par_7
USB6_Score	SUS	1.316	0.289	4.553	***	par_8
USB5_Score	SUS	4.003	0.869	4.604	***	par_9
USB4_Score	SUS	1.861	0.336	5.533	***	par_10
USB3_Score	SUS	5.492	1.188	4.623	***	par_11
USB2_Score	SUS	3.108	0.609	5.101	***	par_12
USB1_Score	SUS	3.181	0.697	4.564	***	par_13
USF9	BAPUS	1				
USF8	BAPUS	1.008	0.025	39.768	***	par_14

Dependent	Independent	Estimate	S.E.	C.R.	P	Label
USF7	BAPUS	1.013	0.027	37.832	***	par_15
USF6	BAPUS	1.016	0.023	44.41	***	par_16
USF5	BAPUS	0.97	0.023	41.429	***	par_17
USF4	BAPUS	0.763	0.035	22.067	***	par_18
USF3	BAPUS	0.946	0.025	38.248	***	par_19
USF2	BAPUS	0.988	0.025	39.008	***	par_20
USF1	BAPUS	1.005	0.025	40.746	***	par_21
SUP2	Support	1				
SUP2	e21	0.101	0.657	0.153	0.878	par_22
SUP1	Support	0.943	0.023	41.011	***	par_23
SUP1	e20	0.889	0.069	12.901	***	par_24
IPT5	IPT	1				
IPT4	IPT	1.255	0.061	20.505	***	par_25
IPT3	IPT	1.571	0.069	22.908	***	par_26
IPT2	IPT	1.488	0.067	22.328	***	par_27
IPT1	IPT	1.5	0.068	21.902	***	par_28
OTC1	OTC	1				
OTC2	OTC	0.062	0.065	0.968	0.333	par_29
OTC3	OTC	0.258	0.059	4.36	***	par_30
OTC4	OTC	1.218	0.046	26.301	***	par_31
OTC5	OTC	1.173	0.045	25.994	***	par_32
OTC6	OTC	0.349	0.059	5.895	***	par_33
USF10	JPIS	1				
CHG4	JPIS	0.388	0.032	12.013	***	par_34
PRF2	JPIS	0.437	0.024	18.136	***	par_35

Standardized Regression Weights: (Group number 1 - Default model)

Dependent	Independent	Estimate
OTC	SUS	0.125
OTC	BAPUS	0.16
OTC	Support	-0.021
OTC	IPT	0.318
JPIS	SUS	0.051
JPIS	BAPUS	0.971
JPIS	Support	-0.009
JPIS	IPT	-0.021
JPIS	d1	0
JPIS	OTC	0.028
USB10_Score	SUS	0.154
USB9_Score	SUS	0.738
USB8_Score	SUS	0.426
USB7_Score	SUS	0.761
USB6_Score	SUS	0.214
USB5_Score	SUS	0.707
USB4_Score	SUS	0.26
USB3_Score	SUS	0.78
USB2_Score	SUS	0.422
USB1_Score	SUS	0.601
USF9	BAPUS	0.863
USF8	BAPUS	0.882
USF7	BAPUS	0.86
USF6	BAPUS	0.929

Dependent	Independent	Estimate
USF5	BAPUS	0.901
USF4	BAPUS	0.608
USF3	BAPUS	0.865
USF2	BAPUS	0.874
USF1	BAPUS	0.893
SUP2	Support	0.999
SUP2	e21	0.04
SUP1	Support	0.935
SUP1	e20	0.354
IPT5	IPT	0.65
IPT4	IPT	0.746
IPT3	IPT	0.867
IPT2	IPT	0.843
IPT1	IPT	0.823
OTC1	OTC	0.727
OTC2	OTC	0.032
OTC3	OTC	0.144
OTC4	OTC	0.889
OTC5	OTC	0.861
OTC6	OTC	0.194
USF10	JPIS	0.944
CHG4	JPIS	0.358
PRF2	JPIS	0.506

Covariances: (Group number 1 - Default model)

		Estimate	S.E.	C.R.	P	Label
SUS	BAPUS	0.071	0.016	4.426	***	Cov4
Support	IPT	0.179	0.015	11.68	***	Cov1
SUS	Support	0.052	0.012	4.342	***	Cov3
SUS	IPT	0.043	0.01	4.384	***	par_60
BAPUS	IPT	0.145	0.016	9.325	***	Cov2
BAPUS	Support	0.171	0.022	7.869	***	par_67
e23	e22	0.071	0.012	5.989	***	par_36
e28	e29	0.899	0.048	18.624	***	par_47
e28	e32	0.744	0.045	16.371	***	par_48
e29	e32	0.838	0.044	18.971	***	par_49
e4	e2	0.526	0.039	13.449	***	par_50
e6	e2	0.407	0.033	12.243	***	par_51
e8	e2	0.662	0.04	16.418	***	par_52
e10	e2	0.425	0.035	12.033	***	par_53
e6	e4	0.325	0.033	9.871	***	par_54
e8	e4	0.586	0.04	14.799	***	par_55
e10	e4	0.575	0.038	15.142	***	par_56
e8	e6	0.382	0.033	11.738	***	par_57
e10	e6	0.296	0.03	9.734	***	par_58
e10	e8	0.538	0.036	14.76	***	par_59
e34	e35	0.142	0.019	7.628	***	par_61
e12	e11	0.086	0.008	11.175	***	par_62
e13	e11	0.084	0.008	11.03	***	par_63
e13	e12	0.093	0.008	11.38	***	par_64

		Estimate	S.E.	C.R.	P	Label
e16	e15	0.045	0.006	8.126	***	par_65
e17	e14	0.094	0.014	6.601	***	par_66

Correlations: (Group number 1 - Default model)

		Estimate
SUS	BAPUS	0.546
Support	IPT	0.466
SUS	Support	0.425
SUS	IPT	0.571
BAPUS	IPT	0.357
BAPUS	Support	0.261
e23	e22	0.306
e28	e29	0.712
e28	e32	0.593
e29	e32	0.735
e4	e2	0.475
e6	e2	0.423
e8	e2	0.626
e10	e2	0.413
e6	e4	0.326
e8	e4	0.535
e10	e4	0.54
e8	e6	0.403
e10	e6	0.32
e10	e8	0.529

		Estimate
e34	e35	0.247
e12	e11	0.446
e13	e11	0.437
e13	e12	0.446
e16	e15	0.345
e17	e14	0.225

Variances: (Group number 1 - Default model)

Variable	Estimate	S.E.	C.R.	P	Label
e21	0.1				
e20	0.1				
d1	0.1				
SUS	0.024	0.01	2.319	0.02	par_68
BAPUS	0.696	0.04	17.373	***	par_69
Support	0.62	0.03	20.433	***	par_70
IPT	0.237	0.021	11.261	***	par_71
d2	0.278	0.022	12.689	***	par_72
e10	0.991	0.044	22.654	***	par_73
e9	0.38	0.02	18.724	***	par_74
e8	1.044	0.047	21.995	***	par_75
e7	0.465	0.026	18.103	***	par_76
e6	0.863	0.038	22.573	***	par_77
e5	0.386	0.02	19.393	***	par_78
e4	1.147	0.051	22.491	***	par_79
e3	0.466	0.027	17.501	***	par_80

Variable	Estimate	S.E.	C.R.	P	Label
e2	1.072	0.049	22.014	***	par_81
e1	0.43	0.021	20.856	***	par_82
e19	0.239	0.012	20.599	***	par_83
e18	0.201	0.01	20.153	***	par_84
e17	0.251	0.012	20.638	***	par_85
e16	0.113	0.006	17.748	***	par_86
e15	0.152	0.008	19.128	***	par_87
e14	0.69	0.031	22.276	***	par_88
e13	0.209	0.01	20.351	***	par_89
e12	0.21	0.01	20.168	***	par_90
e26	0.324	0.015	20.888	***	par_91
e25	0.298	0.015	19.517	***	par_92
e24	0.194	0.013	14.547	***	par_93
e23	0.214	0.014	15.369	***	par_94
e22	0.254	0.016	16.179	***	par_95
e11	0.179	0.009	19.68	***	par_96
e27	0.324	0.017	19.396	***	par_97
e28	1.39	0.061	22.735	***	par_98
e29	1.148	0.051	22.678	***	par_99
e30	0.142	0.013	10.601	***	par_100
e31	0.174	0.013	12.941	***	par_101
e32	1.131	0.05	22.628	***	par_102
e33	0.093	0.016	5.939	***	par_103
e34	0.78	0.034	22.622	***	par_104
e35	0.423	0.019	22.431	***	par_105

Squared Multiple Correlations: (Group number 1 - Default model)

Variable	Estimate
OTC	0.236
JPIS	1
PRF2	0.256
CHG4	0.128
USF10	0.891
OTC6	0.038
OTC5	0.741
OTC4	0.791
OTC3	0.021
OTC2	0.001
OTC1	0.529
IPT1	0.677
IPT2	0.711
IPT3	0.751
IPT4	0.556
IPT5	0.423
SUP1	0.875
SUP2	0.998
USF1	0.797
USF2	0.764
USF3	0.749
USF4	0.37
USF5	0.811
USF6	0.864

Variable	Estimate
USF7	0.74
USF8	0.778
USF9	0.744
USB1_Score	0.361
USB2_Score	0.178
USB3_Score	0.608
USB4_Score	0.068
USB5_Score	0.499
USB6_Score	0.046
USB7_Score	0.579
USB8_Score	0.182
USB9_Score	0.544
USB10_Score	0.024

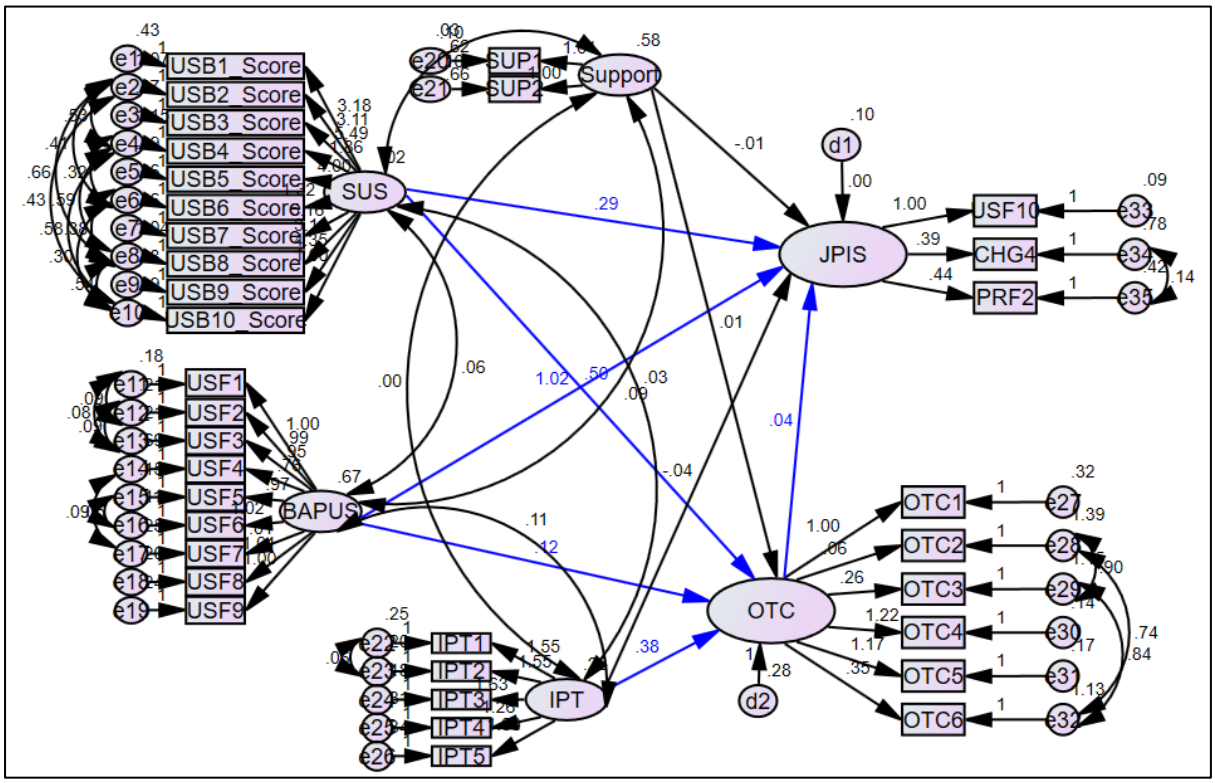
Factor Score Weights (Group number 1 - Default model) (TRANSPOSE_M)

	IPT	Support	BAPUS	SUS	OTC	JPIS
PRF2	0	0	0.02	0.001	0.001	0.021
CHG4	0	0	0.007	0	0.001	0.007
USF10	-0.004	0	0.234	0.011	0.017	0.242
OTC6	0	0	0	0	0.014	0.001
OTC5	0.009	0	0	0.002	0.268	0.011
OTC4	0.012	0	0	0.002	0.341	0.014
OTC3	0	0	0	0	0.006	0
OTC2	0	0	0	0	-0.01	0
OTC1	0.004	0	0	0.001	0.123	0.005

	IPT	Support	BAPUS	SUS	OTC	JPIS
IPT1	0.101	0	0.001	0.003	0.006	-0.002
IPT2	0.128	0	0.001	0.003	0.008	-0.002
IPT3	0.188	0	0.002	0.005	0.011	-0.003
IPT4	0.098	0	0.001	0.003	0.006	-0.002
IPT5	0.072	0	0.001	0.002	0.004	-0.001
SUP1	0	0.012	0	0	0	0
SUP2	0.028	0.987	0.004	0.008	0	-0.004
USF1	0.001	0	0.076	0	0	0.077
USF2	0.001	0	0.05	0	0	0.051
USF3	0.001	0	0.044	0	0	0.045
USF4	0	0	0.013	0	0	0.013
USF5	0.001	0	0.09	0.001	0	0.092
USF6	0.002	0	0.157	0.001	0	0.159
USF7	0.001	0	0.082	0.001	0	0.084
USF8	0.001	0	0.108	0.001	0	0.11
USF9	0.001	0	0.09	0.001	0	0.092
USB1_Score	0.005	0	0.001	0.023	0.002	0.007
USB2_Score	0.001	0	0	0.006	0	0.002
USB3_Score	0.007	0	0.002	0.036	0.003	0.012
USB4_Score	0	0	0	0.001	0	0
USB5_Score	0.006	0	0.001	0.032	0.002	0.01
USB6_Score	0	0	0	0	0	0
USB7_Score	0.007	0	0.002	0.034	0.003	0.011
USB8_Score	0.001	0	0	0.007	0.001	0.002
USB9_Score	0.007	0	0.002	0.035	0.003	0.012

	IPT	Support	BAPUS	SUS	OTC	JPIS
USB10_Score	-0.001	0	0	-0.003	0	-0.001

The Final Model with Coefficient Estimates



- The blue arrows in the model above represent the statistically significant relationships.
- The inclusion of the covariances between the selected measurement error terms and between the constructs have been incorporated into the model based on both empirical findings (i.e., the modification indices given in the SPSS AMOS output) and substantive thinking about the contents of the related questionnaire items and constructs:
    - The covariances between the measurement errors of the negatively worded items related to SUS have been incorporated into the model to account for the potential common variance (in addition to the variance of SUS) between the negatively worded items of the scale.
    - The covariances between the measurement errors of the negatively worded items related to OTC have been incorporated into the model to account for the potential common variance (in addition to the variance of OTC) between the negatively worded items the scale.
    - The covariances between the measurement errors of the items related to the BAPUS, IPT, and JPIS have been incorporated into the model to account for the potential common variance (in addition to the variance of the respective scales) between these items due to their similar wordings.

- The covariance between SUS and BAPUS have been incorporated into the model considering that these two constructs might share another common variance along with the variance of OTC as both of them are the two concepts covered under the broader concept of UX.
- The covariance between SUS and Support have been incorporated into the model considering that these two constructs might share another common variance along with the variance of OTC, as the perceived usability of the platform can be related to the support the users receive.
- The covariance between BAPUS and Support have been incorporated into the model considering that these two constructs might share another common variance along with the variance of OTC, as the perceived usefulness of the platform can be related to the support the users receive.
- The covariance between SUS and IPT have been incorporated into the model considering that these two constructs might share another common variance along with the variance of OTC, as the perceived usability of the platform can be related to the extent to which users think that they have been able to participate in and informed about the change process, and their trust in the team behind the platform.
- The covariance between BAPUS and IPT have been incorporated into the model considering that these two constructs might share another common variance along with the variance of OTC, as the perceived usefulness of the platform can be related to the extent to which users think that they have been able to participate in and informed about the change process, and their trust in the team behind the visual-analytics-related change initiatives.
- The covariance between IPT and Support have been incorporated into the model considering that both of these scales have contents about the communications between the users and the team behind the visual-analytics-related change initiatives, so they might share another common variance in addition to the variance of the OTC.

Appendix 16. The Screenshot of the Email Announcement of the First of Our New Version QV Dashboard Applications

From: [redacted]
Sent: Tuesday, May 09, 2017 2:46 PM
Subject: [redacted] YENİ TASARIM ***

Sizlerin değerli katılımları ile gerçekleştirdiğimiz anket çalışmamız sonrasında, bilgiye daha kullanıcı dostu tasarımlar üzerinden erişim için "Kullanıcı Deneyimi (UX)" odaklı araştırma ve geliştirme çalışmalarımızı sürdürdük.

Bu kapsamda ilk olarak [redacted] uygulamasını ele aldık. Yeni versiyon uygulamamızı bugün itibari ile kullanımınıza açtık.

Anket çalışmamıza ve test süreçlerimize katılımlarınız, bunun yanı sıra çeşitli kanallar ile paylaşmakta olduğunuz görüş ve önerileriniz için teşekkür ederiz.
Katkılarınız ile, bilgiye daha kolay erişim için tüm uygulamalarımızı sürekli geliştirmeye devam ediyoruz.

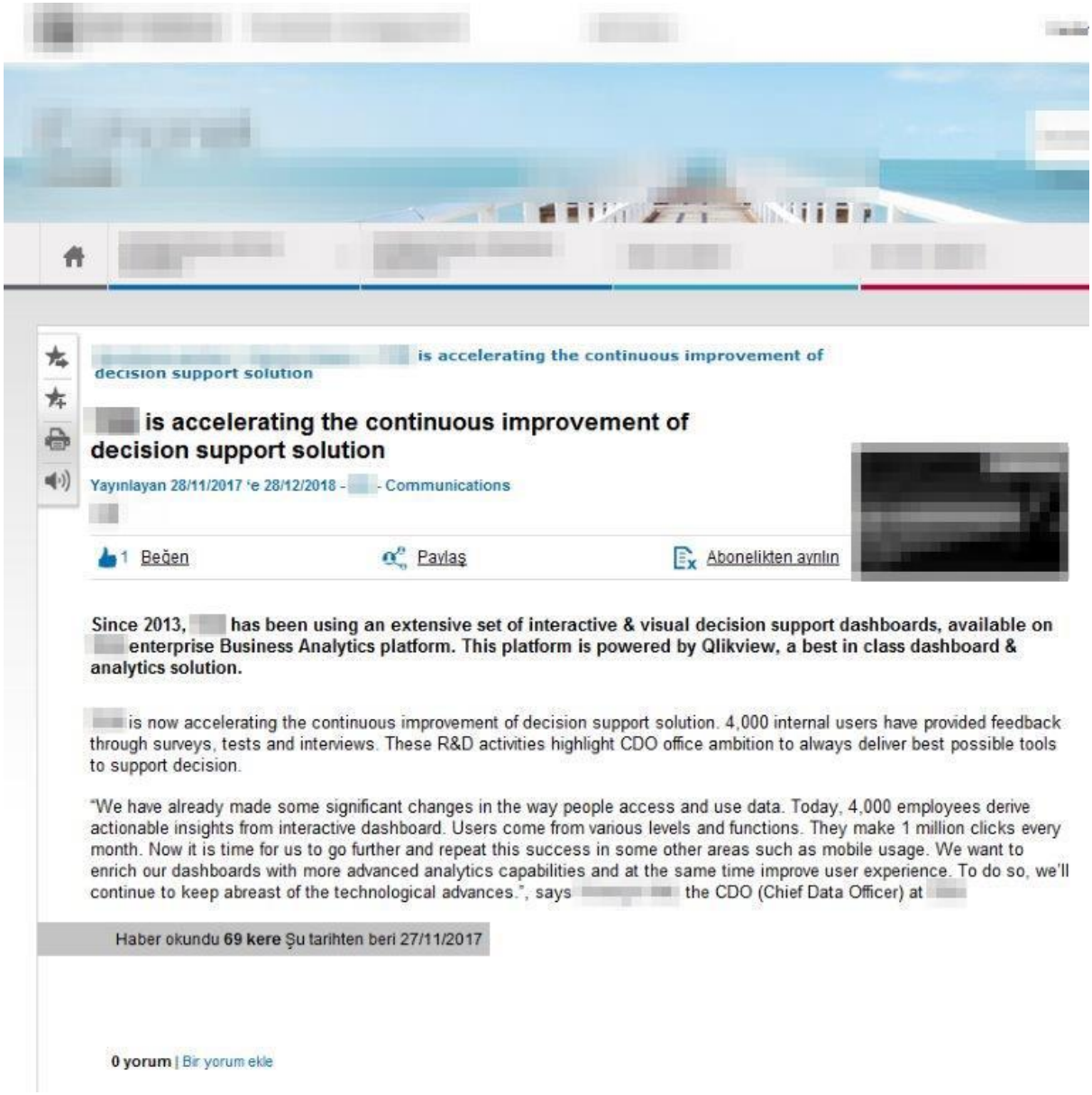
Appendix 17. Hierarchy of Nodes – QV Change Overall

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Experiences	QV Change Overall	Finding QV helpful for supporting business planning, decisions, and actions		1	1	1	1
2	Nodes	Experiences	QV Change Overall	Finding QV very useful to get deep-dive information on a specific topic		1	1	1	1
3	Nodes	Experiences	QV Change Overall	Mentioning positively QV's wide coverage of various topic areas		5	5	4	4
4	Nodes	Experiences	QV Change Overall	Mentioning QV's being updated with adequate frequency as a positive aspect		3	3	3	3
5	Nodes	Experiences	QV Change Overall	Mentioning that QV has ensured the consistency of the data being monitored		3	3	2	2
6	Nodes	Experiences	QV Change Overall	Mentioning that QV provides support for different points of view		2	2	2	2
7	Nodes	Experiences	QV Change Overall	Mentioning the QV team's responsiveness positively regarding fast development		3	3	3	3
8	Nodes	Experiences	QV Change Overall	Pertaining to the need for a shift in organisational culture	Mentioning that QV has a limited positive impact due to lack of adequate standardisation of	2	2	1	1
9	Nodes	Experiences	QV Change Overall	Pertaining to the need for a shift in organisational culture	Not observing significant changes coming with the QV	1	1	1	1
10	Nodes	Experiences	QV Change Overall	Pertaining to the need for a shift in organisational culture	Thinking that further change in the approach across the Bank should change from requesting data from	3	3	3	3
11	Nodes	Experiences	QV Change Overall	Pertaining to the need for a shift in organisational culture	Thinking that teams do not really want to use QV	1	1	1	1
12	Nodes	Experiences	QV Change Overall	QV enabling the users to do their own interactive analyses		13	13	8	8
13	Nodes	Experiences	QV Change Overall	QV has improved workplace efficiency		3	3	2	2
14	Nodes	Experiences	QV Change Overall	QV having a very positive impact		7	7	6	6
15	Nodes	Experiences	QV Change Overall	QV rendering some manual reports redundant (even if they are not dropped)		2	2	1	1
16	Nodes	Experiences	QV Change Overall	QV Room for Improvement	Mentioning inadequate QV training	2	2	2	2
17	Nodes	Experiences	QV Change Overall	QV Room for Improvement	Mentioning that performance improvements are required on QV	2	2	1	1
18	Nodes	Experiences	QV Change Overall	QV Room for Improvement	Mentioning that QV allows only limited customisation on the user side	1	1	1	1
19	Nodes	Experiences	QV Change Overall	QV Room for Improvement	Mentioning that QV Dashboards' updating frequency needs improvement	1	1	1	1
20	Nodes	Experiences	QV Change Overall	QV Room for Improvement	Mentioning that QV needs further usability improvements	1	1	1	1
21	Nodes	Experiences	QV Change Overall	QV Room for Improvement	Mentioning the need for better monitoring of usage to guide users so that they can make the best use of QV	2	2	2	2
22	Nodes	Experiences	QV Change Overall	QV Room for Improvement	Thinking that QV does not meet one's expectations	1	1	1	1
23	Nodes	Experiences	QV Change Overall	QV Room for Improvement	Thinking that QV has a limited positive impact due to its being not-easy-to-use for everyone	4	4	3	3

Appendix 18. Hierarchy of Nodes – QV Change Recent

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Experiences	QV Change Recent	Experiencing improvements in the time required for solutions when problems arise		1	1	1	1
2	Nodes	Experiences	QV Change Recent	Having access to a wide variety of data		1	1	1	1
3	Nodes	Experiences	QV Change Recent	Having an awareness of the reccent UX improvements		3	3	3	3
4	Nodes	Experiences	QV Change Recent	Lack of a detailed view on what has recently changed on QV UX		9	9	8	8
5	Nodes	Experiences	QV Change Recent	Mentioning lack of curiosity and appetite for learning across HO		1	1	1	1
6	Nodes	Experiences	QV Change Recent	Mentioning positively the communication with QV team		1	1	1	1
7	Nodes	Experiences	QV Change Recent	QV Further Improvements Required	Facing usability issues with the new version and observing resistance-to-change	1	1	1	1
8	Nodes	Experiences	QV Change Recent	QV Further Improvements Required	Further tidying up and simplification required so that users can find what they need and perform their analyses more easily	5	5	2	2
9	Nodes	Experiences	QV Change Recent	QV Further Improvements Required	Mentioning connection problems with QV	2	2	1	1
10	Nodes	Experiences	QV Change Recent	QV Further Improvements Required	Mentioning the need for better communication between the QV team and the user side	2	2	1	1
11	Nodes	Experiences	QV Change Recent	QV Further Improvements Required	Mentioning the need for increased participation of business users on QV development decisions	1	1	1	1
12	Nodes	Experiences	QV Change Recent	Thinking positively about the recent changes thanks to QV being simpler and easier-to-understand		2	2	2	2

Appendix 19. The news of this Research on the Group's Intranet



is accelerating the continuous improvement of decision support solution

is accelerating the continuous improvement of decision support solution

Yayınlayan 28/11/2017 'e 28/12/2018 - - Communications

1 Beğen Paylaş Abonelikten ayrılın

Since 2013, has been using an extensive set of interactive & visual decision support dashboards, available on enterprise Business Analytics platform. This platform is powered by Qlikview, a best in class dashboard & analytics solution.

is now accelerating the continuous improvement of decision support solution. 4,000 internal users have provided feedback through surveys, tests and interviews. These R&D activities highlight CDO office ambition to always deliver best possible tools to support decision.

"We have already made some significant changes in the way people access and use data. Today, 4,000 employees derive actionable insights from interactive dashboard. Users come from various levels and functions. They make 1 million clicks every month. Now it is time for us to go further and repeat this success in some other areas such as mobile usage. We want to enrich our dashboards with more advanced analytics capabilities and at the same time improve user experience. To do so, we'll continue to keep abreast of the technological advances.", says the CDO (Chief Data Officer) at

Haber okundu **69 kere** Şu tarihten beri 27/11/2017

0 yorum | Bir yorum ekle

Appendix 20. The Interview Schedule for AR Cycle-3

I. Analysis/Reporting/Visual Analytics/Advanced Analytics, etc. concepts, their connotations

a. What comes to your mind when you hear the terms analysis, analytics, and reporting?
b. What comes to your mind when you hear the terms visual analytics and advanced analytics?
c. What is the purpose of this kind of applications and practices, in your view?
d. Is there a distinction like “standard” and “ad-hoc” requirements, in your opinion? How?

II. Experiences with and views on the applications within the Bank – Positive aspects

a. Think of a moment/experience that you think was the best or peak of your overall experience concerning your analysis/reporting/visual analytics/advanced analytics requirements. Describe that experience, what makes it the peak for you?
b. What/who are the applications/teams that you use or get support from, in this regard? Which are the best ones, in your opinion? Could you explain what makes them best?
c. Have the QlikView applications brought about some changes to the Bank, as well as to your/your team’s workplace activities and approaches to work, in your opinion? If yes, in which aspects? Has this change contributed to the Bank, to you and your team? If yes, in which aspects, and how? What would you think as the best about it? Can you explain what makes them best?
d. Do you notice any recent (i.e. last 1 year, after the survey) changes on QlikView and related communication? If yes, what do you think about the changes that we have been doing following the survey performed last year?

III. Experiences with and views on the applications within the Bank – Dreamed of

a. Imagine you have been fast-forwarded to a future state of the Bank. What does the analysis/reporting/visual analytics/advanced analytics environment look like? What components does it consist of? What kind of teams are there? What kind of communication (i.e. between these teams and their internal clients, and between the teams themselves) is there between these? How do they work?

IV. Experiences with and views on the applications within the Bank – Determining the changes to be made

a. What, in your view, could or should be changed in the Bank to realise the picture (analysis/reporting/visual analytics/advanced analytics environment) you dream of? How and in what direction could or should the change be made?

Appendix 21. AR Cycle-3 Interview Invitation

Hello,

We are investigating how to exploit data more effectively and efficiently across the Bank and taking actions accordingly as part of our Business Analytics R&D efforts.

These efforts also form an important focus of my doctorate, which I have been continuing at Middlesex University (London).

Our interactive dashboard applications on our corporate business analytics platform, QlikView, which has been in widespread use since 2013, and the changes we have been realising and/or expecting to realise throughout this process, is an important area on which our efforts are focused on.

Today, in continuance of the survey that we performed last year and the following change and improvement process, we would like to gain detailed information on our internal clients' experiences, best practices, and ideals concerning this topic through on-to-one interviews and set direction for our future efforts accordingly.

In this context, we would like to make an interview with you to learn about your valued views. We will summarise the information, notes, etc. that we will have through this interview and keep your identity completely confidential, and we will report the results in full respect of this confidentiality, including when we make direct quotations.

Participation in our interviews is completely voluntary.

We would be more than pleased if you participate in this interview so that we can set direction for our future efforts.

Best regards,

Murat Özel

Business Analytics & Information Management Department.

MURAT OZEL - Is Analitigi ve Bilgi Yonetimi Muduru

Subject:	İş Analitiği Ar-Ge çalışmaları - Birebir Görüşme
Location:	Toplanti D
Start:	Pzt 13.11.2017 10:00
End:	Pzt 13.11.2017 11:00
Recurrence:	(none)
Meeting Status:	Meeting organizer
Organizer:	MURAT OZEL - Is Analitigi ve Bilgi Yonetimi Muduru
Required Attendees:	
Resources:	Toplanti D

Merhaba,

İş Analitiği Ar-Ge çalışmalarımız kapsamında, Banka genelinde veriden nasıl daha etkin ve verimli şekilde yararlanabileceğimizi inceliyor ve buna yönelik aksiyonlar almaya çalışıyoruz. Söz konusu çalışmalar, aynı zamanda benim Middlesex Üniversitesi (Londra)'nde devam etmekte olduğum doktora programımın da önemli bir odak noktasını oluşturuyor.

2013 yılından bu yana yaygın kullanıma açık olan kurumsal iş analitiği platformumuz QlikView üzerindeki interaktif "dashboard" uygulamalarımız ve bu süreçte yaşamakta olduğumuz ve/veya beklediğimiz değişimler ise, söz konusu çalışmalarımızın yoğunlaştığı önemli bir konu alanı durumunda.

Geldiğimiz noktada, geçtiğimiz yıl içinde uyguladığımız anket çalışmasının ve takip eden değişiklik ve geliştirme sürecinin devamı olarak; birebir görüşmeler yoluyla iç müşterilerimizin deneyimleri, en iyi uygulamaları ve konuya ilişkin idealleri hakkında detaylı bilgi edinmek ve çalışmalarımıza bu bilgilere göre yön verebilmek istiyoruz.

Bu bağlamda, değerli görüşlerinizi almak amacıyla sizinle de görüşme yapmak isteriz. Yapacağımız görüşmeden edineceğimiz bilgileri, alacağımız notları, vs. özetleyip, kimliğinizi tamamen gizli tutacak şekilde kullanacağız ve olası doğrudan alıntılar da dâhil olmak üzere yine kimliğinizi açığa çıkarmayacak şekilde raporlayacağız.

Görüşmelerimize katılım tamamen gönüllük esasına dayalıdır.

Çalışmalarımıza yön verebilmemiz için değerli görüşlerinizi paylaşmak üzere görüşmemize katılırsanız çok memnun oluruz.

Saygılarımızla,

Murat Özel

İş Analitiği ve Bilgi Yönetimi Departmanı

Appendix 22. Hierarchy of Nodes – Perceived Meaning of Reporting

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Definitions of Concepts	Definition of Reporting	A hierarchical perception of the concepts from reporting upwards		6	6	5	5
2	Nodes	Definitions of Concepts	Definition of Reporting	Output of analysis		1	1	1	1
3	Nodes	Definitions of Concepts	Definition of Reporting	Standardised Periodic Information	Standardised periodic information to be monitored, not necessarily leading to a specific action	10	10	8	8
4	Nodes	Definitions of Concepts	Definition of Reporting	Standardised Periodic Information	Standardised periodic information to support action towards setting and achieving goals	1	1	1	1

Appendix 23. Hierarchy of Nodes – Perceived Meaning of Analysis

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Definitions of Concepts	Definition of Analysis	Arguing that automated analysis together with automated interpratation could be called AI		1	1	1	1
2	Nodes	Definitions of Concepts	Definition of Analysis	Making sense of data through in-depth reasoning over data and reports	Creating own visuals based on ad hoc requirements	1	1	1	1
3	Nodes	Definitions of Concepts	Definition of Analysis	Making sense of data through in-depth reasoning over data and reports	Going beyond just reading the reports, bringing together various data to meet one's requirements	4	4	4	4
4	Nodes	Definitions of Concepts	Definition of Analysis	Making sense of data through in-depth reasoning over data and reports	Going from data to action through reasoning over data	6	6	6	6
5	Nodes	Definitions of Concepts	Definition of Analysis	Making sense of data through in-depth reasoning over data and reports	Making sense of complex data	2	2	2	2
6	Nodes	Definitions of Concepts	Definition of Analysis	Making sense of data through in-depth reasoning over data and reports	More deep-dive, detailed, not-regular processing of data to support decisions and actions	6	6	6	6
7	Nodes	Definitions of Concepts	Definition of Analysis	Making sense of data through in-depth reasoning over data and reports	The art of transforming numbers into business strategy and tactic plans	2	2	1	1

Appendix 24. Hierarchy of Nodes – Perceived Meaning of Analytics

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Definitions of Concepts	Definition of Analytics	Analysis and Analytics are intertwined		1	1	1	1
2	Nodes	Definitions of Concepts	Definition of Analytics	Helping one know one's current status i.e. descriptive analytics		2	2	2	2
3	Nodes	Definitions of Concepts	Definition of Analytics	Statistical Modelling and Data Mining	More in-depth analysis like data mining to find out how one can integrate information into one's business	1	1	1	1
4	Nodes	Definitions of Concepts	Definition of Analytics	Statistical Modelling and Data Mining	Statiscal modelling with aims such as segmentation, clustering, etc.	1	1	1	1
5	Nodes	Definitions of Concepts	Definition of Analytics	The point of view behind analysis		1	1	1	1

Appendix 25. Hierarchy of Nodes – Perceived Meaning of Advanced Analytics

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Definitions of Concepts	Definition of Advanced Analytics	Bringing together and analysing various data to be able to come to correct conlusions		1	1	1	1
2	Nodes	Definitions of Concepts	Definition of Advanced Analytics	More detailed version of analytics		1	1	1	1
3	Nodes	Definitions of Concepts	Definition of Advanced Analytics	Relating to big data, new technologies, and sophisticated analysis methods	Relating to big data and new technologies on top of statistical modelling	1	1	1	1
4	Nodes	Definitions of Concepts	Definition of Advanced Analytics	Relating to big data, new technologies, and sophisticated analysis methods	Relating to big data, mentioning sales opportunities as a goal used on social media	1	1	1	1
5	Nodes	Definitions of Concepts	Definition of Advanced Analytics	Relating to big data, new technologies, and sophisticated analysis methods	Relating to techniques unbeknownst to himself	2	2	2	2

Appendix 26. Hierarchy of Nodes – Perceived Meaning of Visual Analytics

#	Codes				Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Definitions of Concepts	Definition of Visual Analytics	Making information easily understandable at a glance through data visualisation	4	4	4	4
2	Nodes	Definitions of Concepts	Definition of Visual Analytics	Visualising data, also incluing self-service analytics, taking one futher step	1	1	1	1
3	Nodes	Definitions of Concepts	Definition of Visual Analytics	Visualising the results of analyses	2	2	2	2

Appendix 27. Hierarchy of Nodes – Purpose of Data Analytics

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Definitions of Concepts	Purpose of Data Analytics	Getting information and insights about the present and the past		1	1	1	1
2	Nodes	Definitions of Concepts	Purpose of Data Analytics	Making predictions		1	1	1	1
3	Nodes	Definitions of Concepts	Purpose of Data Analytics	Questioning on assumptions and laying bare own fallacies		3	3	3	3
4	Nodes	Definitions of Concepts	Purpose of Data Analytics	Setting Strategy and Tactics	Setting direction for sales and marketing activities	4	4	4	4
5	Nodes	Definitions of Concepts	Purpose of Data Analytics	Setting Strategy and Tactics	Setting strategy	2	2	2	2
6	Nodes	Definitions of Concepts	Purpose of Data Analytics	Supporing business decisions and actions	Performance management	6	6	5	5
7	Nodes	Definitions of Concepts	Purpose of Data Analytics	Supporing business decisions and actions	Risk Management	1	1	1	1
8	Nodes	Definitions of Concepts	Purpose of Data Analytics	Supporing business decisions and actions	Supporting and triggering actions in-line with the defined strategy	9	9	7	7
9	Nodes	Definitions of Concepts	Purpose of Data Analytics	Supporing business decisions and actions	Supporting or triggering actions towards finding and exploiting new sales opportunities	7	7	6	6
10	Nodes	Definitions of Concepts	Purpose of Data Analytics	Supporing business decisions and actions	Supporting organisational change decisions	1	1	1	1

Appendix 28. Hierarchy of Nodes – Standard vs Ad Hoc

#	Codes				Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning that both standard and ad hoc efforts are required	14	14	8	8
2	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning more detailed work as an attribute of ad hoc requests	9	9	7	7
3	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning periodic preparation as a defining attribute of standard requirements	7	7	7	7
4	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning standardisation as a kind of target state following ad hoc analyses	5	5	4	4
5	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Drawing the line on basis of creativity and flexibility i.e. the more standardisation the less creativity and	2	2	1	1
6	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning stress as a side effect of ad hoc requirements	2	2	2	2
7	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Lack of a clearly understandable definition of standard vs ad hoc requirements	1	1	1	1
8	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning a third set of requirements for those that are neither standard nor ad hoc	1	1	1	1
9	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning automation as a defining attribute of standard requirements	1	1	1	1
10	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning being not regular as a defining feature of ad-hoc requirements	1	1	1	1
11	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning inadequate requirement analyses as a culprit for unnecessary ad hoc requirements	1	1	1	1
12	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning need for support from analysis departments for standard reports	1	1	1	1
13	Nodes	Definitions of Concepts	Definition of Standard vs Ad Hoc	Mentioning urgency as an attribute of ad hoc requirements	1	1	1	1

Appendix 29. Hierarchy of Nodes – Best Experience

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Experiences	Best Experience	Collaborating with a wide range of stakeholders		2	2	2	2
2	Nodes	Experiences	Best Experience	Creating efficiency		4	4	1	1
3	Nodes	Experiences	Best Experience	Points for Imporvement	Experiencing problems in reporting due to shortcomings in data infrastructure	1	1	1	1
4	Nodes	Experiences	Best Experience	Points for Imporvement	Mentioning the importance of easy-to-use user interface with understandable terminology	1	1	1	1
5	Nodes	Experiences	Best Experience	Points for Imporvement	Mentioning the importance of proper guidance in reporting	1	1	1	1
6	Nodes	Experiences	Best Experience	Points for Imporvement	Mentioning user-side change management as a challenge in getting the users to use a new system	1	1	1	1
7	Nodes	Experiences	Best Experience	Supporting business through deriving meaning from data	Feeling happy for enabling users to visually analyse and interact with data	4	4	3	3
8	Nodes	Experiences	Best Experience	Supporting business through deriving meaning from data	Making discoveries through data analysis	3	3	3	3
9	Nodes	Experiences	Best Experience	Supporting business through deriving meaning from data	Making sense of complex data	11	11	7	7
10	Nodes	Experiences	Best Experience	Supporting business through deriving meaning from data	Mentioning a specific report design prepared on the user side	1	1	1	1
11	Nodes	Experiences	Best Experience	Supporting business through deriving meaning from data	Mentioning filling a gap as a justification for the selected best experience	1	1	1	1
12	Nodes	Experiences	Best Experience	Supporting business through deriving meaning from data	Mentioning the importance of brining together business knowledge and data	1	1	1	1
13	Nodes	Experiences	Best Experience	Supporting business through deriving meaning from data	Supporting business action through automated data analytics output	2	2	2	2
14	Nodes	Experiences	Best Experience	Supporting business through deriving meaning from data	Supporting business decision or action through ad hoc data analysis	10	10	8	8

Appendix 30. Hierarchy of Nodes – Best Tools & Collaboration

#	Codes					Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Experiences	Best Collaborarion & Tools	Critical feedback	Complaining about performance issues on BO	1	1	1	1
2	Nodes	Experiences	Best Collaborarion & Tools	Critical feedback	Experiencing a limited selection of tools	1	1	1	1
3	Nodes	Experiences	Best Collaborarion & Tools	Critical feedback	Facing problems in finding the right contacts for collaboration and in receiving the required support	1	1	1	1
4	Nodes	Experiences	Best Collaborarion & Tools	Critical feedback	Feeling lack of confidence in the consistency of the data	4	4	2	2
5	Nodes	Experiences	Best Collaborarion & Tools	Critical feedback	Mentioning room for further improvement in QV	1	1	1	1
6	Nodes	Experiences	Best Collaborarion & Tools	Critical feedback	Mentioning unsatisfactory collaboration with IT	1	1	1	1
7	Nodes	Experiences	Best Collaborarion & Tools	Improving operational data input and screens		1	1	1	1
8	Nodes	Experiences	Best Collaborarion & Tools	Mentioning capabilities as a basis for calling a tool best		1	1	1	1
9	Nodes	Experiences	Best Collaborarion & Tools	Mentioning good usability as a basis to call a tool best		2	2	1	1
10	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentinoning BO positively	1	1	1	1
11	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning collaborating with a team who can act upon the outputs of the collaboration	1	1	1	1
12	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning collaboration with a team who know and define clearly what they need	1	1	1	1
13	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning CRM for best collaboration	2	2	2	2
14	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning Excel as the tool of choice for the specific best experience	2	2	2	2
15	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning MABA for the best collaboration	3	3	2	2
16	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning Oracle Discoverer as the best tool for reporting	1	1	1	1
17	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning Performance Management under Finance as the source of data for the	3	3	3	3
18	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning Private Banking Marketing Team for the best collaboration	1	1	1	1
19	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning SAS and-or SPSS positively	1	1	1	1
20	Nodes	Experiences	Best Collaborarion & Tools	Mentioning other tools and-or teams positively	Mentioning SAS as the best tool used	2	2	1	1
21	Nodes	Experiences	Best Collaborarion & Tools	Mentioning QV and-or QV Team Positively	Efficiently working with QV Dashboard Apps	6	6	4	4
22	Nodes	Experiences	Best Collaborarion & Tools	Mentioning QV and-or QV Team Positively	Finding QV useful due to its practicality	1	1	1	1
23	Nodes	Experiences	Best Collaborarion & Tools	Mentioning QV and-or QV Team Positively	Mentioning QV as the best for the purposes of reporting etc.	3	3	3	3
24	Nodes	Experiences	Best Collaborarion & Tools	Mentioning QV and-or QV Team Positively	Mentioning the QV team for the best experience	2	2	2	2
25	Nodes	Experiences	Best Collaborarion & Tools	Mentioning QV and-or QV Team Positively	Working with QV as a complementary data source for self-prepared reports	2	2	1	1
26	Nodes	Experiences	Best Collaborarion & Tools	Worked alone for the best experience		2	2	2	2

Appendix 31. Hierarchy of Nodes – Dreams

#	Codes				Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Dreams	Dreaming of data-and-digital culture spread across the whole organisation		1	1	1	1
2	Nodes	Dreams	Improving the usability of analytics platforms	Data being processed fast and results being achieved fast	6	6	5	5
3	Nodes	Dreams	Improving the usability of analytics platforms	Having access to a customer-and-RM-centred holistic view on a single user interface	8	8	3	3
4	Nodes	Dreams	Improving the usability of analytics platforms	Having easy-to-understand outputs for end users	4	4	2	2
5	Nodes	Dreams	Regulating data analytics efforts across the Bank	Ensuring better coordination and integration between business lines and supports such as Cash Management and Foreign Trade	1	1	1	1
6	Nodes	Dreams	Regulating data analytics efforts across the Bank	Feeling reluctant or unable to be specific about the dreamed data-related organisational structure	2	2	2	2
7	Nodes	Dreams	Regulating data analytics efforts across the Bank	Further empowerment and authorisation of users or certain business teams	4	4	1	1
8	Nodes	Dreams	Regulating data analytics efforts across the Bank	Having a better structured data roles framework so that everyone can focus on one's core business	3	3	3	3
9	Nodes	Dreams	Regulating data analytics efforts across the Bank	Improved adaptability to new technologies through the ability to decide and act fast	1	1	1	1
10	Nodes	Dreams	Regulating data analytics efforts across the Bank	Increased adaptability according to changing business priorities	3	3	3	3
11	Nodes	Dreams	Regulating data analytics efforts across the Bank	Increased efficiency and effectiveness through process optimisation	2	2	2	2
12	Nodes	Dreams	Regulating data analytics efforts across the Bank	Proposing collaboration with s consultancy to work on the future data organisatioın in the Bank	1	1	1	1
13	Nodes	Dreams	Regulating data analytics efforts across the Bank	Setting up a mechanism to help find the right contacts for data-related requirements	3	3	2	2
14	Nodes	Dreams	Upgrading data analytics capabilities	Automated and customised analytics producing ready-to-consume information to support decisions and actions	10	10	7	7
15	Nodes	Dreams	Upgrading data analytics capabilities	Being able to perform fast drill-down-up analyses with consistent results	1	1	1	1
16	Nodes	Dreams	Upgrading data analytics capabilities	Business users being able to engage with data in self-service manner	8	8	5	5
17	Nodes	Dreams	Upgrading data analytics capabilities	Defining a road map for improving technical capabilities	1	1	1	1
18	Nodes	Dreams	Upgrading data analytics capabilities	Focus shifting to advanced analytics including predictive analytics	4	4	2	2
19	Nodes	Dreams	Upgrading data analytics capabilities	Having a more complete view of what data is available, what we have	1	1	1	1
20	Nodes	Dreams	Upgrading data analytics capabilities	Having access from mobile devices to mobile-oriented analytics apps	5	5	5	5
21	Nodes	Dreams	Upgrading data analytics capabilities	Improved consistency across the results obtained by different teams i.e. single version of truth	2	2	2	2
22	Nodes	Dreams	Upgrading data analytics capabilities	Unqualified tasks being automated	2	2	2	2
23	Nodes	Dreams	Upskilling staff	Better qualified workforce which will be able to intervene in automated decision systems when they start to create incorrect patterns	1	1	1	1
24	Nodes	Dreams	Upskilling staff	Better qualified workforce which will be able to turn expertise into action to create added value for our clients	1	1	1	1
25	Nodes	Dreams	Upskilling staff	Business lines being better able to define own requirements	4	4	2	2
26	Nodes	Dreams	Upskilling staff	Having highly qualified analytics staff with both analytics and business knowledge, working freely on advanced analytics	1	1	1	1
27	Nodes	Dreams	Upskilling staff	Improving data literacy on the business user side	8	8	4	4

Appendix 32. Hierarchy of Nodes – Change Actions Proposed

#	Codes				Number of coding references	Aggregate number of coding references	Number of items coded	Aggregate number of items coded
1	Nodes	Change Actions Proposed	Bringing change in the organisational culture	Becoming more practical and efficient	4	4	3	3
2	Nodes	Change Actions Proposed	Bringing change in the organisational culture	Becoming open to change	1	1	1	1
3	Nodes	Change Actions Proposed	Bringing change in the organisational culture	Changing business approach so that all business decisions will be supported by data	2	2	1	1
4	Nodes	Change Actions Proposed	Enabling access to real-time or near-real-time data		6	6	3	3
5	Nodes	Change Actions Proposed	Enabling automation and digitalisation through data analytics	Automating decisions through data analytics	3	3	3	3
6	Nodes	Change Actions Proposed	Enabling automation and digitalisation through data analytics	Developing a mechanism for automated alerts and notifications	1	1	1	1
7	Nodes	Change Actions Proposed	Enabling automation and digitalisation through data analytics	Digitalisation of processes	1	1	1	1
8	Nodes	Change Actions Proposed	Enabling better self-service and mobile visual analytics	Enabling fast access to specific KPIs with the ability to interactively analyse further details	3	3	3	3
9	Nodes	Change Actions Proposed	Enabling better self-service and mobile visual analytics	Enabling self-service visual analytics	1	1	1	1
10	Nodes	Change Actions Proposed	Enabling better self-service and mobile visual analytics	Taking action to enable access from mobile devices	11	11	4	4
11	Nodes	Change Actions Proposed	Establishing a subsidiary focusing on data and digital		1	1	1	1
12	Nodes	Change Actions Proposed	Feeling reluctant to be specific about the organisational proposals		2	2	2	2
13	Nodes	Change Actions Proposed	Improving data consistency across platforms to ensure better reliability on the user side		6	6	5	5
14	Nodes	Change Actions Proposed	Improving usability	Building up a library (or inventory) of QV apps so that the users can find the required information easily	1	1	1	1
15	Nodes	Change Actions Proposed	Improving usability	Developing a single user interface enabling a holistic view of the customer and RM	6	6	5	5
16	Nodes	Change Actions Proposed	Improving usability	Improving the usability of user interfaces	6	6	4	4
17	Nodes	Change Actions Proposed	Improving usability	Tidying up QV platform by eliminating repetitive apps, separately categorising summary and detail apps,etc.	2	2	1	1
18	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Changing approach so that data analyses can be made only by the properly skilled teams set up for this purpose	5	5	3	3
19	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Consolidating data-related roles and responsibilities within a central team	2	2	2	2
20	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Further empowering and authorising users in business lines to do their own analyses	13	13	4	4
21	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Improving coordination between business lines regarding data analytics projects	1	1	1	1
22	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Improving impact analyses of data analytics projects	1	1	1	1
23	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Making organisational changes to have data-literate people focusing only on data analytics efforts across the Bank	1	1	1	1
24	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Reducing bureaucracy	4	4	2	2
25	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Regulating analytics efforts across the Bank in terms of roles and responsibilities, term definitions, standards, distribution frequencies, etc.	6	6	3	3
26	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Remaining open-minded regarrding a data-analytics organisation	5	5	2	2
27	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Re-organising IT in terms of both planning and development to be able to deliver much faster	1	1	1	1
28	Nodes	Change Actions Proposed	Regulating data analytics efforts across the Bank	Setting and making clear the responsibilities and processes concerning reporting and analytics	1	1	1	1
29	Nodes	Change Actions Proposed	Serving external customers' analytics and reporting requirements		1	1	1	1
30	Nodes	Change Actions Proposed	Shifting the focus of reporting to be future-oriented i.e. with predictive capabilities		1	1	1	1
31	Nodes	Change Actions Proposed	Stating the expected continuance of Excel requirements along with BA tools		2	2	1	1