Achieving Sustainability: from Innovation to Valorisation and Continuous Improvement

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Abstract

The Software Process Improvement methodology plans and implements improvement activities to achieve specific goals, for example, increase development speed, achieve higher product quality, and reduce costs. The approach paves way for the implementation of SPI innovations in software organisations. Innovation is the successful implementation of novel and appropriate ideas within an organisation. Innovation is underpinned by the concepts of creativity and invention. Often organisations, projects and individuals fail to gain adequate value let alone added value from their innovations. The term *valorisation* encompasses all activities that maximise the achievements of a project and innovation. The emphasis is on optimising the value of the project and innovation for diverse stakeholders (society, community, institutions, and individuals) and boosting its impact.

In this paper, the authors report on the understandings and collective experience gained over several years in industry as well as academia culminating in the design and implementation of the European Union VALO Project which dissemination and exploitation. VALO outputs include the elements of the training and on-line examination for possible certification to become Valorisation experts. The insights gained from the VALO project, enabled the development of a valorisation strategy which is used, alongside quality strategies to enable the development of a Quality and Valorisation of Projects Framework. The genericity of the framework provides the potential foundations for successful projects of high quality, and maximises the valorisation of project and innovation results.

Software development projects (and projects in general) fail regularly. These quality failures manifest themselves in late deliveries, over-budget, not satisfying the users' requirements and more importantly in poor reliability. Quality attributes are system qualities (such as availability, modifiability, performance and security), business qualities, (such as time to market, cost and benefit, product lifetime and target market), and architectural qualities (such as conceptual integrity, correctness and completeness). Whenever any of these qualities are compromised a system can be considered a total or partial failure. Moreover, after a project's completion there is often evidence that it fails to deliver sustained value to stakeholders. In this paper we examine the challenges and benefits of sustainability viewed from a STEEPLED multidimensional analysis.

Keywords: sustainability, software process improvement, multi-dimensionality, valorisation, innovation

1. Introduction

1. Project Quality and Quality Planning

Whoever does not plan plans to fail.

Aristotle (384–322 BC)

Project Quality and Quality Planning should never be an afterthought. Improving the quality of the project planning process and of the dissemination and exploitation of project outputs is paramount for building-in quality in the product/service from the very beginning, but also in order to transfer results and best practices to different and broader contexts; to tailor the results and outcomes to the needs of others; and to influence the formulation of policy and the implementation of practice.

A Quality Plan should form an integral part of the Project Plan and should comprise of at least the following elements:

  i. Building a project schedule;
 ii. Setting stakeholder expectations;
iii. Reaching a common understanding across the project team;
iv. Allocating roles and responsibilities;
 v. Identifying the risks of the project to the organisation and how they are related to other projects and initiatives;
vi. Controlling the project throughout its duration;
vii. Revising, Adapting and Changing, if necessary, as the project progresses.

1.2 Innovation and Creativity

According to Greenhalgh and Rogers (2010) "Innovation *can be defined as the application of new ideas to the products, processes, or other aspects of the activities of a firm that lead to increased value"*.

Trott (2013) explains innovation as follows:

"Innovation is not a single action but a total process of interrelated sub-processes. It is not just the conception of a new idea, nor the invention of a new device, nor the development of a new market. The process is all these things acting in an integrated fashion. Innovation is the management of all the activities involved in the process of idea generation, technology development, manufacturing and marketing of a new (or improved) product or manufacturing process or equipment".

Creativity is the thinking of novel and appropriate ideas. Innovation is the successful implementation of those ideas within an organisation. Creativity is "*fuel*" for creating new innovation. Ideation is the earliest phase in the innovation process that includes developing new ideas.

Innovation comprises a theoretical concept together with a technical invention (of a product or process), followed by commercial exploitation, i.e., innovation includes invention which is a product or process that is a result of a new idea. Creativity and invention are parts of the whole concept of innovation.

1.3 Innovation in Information Technologies (IT) and Information Systems (IS)

Innovations in Information Technologies (IT) and Information Systems (IS) are shaping the future and changing the world. Innovation without good Project Quality is deemed to fail, because innovation includes diffusion of Innovation and adoption by stakeholders. The perceptions of the innovation itself are secondary to the perceived characteristics of using an innovation. Rogers (2003) proposed five general attributes of innovations that consistently influence adoption: Relative Advantage, Compatibility, Complexity, Observability and Trialability. Moore and Benbasat (1991) appended to the list, a further three attributes: Image, Relative Advantage and Voluntariness of Use.

1.4 Software Process Improvement

Cases of systems failures suggest that the development of software is a complex task. Projects frequently result in unfinished projects, project overruns and system failures. Software Process Improvement (SPI) approaches are viewed as potential solutions to address such instances. The SPI methodology plans and implements improvement activities to achieve specific goals, for example, increase development speed, achieve higher product quality, reduce costs (Winkler et al, 2011). The SPI Manifesto (spi_manifesto.pdf (eurospi.net) "defines values and principles for making SPI work". The approach paves way for the implementation of SPI innovations in software organisations.

2. Valorisation

2.1 Research Projects and Wasted Results

Often organisations, projects and individuals fail to gain adequate value, let alone added value, from their innovations. The European Union for example funds an enormous number of projects whose outcomes are poorly exploited. In particular, projects consisting of purely research oriented and/or technically oriented partners seem to lack awareness of the importance of dissemination, exploitation and valorisation for sustainable development and skills in carrying out such activities (Siakas, et al,2012). The term *valorisation* encompasses all activities that maximise the achievements of a project. The emphasis is on optimising the value of the project for diverse stakeholders (society, community, institutions, and individuals) and boosting its impact.

Value attributable to many innovative projects tends to run out in relation to the allocated funding (Sheriff et al, 2013). Thus, the value created is not sustained beyond the lifetime of the project.

The failure of planned dissemination and future exploitation is demonstrated every year. Students undertaking PhDs, whether lasting three years for full time or up to eight years for part-time study, are normally concentrating on a real industrial problem or on an unsolved research problem. This also applies to post graduate master's projects and final-year undergraduate projects. For example, in the UK, the number of those studying, in the computer science subject in 2012-13 were 4,470 PhD students, 12,035 postgraduate taught and 67,005 first degree students. Also, in 2012-13 there were 925 PhD students, 7,480 postgraduate taught and 15,565 first degree students qualifying in this subject area (HEID, (2013*).

The majority of these investigations, and often proposed or proved solutions, are lost to business, due to lack of appropriate dissemination and/or exploitation. It is usual for a MSc or BSc project to be disseminated at a theoretical level via conferences, articles or journals. However, unless the problem addressed is based in a company, the results of the work are usually lost. If it relates to a company, the report or product might be examined and, in some cases, implemented but again restricted purely at that single company. In a few cases students/scholars might try exploitation for the development of a certain product such as an appropriate original App.

Students studying for PhDs are encouraged in many universities to publish their findings. These might result in possibly six papers at academic conferences, usually aimed at those already involved in the particular area, and also perhaps one or two journal papers, again aimed at those with research interests in that particular field. Students are not normally encouraged to produce in addition to publications or presentations aimed at wider audiences, so allowing their research to be of benefit to businesses or industry. A few conferences, such as the EuroAsiaSPI, aim to attract both academic and industrial presenters and attendees, with a stated aim of promoting the exchange of ideas between the two communities of academia and industry.

2.2 The VALO₅ Valorisation Maturity Model

Georgiadou and Siakas (2013) suggested that the level of process maturity determines the level of valorisation capability. They developed the VALO₅ Valorisation Maturity Model (Figure 1) which represents the maturity level that characterises a Valorisation process and its likelihood of success within a project team, an organisation, group or partnership. The circles underneath each step (level) depict Deming's Plan-Do-Check-Act wheel (1986). Without improvement at each step, it is not possible to reach the following level. A project team, an organisation, group, or partnership could go through several cycles without improving adequately in order to reach the following level. It requires awareness and commitment to mature and usually this is a long process.
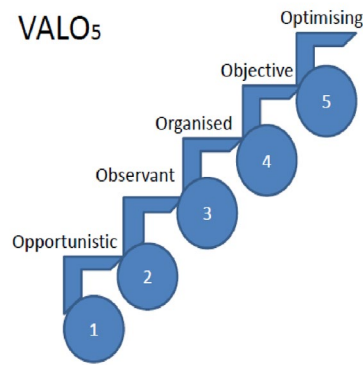
Figure 1: The VALO₅ Valorisation Maturity Model (Georgiadou and Siakas, 2013)

Valorisation means planning in such a way that the resources committed to a project yield results that can be used and exploited on a large scale, with the view of benefiting as many people as possible. Valorisation also means a better transfer and deployment of the results of a project once it has been completed (Neumann et al, 2012).

Valorisation can contribute to:
- enhancing the impact of all kind of projects such as EU projects;
- improving/ensuring the sustainability of project results;
- capitalising on investments;
- transferring results to other contexts;
- generating savings from not '*re-inventing the wheel*';
- reducing timescales for innovation policy;
- feeding the policy process.

VALO is a Lifelong Learning Programme, according to Leonardo da Vinci, (n..d). It is based on dissemination and exploitation of project results. VALO includes the elements of the training and on-line examination for possible certification to become Valorisation experts. The general aims and objectives of the project are to create a new certified Valorisation Expert profession adding to the existing certifications in the European Certification and Qualification Association (ECQA) (2022), which is a non-for-profit association, joining institutions and several thousands of professionals from all over Europe and outside of Europe. The trainees learn how to plan to obtain the full life benefit from research or development of a project, by systematic planning at the start of the project. The main features of VALO include dissemination, exploitation and sustainability, as well as the need to introduce early planning, and to identify the wider stakeholders.

Identifying and prioritising expectations for both quality and value from all perspectives is paramount for maximising both quality and value. This changing nature of value needs the innovator (or the owner of the innovation/ the company) to constantly monitor and send signals to the suitable audience to continue their interest and create new interest.

2.3 The Need for Early Valorisation

As we can see from Figure 2 there are similarities in the need of early planning regarding the execution of a new project, its quality outcomes and its valorisation. The execution of a new innovative project is depicted in more detail in Figure 3 as the innovation process. Innovations in software include the same phases as innovation in product development, namely the ideation phase for idea generation through brainstorming, mind maps and customer feedback, the determination of potential projects, the feasibility analysis and finally the decision to start the project implementation. In this stage a detailed project plan is imperative.
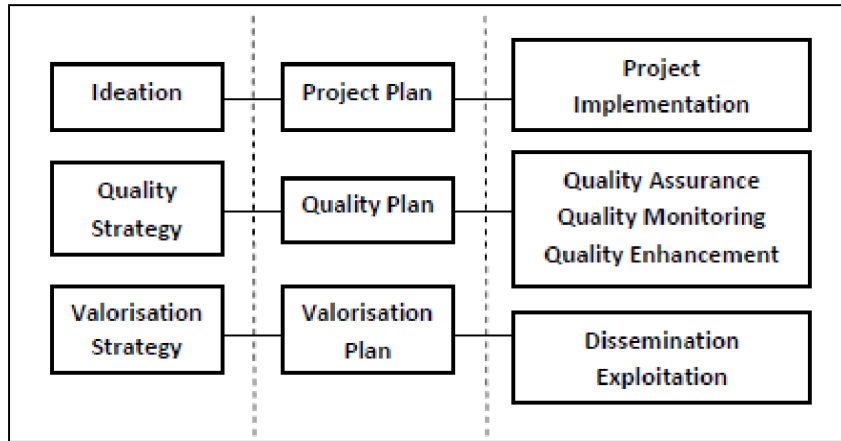
Figure 2: Project-Quality-Valorisation Components

Figure 2 shows the phases of new production development. The first stage is the Ideation stage including opportunity identification. Innovation management must guarantee a sustainable idea generation to support the product development with the continuous flow and collection of new successful ideas.

The quality strategy and the valorisation strategy should already be broadly outlined at the project ideation stage. A more concrete and detailed quality plan and valorisation plan should be outlined in parallel with the project plan.

Research by Greenhalgh and, Rogers, (2010), reveals that idea generation is currently limited to a core group of employees who act as idea contributors. New trends in the ideation process and the front end stage before the final decision of new production include the identification of potential idea sources inside and outside the organisation in the external corporate environment. This often happens by tapping intelligence of customers and collective knowledge through social media (Siakas et al, (2012). The new production decision is taken after the feasibility study and even at the production stage the voice of the customer is important for high quality outcome.
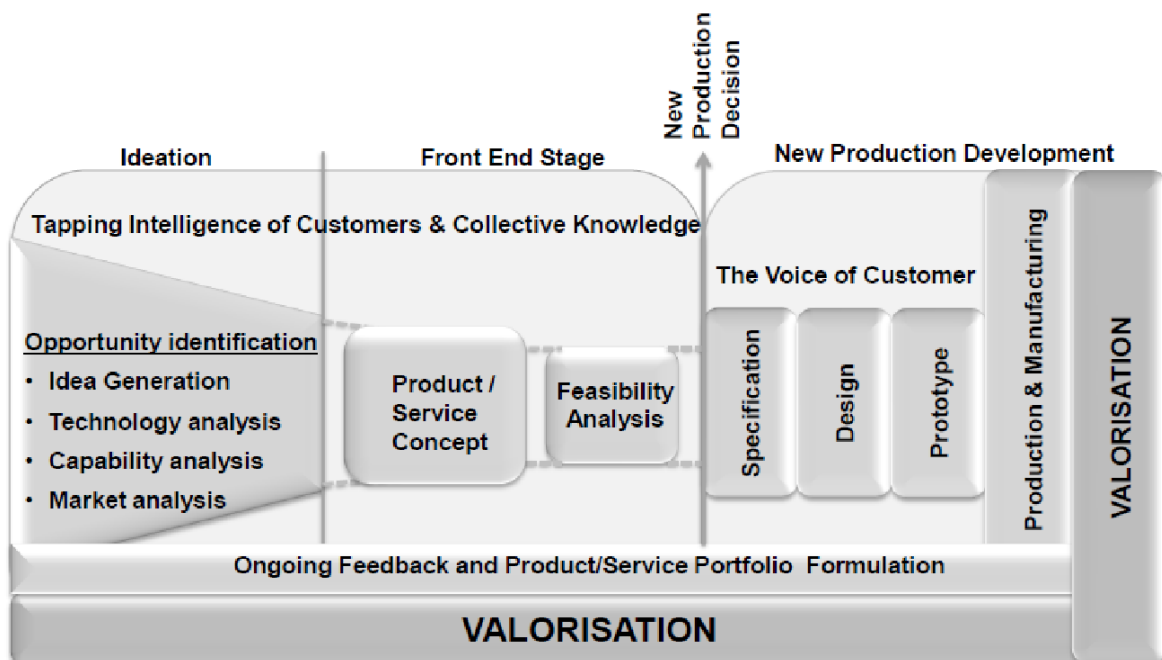

Figure 3: The Valorisation Process within the Innovation Process

As we can see in Figure 3 the valorisation process starts at the ideation stage of the project and is an ongoing process throughout the product life cycle. After the project finishes the valorisation continues encompassing all

activities that maximise the sustainability of the project. The emphasis is on boosting the impact and optimising the value of the project and its outcomes for diverse stakeholders, such as customers, society, community, institutions, and individuals with an interest in the project and the outcomes.

Effective communication, for example by using Information and Communication Technologies (ICTs), maximizes the opportunities for dissemination, exploitation and value gains originating in innovation. Openness and richness of networks are also believed to foster a fertile environment for the creation of new knowledge and accelerating the innovation rate argued by Siakas and Siakas (2019). Knowledge networks are increasingly created to accumulate and use knowledge for creating value. Effective innovation should not only facilitate the creation of value but should also ensure that such value is sustained and shared to its optimum potential. The impact/benefit of a sustainable project translates into added value gained by a diverse group of stakeholders and/or specific target groups well beyond the lifespan of the project. Projects consisting of purely research oriented and/or technically oriented partners seem to lack knowledge of the importance of dissemination, exploitation and valorisation for sustainable development.

3. Sustainability

3.1 Converting blue sky research to tangible benefits

Sustainability will not just '*be ensured*' even if a project is successful unless quality forms part of the project plan. When the funding for a project finishes, there should be plans (short, medium and long term) for exploiting the outputs in order to continue to deliver benefits. Sustainable projects become self-financing and as such deliver added value.

Projects often experiment with a wide range of creative strategies to earn revenue, though this is just one of multiple strategies they use to cover operating costs. Innovative business models range from subscription, to licensing out content, to offering premium services on free content. Many combine earned revenue strategies with other sources of support, including grants and support from host institutions.

A strategic plan provides an organisation wide framework for keeping the focus on priorities, dealing with challenges, and preparing for sustainability. It helps in allocating necessary resources for achieving organisational goals. A strategic plan is an organization-wide consensus among managers, staff, and diverse stakeholders regarding what success is and how it can be achieved. The strategic plan must be institutionalized, practical and flexible. It is important that it is systematically reviewed and revised to remain relevant state-of-the-art. The aim of a strategic plan is to develop a shared vision of the future for the organisation and the major steps that need to be taken to move the organisation in that direction. A strategic plan will help the organisation to find the best fit between its vision, mission, capabilities, opportunities and threats (Siakas, et al, 2012).
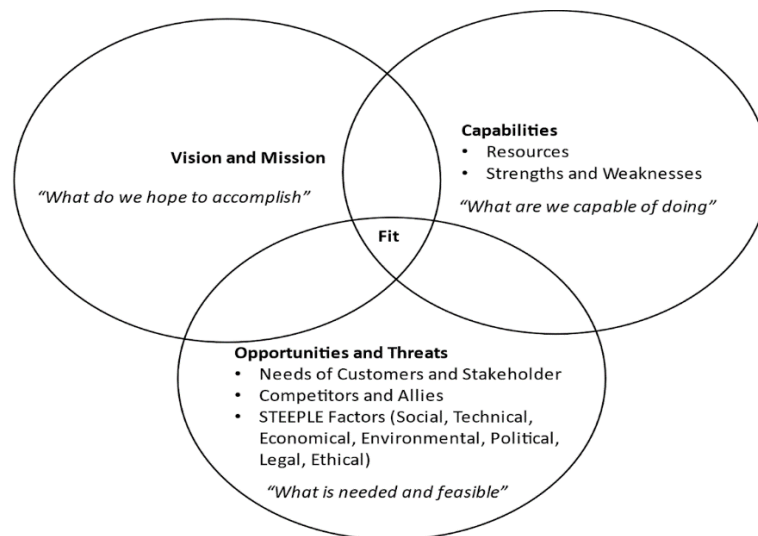

Figure 4 Strategic fit for preparing sustainability (adapted from Barry,1997).

Figure 4 shows three circles with subject matters that need to be taken into consideration when creating a strategic plan. When all the circles osculate, the perfect fit is found in the middle and can serve as ground for the creation of the strategic plan that is needed for preparing sustainability. In recent years an increased emphasis is put on the STEEPLED (Sociocultural, Technical, Economical, Environmental, Political, Legal, Ethical and Demographic) factors in the Opportunities and Threats circle. For example, regarding environmental factors, Arancon et al.. (2013) assert that "*Increasingly tighter regulations regarding organic waste, and the demand for renewable chemicals and fuels, are pushing the manufacturing industry toward higher sustainability to improve cost-effectiveness and meet customers' demand. Food waste valorization is one of the current research areas that has attracted a great deal of attention over the past few years as a potential alternative to the disposal of a wide range of residues in landfill sites…Instead of disposing and decomposing e.g., food waste, recent development of waste valorization strategies concentrates on sustainable production of chemicals, materials, and fuels through the development of green production strategies.* Similarly, Strøm-Andersen. (2020) argue that "*The transition toward the bioeconomy concerns how firms innovate, especially how they utilize biobased resources…and make use of technological developments to create high added-value for their by-products*".

Georgiadou et al (2021a, 2021b) used the STEEPLED analysis (Sociocultural, Technical, Economic, Environmental, Political, Ethical, Demographic) dimensions of systems for tackling complexity and for process improvement which in turn results in improved products and services thus maximising the gained value through valorisation (dissemination and exploitation and sustainability of results) thus ensuring sustainability in the long run.

A JISC study (2022) on the sustainability of projects reported that *"Cost control strategies were at least as important as revenue models in the sustainability plans of the organisations profiled. Of particular interest were the partnerships that many projects established to allow them to benefit from the skills and scale of others by outsourcing or sharing responsibility for functions that the projects were not well-positioned to perform. The role of in-kind contributions from the host institution was often significant. Many projects receive a great number of in-kind contributions from their host institutions, ranging from rent and utilities to IT support, to the unplanned-for contributions of staff time. We found that in many cases, neither project nor host institution is fully aware of the value of these 'hidden costs', which could lead to inefficiencies at scale"*

There should be plans for financial returns at the end of a research project for future exploitation; examples concerning the process exploitation could be training and, in future consultancy, and for the product exploitation selling the output including additional training and consultancy in the use of the product.

Short, middle, and long-term sustainability strategy and plans need to be elaborated. Different stakeholders have different perspectives and tend to focus primarily on one of the three, discerning what each group of stakeholders focuses on.

3.2 Exploitation and Intellectual Property

For many industries and sectors Intellectual Property (IP) is a core element of business strategy and a driving force for innovation and creativity. From the economic perspective IP is the corner stone of the economy and the key motivator for further growth. Hence any IP generated from a project needs to be exploited, protected and promoted appropriately.

All projects, and in particular innovation projects, need to disseminate and exploit their results for maximising achievements and increasing sustainability after their completion, as well on boosting their impact. The emphasis needs to be on optimising the value of the project for diverse stakeholders (society, community, institutions, and individuals). Intellectual property (IP) is considered to be the intangible property created by individuals or organisations. Due to the intangible nature of the IP, it is easy to misunderstand IP and hence it is often overlooked. Hence as a valorisation agent or a Project Manager it is important to understand the responsibilities of recognising IP.

"Intellectual property is more than ever the centre of the attention. Continuous changes to the demographic, industrial and commercial sectors during the past 30 years have placed knowledge (or innovation) and its protection at the strategic centre of regional and domestic economic policy" (Gevers, and Englebert, 2011), The foreword of the "*The future prospects for Intellectual Property in the EU: 2012-2022*" (Neumann et al, 2012), , by Gevers and Englebert (2012) regarding producing an innovative project idea is well suited to the SME's core business;

- establishing a work plan for exploitation before conducting the research;
- creating a well-defined Intellectual Property (IP) arrangement and securing your interests for the period of exploitation well in advance;
- incorporating demonstration activities (validation, prototyping, etc.) in the project work plan.

Exploitation must never be an afterthought. It must be at the forefront of everyone's mind throughout the project, from the earliest stages to gathering end results. Ways to help achieve this include:

- adopting a strong drive to market approach throughout the project;
- taking a more strategic role in the project;
- ensuring you have a well-structured consortium and additional strategic partners in place such as market developers and end-users for testing your results;
- drafting a market access action plan as soon as possible.

3.3 Dissemination

The internet is a powerful tool for promoting the results and outcomes of projects. Internet technology is fast-moving and offers new and innovative ways to disseminate project results and outcomes. There are some similar possible activities for internal and/or external target groups to an organisation and academic research. The relevance of the appropriate action and approached would depend on the actual project.

3.3.1 Deep Dissemination and exploitation for different types of output of a project

- Projects internal to an organisation: If a pilot project is to be used, then internal dissemination will be improved if the project is relevant to the majority of the staff. An example of this could be the reorganisation of allocation of parking spaces to minimise the distances for employees to their current buildings. Also if there is support for the research from senior management, then internal dissemination is encourages and facilitated.

- Projects for external use: Techniques could include the use of restricted websites or discussion groups, the use of video conferencing or webinars. Twitter with a limited circulation can also be used. Demonstrations again with restricted attendance could be arranged, including presentations such as at relevant user group meetings.

- Academic research: Techniques could include journal and conference papers, and participation in appropriate forums or groups. These could include specialist interest groups such as those arranged by professional bodies. These could be made in person or remotely via technology.

3.3.2 Dissemination to a wider population

There are many possible activities for internal or external dissemination for an organisation's project or research. The relevance of the appropriate action and approached would depend on the actual project.

Techniques could include:

- Use of the Internet and social media: These techniques are now used widely for raising awareness of and marketing products and ideas. It has been shown that the use of SEO (Search Engine Optimisation) can increase the awareness of a Web site

- By using search engines, over 90 per cent of the information required can be found (Winkler et al, 2011). An organisation, by using Google Analytics or similar tools, can measure obtain measurement about the use of the site such as the number of visitors, how long they viewed the site and also the route that they used to reach it (Purcell et al, 2012).

- User Group/Conference presentations: This can be aimed at wider audiences than the targeted ones used for deep dissemination. Some conferences, with less focused topics, attract wider range of attendees from

different aspects of business and from various countries. Events that allowed or encouraged remote participation could be particularly useful.

- Webinars: These can be closed or open to all, regardless of location. They have the advantage, as with remote conference participants, of reducing the time and cost of travel.

- Sponsorship: Sponsoring events, both related to the topic, such as conferences, and those unrelated, such as student competitions, sporting or charity activities, can raise the profile of the research, possibly by generating targeted or wider publicity. Examples of these are seen on some TV and press advertisements to promote awareness of the organisation's research activities.

- Standards Bodies: By encouraging active participation of relevant Standard Bodies and similar groups, and although not directly related to the research activity, this can generate awareness as the background and work of those on these committees are often known to the other members. This could encourage, through the "*word of mouth*" dissemination, to other key members of their organisations and hence to a wider influential circle of contacts.

- Professional and Industrial Bodies: By encouraging active participation in groups such as these, the awareness of the background and current activities of the key participants become widely known, so promoting the knowledge of the research or product. By becoming involved in various major committees, the network of those with similar interests is widened which assists with the dissemination. An example is by offering to make presentations in person or remotely, such as to various Specialist Groups and Branches of the BCS, The Chartered Institute of IT (2022). Even if the attendance was possibly under fifty, the event would have been advertised widely to several thousand and often filmed so this could be watched to by hundreds of those interested in the research topic.

- Media Packs: The concept of raising awareness of the research by the media should be considered by the creation of media packs, targeted at particular radio, television and newspapers. It is better to try to link to relevant local interests or those of special interest to that aspect of the media, rather than to produce a general media press release. A local point of contact, if possible, should be provided, as well as a central contact point. Local television and radio stations are often more interested in interviews with someone from their catchment area.

- Governmental Packs: These can be like the media packs, but targeted at particular local Councillors, Members of Parliament or Government lobbyists. The interests of those receiving the pack should be taking into account, if only by reordering the content.

- Articles: The media, in addition to press releases, are often interested in articles, again tailored in content and style for their readers. Similarly features for relevant radio or television programmes can be useful for dissemination. Examples of these are the television programmes "*Click*", "Tomorrow's World" aimed at adults or those targeted at the younger age group.

- Participation on Media Programs not directly relevant to product: The opportunity to participate in non-related media activities could range from well-known television shows, where participants take part in quizzes or sports outside their prior experience. These activities indirectly can raise the profile of their normal activities and provides wide dissemination of their product, inventions or research. Similarly local involvement with regional television or radio stations could be for example as part of a panel discussion on current issues or reviews of the newspapers. This indirectly provides dissemination for the research or product to a wider audience.

- YouTube: This can be used to up-load formal presentations, possibly in a dedicated area such as arranged by the Professional Bodies, a company or a university. For a much wider dissemination, this can be achieved by introducing an element of fun in the presentation and loading it in a more accessible area.

Valorisation can contribute to:
- improving/ensuring the sustainability of project results;
- enhancing the impact of all kinds of projects such as EU projects;
- capitalising on investments;
- transferring results to other contexts;
- generating savings from not '*re-inventing the wheel*';
- reducing timescales for innovation policy;
- feeding the policy process;

- possibly by promoting it via social media and Twitter, it is possible for a much wider dissemination. If it goes to "*Viral*", as it might then be shown and re-shown on various television programmes including mainstream television channels.

- Television or Radio Series: These can be used to promote ideas if the writers or editors of the series could be interested in the topic and shown a way that it could be made relevant to key characters in the series. The time delay is long for television series but it is possible that for radio series, such as "The Archers" can respond to situations with brief comments within twenty-four hours or less. These serial dramas reach very wide audiences. Although it is difficult to achieve, this is a very effective form of broad dissemination.

- Public Relations (PR): This can be used to create and maintain a favourable image of an organisation, a project and/or a product to a specific target group, but also more generally to the whole public opinion.

The survival and growth of a business depends on its image. PR are informational in nature, rather than promotional and aim to create and maintain a favourable image while advertising/promoting products and services. PR have a social message while advertising includes financial matters.

4. A Quality and Valorisation Framework

A framework is a real or conceptual structure intended to serve as a support or guide for the building of something that expands the structure and generally makes it workable. The nature of frameworks is characterised by *genericity* and hence *customisability*. Meequel et al. (1997) explain a method for designing a framework. The method is based mainly on a domain analysis. In order to identify the requirements and understand the components, as well as the stakeholders involved, to lay the foundations for a successful project but also for maximum valorisation of its results, the authors used a STEEPLED (Sociocultural, Technical, Economic, Environmental, Political, Legal, Ethical, Demographic). In addition, the six fundamental questions: What, Who, When, How, Where, and Why were also used. These analytical tools enabled the development of a Quality and Valorisation of Projects Framework. The genericity of the framework lays he foundations for successful projects of high quality and maximises the valorisation of project results. Table 1 presents a framework for Quality and Valorisation of projects. The components and quality requirements are given in the ***Qualities*** column.

Table 1: A framework for Quality and Valorisation of projects

Qualities	*Why*	*What*	*Who*	*When*	*How*
Business	Credibility Reputation Impact	Open Innovation	Crowdsourcing Manager Stakeholders	Ideation Start of project Revisit Review Improve	Social Media Branding Consultation Consensus
Planning	Predictability Traceability Controllability	Responsibilities Deliverables, Design Risks Contingencies Roles	Developers, Customers Sponsors Society	Beginning After every milestone	Prioritisation Analogies Metaphors Quantification
Correctness	Reliability	Process Deliverables	Quality Assurance Inspectors Testers, Auditors	End of each activity	Verification
Completeness	Functionality	Process Deliverables	Quality Control Inspections	Milestones	Validation
Consistency	Maintainability Usability	Version –Control Terminology management	Quality Control	Ongoing	Standards Procedures Templates
Quality Enhancement	Impact	Stakeholder Value	Quality Management	Throughout Project Lifetime	Quality Plan Quality Reviews Audits KPIs

Sustainability and Exploitation	Value Creation ROI Societal Benefits	Value Creation	All Stakeholders	Throughout and beyond completion	Deep and Broad dissemination KPIs

The reasons and expectations are listed under the **Why** column.

The **What** column presents '*What must be done*' but also '*What deliverables(outputs and outcomes) are expected*'.

The **Who** column identifies the stakeholders responsible for carrying out tasks, customers, sponsors and generally all people, organisations and even society at large who will benefit or suffer the consequences of a project.

The **When** column focuses on the timing of carrying out an activity as timeliness is one of the reasons why projects might be considered total or partial failures.

Finally, the **How** column indicates the methods, standards and tools that might be employed at different phases of a project. It must be emphasised that the Quality and Valorisation Framework in the current form is just an indicative demonstration of the Framework. It can be customised depending on the project specific constraints and priorities.

5 Conclusion

This lack of wider dissemination results in the loss of original ideas, for research and sometimes products that could be of use to the wider world, particularly potentially made available at no cost to organisations. Some students, potentially those studying part-time, based their projects on the aims of their employers. There is a difficult balance required, on the needs of the employer and the academic requirements of the university. These projects usually implemented, at least in part to or used for evaluation of new ideas for the organisation, even if they are not eventually implemented. In the case of these employer-based research projects, there is at least limited internal dissemination and sometimes an external exploitation. In some cases, a university encouraged their PhD students to develop their ideas and assist them with spin off companies for further exploitation.
The EU has funded a large number of projects, for which value and impact have been difficult to ascertain. In industry there are examples of failure to exploit in-house innovations because of inadequate protection and poor dissemination practices.

In today's fast changing and competitive world, there is a need to reconsider the wider dissemination of innovations both in depth and breadth and the exploitation of the outcome of all these academic projects, whether EU funded or university based, for the benefit of the wider business community and society.

The proposed Quality and Valorisation Framework in the current form is an indicative demonstration of the Framework. It can be customised depending on the project specific constraints and priorities. Going back to first principles, asking the right questions, and searching for suitable answers improves the quality of both the quality of process and product.

Future planned work involves the use of the framework proposed in this paper to plan and monitor projects and their innovations in academia and industry in order to improve quality and maximise value. Sustainability can thus be achieved by preventing waste, by internal and external dissemination of ideas, additional knowhow and actual/tangible results.

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