

## **Aligning policies: a flying reform in higher education: The development of aviation professionals**

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**Abstract:** This paper researches the social and occupational ergonomics in educational degrees and the alignment of related government policies. Specifically, it reviews the EU's 2050 vision for aviation, which recognises that education is a key factor in meeting the future needs of the industry. Collaboration of industry, universities and national research organisations are identified as essential components in removing the rigidity of education, which will allow for the recognised shortfall of aviation professionals to be satisfied. The paper commences by providing a *flying reform* of higher education, by reviewing the key development stages within the UK and the EU. The EU's ever-increasing involvement in HE is considered as a means to meet wider related policy objectives and overarching strategies. The diversification of degree opportunities together with the fit to adjacent policies is discussed. The paper concludes by demonstrating successful policy application through the exploration of one specific aviation degree provided by a modern UK university.

**Keywords:** higher education; aviation; policy alignment; Europe 2020.

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This paper is an expanded version of a powerpoint presentation entitled 'Case study: the development of aviation professionals – a flying reform', made at the Air Transport Research Society (ATRS) in Singapore, 2–5 July 2015.

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## 1. Introduction

“Europe has a long, strong and proud tradition of what we now call ‘higher’ education. It has deep roots beginning in the sixth century monastic schools, later developing into the medieval European University beginning in Bologna in 1088 and evolving into the modern higher education system of the present day.”<sup>1</sup>

This paper relates to the social and occupational ergonomics in educational degrees and the alignment of related government policies for industry and employers’ needs. Modernisation of higher education (HE) is viewed as an essential factor of the European ‘bigger’ picture, namely to remain competitive, to drive economic growth and to provide for European ‘well-being’ for the future. The European 2020 Strategy, in recognising this, reinforces the fact that HE institutions are crucial partners in achieving adjacent policy goals. Therefore, this research investigates societies’ needs in terms of ensuring that one particular sector, aviation, remains sustainable in respect to the human workforce and the anticipated growth of the industry.

There has often been criticism levied at the fact that HE curricula is sometimes slow to “respond to the changing needs of the economy and fails to anticipate or shape the careers of tomorrow” (Europa – Quality and Relevance in Higher Education). Although graduates leave university equipped with knowledge and skills, emphasis has often been accorded to the need for further core transferable competences.

Coupled with this, from a European perspective, the European Union (EU) points to the fact that there is a growing skills deficit, which leaves Europe vulnerable if measures are not taken to address this. The EU identifies that by 2030 there will be an estimated 414 million students worldwide in HE and points to the fact that “rigidity in education and training systems would make satisfying these needs impossible” (Europa: The Education Policy Framework).

The emergence of ‘new universities’ offering flexible and diverse programmes is seen as key to filling a skills shortage and training tomorrow’s professionals.

HE has undergone many changes, the biggest one perhaps being ‘access and opportunity’. In the 19th century, the university model provided a system in which only 2% of the population entered university. Today universities are not just for societies’ elite. The EU has contributed to this reformation and has a vision for HE, which has seen the setting of an ambitious target, that by 2020, 40% of all ‘young people’ should have graduated from HE.

This paper commences by providing a *flying reform* of HE, by reviewing the key development stages within the UK before providing further commentary as to the EU’s increasing involvement in this sector.

Consideration is given to the diversification of degree opportunities by way of an aviation

case study, which shows a direct correlation to the EU publication, *Flightpath 2050* vision for aviation, which set a roadmap for aviation development and research. Education is recognised to play a pivotal role in this agenda, which re-aligns to adjacent EU recommendations, as within the 2013 publication ‘Modernisation of Higher Education – Teaching and Learning in Europe’s Higher Education Institutions’. Clear acknowledgment is given to the fact that European universities, to be competitive in a ‘global knowledge economy’, need to embrace the ‘internationalisation’ of HE. Given that aviation is a truly international and a global industry, these factors are particularly important and significant to ensuring the future-proofing of capable professionals.

This paper focuses on these goals and ends with a brief exploration of the courses and opportunities provided by Coventry University in the UK, so as to demonstrate successful policy alignment.

## **2. The evolution of the HE environment within the UK**

The landscape of HE within the UK has continued to develop and evolve, with British universities stemming from diverse origins, and with a vast majority being steeped in extensive history (Anderson, 2006). For example, most of the 24 research-intensive Russell Group are over 100 years old, with the University of Oxford, although not stating a clear date of foundation, recording teaching existing in 1096 (Oxford University website).

The modern university system was shaped in the 19th century and by 1914 all existing universities, except Oxford and Cambridge, relied on the State for up to a third of their funding (Anderson, 2011).

In 1963, the report of the Robbins Committee on Higher Education stated that university places should be available to all who achieved entry on their ability. The 1960s also saw nine new campus-based universities becoming established, and ‘colleges of advanced technology’ being awarded university status. Robbins had initially believed that local colleges would continue to experience this transformation as they matured, but in 1965, the ‘binary’ policy prevented this and, as a consequence, no new universities were founded between 1969 and 1992. According to Anderson (2011), the ‘Robbins era’ heightened both uniformity and expansion in the UK, for the divided binary system protected universities from wider social pressures, allowing elitism to be retained. However, in 1992 the Further and Higher Education Act abolished this binary policy and the polytechnic sector, was once again provided with the opportunity to become universities and award their own degrees (Pratt, 1997). The word polytechnic stems from the Greek word ‘polytekhnos’ and originates via the later French use ‘Polytechnique’ for a school founded in Paris. It means to be skilled in many sciences and arts.

Evolution has continued in the HE sector, with sustainability very much at the forefront of development initiatives. The Higher Education Act, 2004, heralded a new funding

mechanism. This was further elaborated on within the 2011, UK Government's white paper, *Higher Education: Students at the Heart of the System*, which set out the intention to change the way in which funding for teaching was allocated, as well as how student numbers were managed. The identified aim was to increase student choice in HE and support diversity.

In 2010–2011, there were 165 HE institutions within the UK, all of which were in receipt of public funds from funding councils with only the University of Buckingham (as a private university) not receiving such. As of 2014–15, there was a reported 30,000 additional places, with 2015–2016 marking the removal of the cap on student numbers for publicly funded HE providers.

In 2014, the Department for Business, Innovation and Skills (BIS) published a report outlining the national strategy for access and students' success in HE. The clear message being that, "everyone with the potential to benefit from higher education should have equal opportunity to do so". This clearly links in to the above, namely, with regards to added capacity at universities of 'choice'. The emphasis of the strategy also underlines the principles of social mobility, which in this context is said to be, "a society becoming less stratified by socio-economic class"; in other words, this reinforces the principle of accessibility to all and not just to the socially elite. Another primary factor continually reinforced within the strategy is the need for HE to undertake "greater collaboration and partnership at every level including government departments and other organisations working in education, training and employment".

This report also fortified the need for HE institutions to provide the means to increase graduate employability but highlights that university involvement in teaching employability skills alone, does not significantly improve employment outcomes, referring to a paper by Mason et al. (2009).

It is advocated that rather than bolt-on skills, employability should be embedded into the core curriculum by:

- increasing work experience opportunities
- engaging with employers/industry
- modifying course content.

This clearly relates to the need for 'pedagogy for employability' as a fundamental embedded part of the degree. This is emphasised by the HE Academy (Pegg et al., 2012), which reaffirms the need to integrate employability within teaching and learning, through and across discipline areas. Despite this clear message, Teijeiro et al. (2013) express the belief that graduate employability remains affected by the disparity between the skills acquired at university and the expectations of employers. And Mott (2014) identified that

recent research highlighted an expanding divide between the skillsets developed and the requirements of employers. In investigating the re-examination of institutional roles, Mott (2014) points to the fact that there is a secondary factor aligned to the balance and preparation of students for the working environment, namely, the related financial perspective and implications. In his paper he stated that there needed to be a mix between the public and private sources of HE revenue, whilst Reinhard et al. (2008) stated that in some countries, “sponsoring activities of higher education institutions by companies is more and more common place” and now represents a significant percentage of universities’ yearly budgets. Consequently, meeting the needs of the HE sector, the students and employers can become a skilled juggling act and one where careful equilibrium and alignment is needed in ensuring that all parties are equally satisfied and their requirements are met. There can be no denying the value of education to society, in terms of integration, development and social cohesion; and it continues to be widely accepted that universities are significant in driving economic growth and social mobility. The 2012 ‘In Focus’ report of universities within the UK reviewed the patterns and trends of the last ten years referring to universities as ‘core strategic asset(s)’; and as the report highlights, this has resulted in a steady trend and flow of cross-border students. The EU’s recognition of the significance of HE, and indeed universities, to the future sustainability of the EU in the global market, has no-doubt been an instrumental factor in the EU taking an ever-increasing active role in the HE sector.

### **3. Higher education – the EU approach**

Whilst the EU acknowledges that the competence for education and training systems is the responsibility of national governments, emphasis is also accorded to the need to work together in a collaborative partnership, which is, after all, the underlying intention of the EU. Arguably, this could also be viewed as competence creep, if not of subsidiarity, but, of an ever-increasing influence in policy and direction (Garben, 2011; Kerikmäe, 2014). That said, there is a logical acceptance, and therefore counter argument, that education, particularly in the HE arena, is linked to adjacent policy areas, such as, the right of free movement, and, consequently, social mobility. There is also perhaps the more controversial argument, namely, that the university systems now found within much of the EU should in itself be viewed as a business (albeit in education) as there is an ever-increasing global demand for EU HE and specifically, university places (as presented by the UK, HM Government (2014) in its *Review of the Balance of Competences between the United Kingdom and the European Union*). Whilst this is likely to be more significant in the future, many education institutions are already now competing in a competitive global market place.

HE’s pivotal role is the development of highly skilled human capital that translates through to economic growth and prosperity, as has been recognised by the EU. For example, the EU Commission acknowledged the relevance of recognising professional qualifications across the EU as a means to achieving the desired functioning of the

internal market. And this subsequently, led to Directive 2005/36/EC on the recognition of professional qualifications, which came into force in 2007 (it has since been amended several times). The Treaty basis of this legislation clearly endorses the importance of education to other policy areas, namely the free movement of the worker, the rights of establishment and the right to provide services.

More recent emphasis has reaffirmed and also extended the need to continually recognise and expand mutual acceptance of educational qualifications and this has been stressed within the cooperation agencies network framework (e.g., NARIC). Within the European area of recognition (EAR) manual, clear acknowledgement is given to the fact that the recognition of educational qualifications “has recently shifted to the very centre of European and global policy discussions in the field of higher education”; with ‘fair recognition’ being postulated as the very cornerstone of the internationalisation of HE and of student mobility. Whilst the Treaty of the Functioning of the European Union (TFEU) explains, in Article 6, that “The Union shall have competence to carry out actions to support, coordinate or supplement the actions of the Member States” (in accordance with Title XII, Articles 165 and 166 TFEU, which relates to education, vocational training, youth and sport), the EU quite clearly has the means and mechanism through adjacent treaty articles (shared competences) to be actively involved in influencing and leading policy development. This again emphasises the necessary alignment of EU policies which maintains the ultimate goal of establishing a complete internal market, which sees “the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress...” (Article 3.3 – TEU: Treaty on European Union).

### *3.1. Developments*

The EU has increasingly emphasised that the challenges faced by HE are similar across the EU. In particular the common challenges faced in education and training are cited as being directly linked to an ageing society, global competition and skills deficits in the workforce. Once more this reinforces the linkage to adjoining areas, where the EU has clearly defined competence to act, subject to the principles of subsidiarity and proportionality.

There is no doubt that the EU has been steadily influential in directing a policy framework in relation to HE in the EU, whilst continuing to emphasise the importance of education alongside the progressive EU Strategy for jobs and growth. Arguably, this is key to *supporting, coordinating and supplementing* the EU member states in their own education policies and is a logical means to employ as a method to achieving a unified approach that fits into the other, bigger policy areas – such as the EU2020 strategy, which is, after all, based on the principle of inclusivity.

Within the EU education agenda, competencies for lifelong learning are consistently

reinforced. Transversal skills, such as the ability to continually learn and ‘initiative-taking’ are identified as essential skills in the workplace, alongside entrepreneurial skills and other basic skills. Emphasis is accorded to the fact that education should assist also in unpredictable career paths and choices. In an ever-increasing globalised society, a skilled and capable workforce remains key to economic competition and European prosperity. Productivity, quality and innovation within the workplace are cited as essential elements in attaining and maintaining a global presence. The labour market continues to evolve and therefore the required skills, competences and qualifications of the workforce need to be aligned to the needs of the employer. That said, literacy, numeracy and alongside this, foreign language skills, and digital and scientific skills are a requirement in most European businesses. However, recent evidence suggests that 20% of the EU working population has low literacy and numeracy skills, which is seen as a factor in the mismatch between the skills of the labour-force and the demands of the labour market and related employers (Europa). Therefore, the EU emphasises the continued key role it has to play, in both supporting and supplementing the member states, to make improvements aimed at modernising and improving educational systems – namely, through the coordination of policies across the 28 countries.

The Bologna Process has been instrumental in reforming HE through an intergovernmental commitment that focuses on restructuring the HE systems. This has significance beyond the EU and also should be viewed as part of the union’s wider economic strand that likewise extends beyond the HE sector (Bologna Process Implementation Report, 2012). Corbett (2005) provides a clear account of the developments within the European Community HE policy from 1955–2005. And 2005 is particularly identified as being influential in relaying the aim of reform and development in the HE arena, with the European Commission proposing the establishment of a European Research Funding Council, which was supported by several high-profile university alliances (Glasgow Declaration, 2005; EUA, 2005; LERU, 2005). The Ministerial Conference in Bergen, in the same year, confirmed the commissions intention to support the reform of degree structures, the credit transfer, the quality assurance and the curricular advancement, whilst, the then EU President, José Manuel Borosso, announced the intention to set up the European Institute of Technology (European Commission, 2005a, 2005b).

In 2008, the European Institute of Innovation and Technology (EIT) was established through Regulation (EC) 294/2008, becoming operational in 2010. The regulation stated that the aim was to be seen as “[a] new initiative at Community level” and that EIT “should be established to complement existing Community and national policies and initiatives by fostering integration of the knowledge triangle – higher education, research and innovation – across the European Union”. The objective of EIT is to increase sustainable economic growth and competitiveness within the EU, whilst reinforcing innovation and entrepreneurship. Again, this shows the clear synergy to the aims of the EU2020 Strategy. This subsequently also links back to the modernisation agenda of the

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EU Commission, which aims to support the development of HE policies across the EU by identifying five key priorities for HE, namely:

1. increasing the number of HE graduates
2. improving the quality and relevance of teaching and learning
3. promoting mobility: both student and staff, as well as cross-border cooperation
4. strengthening the knowledge triangle (as identified above)
5. creating effective governance and funding mechanisms (see Report to the Commission – Modernisation Report; and also – COM/2011/0567 Final)

These five priority areas are firmly rooted in the six actions of the Bologna Declaration of 19 June 1999 and the priority areas develop on from the earlier modernisation Communication (COM(2006) 208 Final).

The Education and Training 2020 strategy (ET2020 – Europa) is part of the overarching Europe 2020 strategy, which builds upon the recognition that HE institutions are crucial partners in delivering the Union’s strategy. It has therefore set a target that by 2020 40% of ‘young’ (aged 30–34) Europeans will have a HE qualification (or equivalent qualification) (EU2020 targets). This naturally sees this being translated by national governments within their own goals. Broadly speaking the three primary educational attainment levels remain, as above points 1 and 2, which are further segmented into the areas of:

- targeting under-represented groups in society (- increasing access to HE/the number of HE graduates)
- reducing drop-out rates, as well as in some instances the time it takes to complete a degree (- the number of HE graduates)
- improving the quality of HE and ‘making it more relevant’ (ET2020 – it should be noted that it is point 3, which forms the primary focus of this later study.)

Cooperation and collaborative partnership working are seen as significant factors in reforming education, and this includes institution-to-institution links, as well as links to business/industry and other organisations. The key advantages are enormous, for example, strategic partnerships allow for the sharing of best-practices; enhancing quality of teaching; exploiting education and business resources further afield; innovation – both in terms of developing new curricula, and *making it relevant* (whilst catering for future development) – this includes building bridges between HE and the various sectors through the mutual appreciation of needs.



One of the more key initiatives perhaps is the European Region Action Scheme for the Mobility of University Students (ERASMUS) which is a European Exchange Programme named after the Dutch philosopher Desiderius Erasmus of Rotterdam (Erasmus – Europa website).

### 3.2. *ERASMUS*

1987 witnessed the launching of the Erasmus mobility programme, and comment has been made, that not only has it been hugely influential, but that it “dramatically intensified the Commission’s involvement in European higher education” (Keeling, 2006) particularly in regards to credit transfers and university networking. Keeling (2006) identifies that in 2005, the EU Commission acknowledged that 90% of European universities were formally integrated into the Erasmus mobility, cooperation and thematic networks, which shows the extensive ‘buy-in’ in such a short period of time. Initially the Programme was incorporated into the Socrates Programme, established by the Commission in 1994, which ended in 1999, and then into the Socrates II Programme from 2000–2007. During the period 2007–2013 it formed part of the EU’s Lifelong Learning Programme and has since re-emerged as Erasmus Plus (or Erasmus +) for the period 2014–2020. This has seen the extension of the Programme to other areas, namely;

- school education opportunities
- vocational education and training opportunities
- adult education opportunities.

However, HE opportunities for students, staff, institutions and businesses and European Integration for academic and research staff and institutions, remains a significant part of the Programme. And, just as the EU has expanded, so has the Erasmus programme and the related partnerships, which now extends to other adjoining countries of the EU, and other partner countries. The Programme countries consist of the 28 member states plus 5 non-EU countries,<sup>2</sup> whilst the partner countries are divided into those neighbouring the EU, according to regions; and other geographical locations, again regionally-based. There is also grouping according to the financial instruments of the EU external action. The latter expansion of countries illustrates the extension of the programme across the globe. It therefore provides the opportunity for an extension of cultural awareness outside the EU and befits the globalised era.

## **4. Aviation**

Aviation is a truly global industry. There is little doubt that flight has changed the world for the better and quickened the pace of globalisation (Fox, 2014). Aviation crosses boundaries, both in terms of physical movement, and in terms of complexity of organisation (Fox, 2015). Air transport provides an international network of connectivity.

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The air transport industry is a network of organisations and entities, ranging from commercial aircraft operators, airports, air navigation service providers and related manufacturers of component parts. Air transport provides an invaluable service in a multitude of ways, to both businesses and individuals; for example, it aids to improve and transform standards of living, increase social and cultural awareness, it provides public services and support, allows access to remote and least-developed areas, and significantly contributes to international, national and regional GDP.

In 2000, recognising the importance of aviation in Europe, Commissioner Philippe Busquin invited key stakeholders, known as the Group of Personalities, to discuss how aviation could better serve society's needs and become a global leader in the field of aeronautics. The result was the 'European Aeronautics: A vision for 2020' report, which was published in January 2001. This led to an Advisory Council for Aeronautics Research in Europe which developed a strategic research and innovation agenda.

Within the 2020 vision document emphasis was given to the fact that education must be seen as "a high priority to ensure the long-term supply of first-class, well-trained and suitably qualified people".

This vision has since been extended beyond 2020 with the key focus now towards 2050 but with this goal firmly implanted.

Aviation is a strategically important sector for the EU both in terms of providing employment and for the European economy. It supports 5.1 million jobs and contributes to €365 billion, and despite the recent economic crisis global air transport is set to grow and is predicted to see the highest expansion for any mode of transport (EU Commission, DG Transport and Mobility).

#### *4.1. Jobs in the industry: future-proofing aviation*

Jobs in air transport cover a wide range of activities and skills, from the highly skilled to more supportive roles. This encompasses passenger and cargo/logistics roles for airlines and airports at operational, tactical and strategic levels.

For example, the diversity extends from:

- skilled engineers and technicians (e.g., maintaining aircraft and other facilities)
- air traffic controllers
- pilots
- designers and planners – both of the infrastructure within the business (routes, etc.)
- baggage handling and manual labour

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- customer service roles – check-in; cabin crew; etc.
- retail and catering roles
- management roles at operational, tactical and strategic levels
- ... and so on (the list is extensive and extending).

With the projected growth in air transport traffic, there will not only be a need to replace retiring staff but to recruit and train thousands of new staff for jobs across the sector. The Boeing Pilot and Technician Outlook (2014) identified the need for skilled professionals by forecasting that 533,000 new commercial airline pilots and 584,000 new maintenance technicians will be needed to fly and maintain the world fleet over the next 20 years. From a European perspective this translates to 94,000 pilots and 102,000 technicians. Management skills are also key in ensuring smooth, efficient, effective, safe and secure travel and operations at each respective stage of the process. A report from the Air Transport Action Group (2014) identifies that, according to data based on US figures, management staff working in aviation, are financially rewarded significantly more than the average base wage for comparable roles (this comparison analysis was also extended to other jobs within the aviation industry, which concluded the same).

It is recognised that “[a]viation is a catalyst for growth and skilled employment. As such, it is at the heart of the EUROPE 2020 strategy and its flagship initiatives including: Innovation Union, an industrial policy for the globalisation era and Resource Efficient Europe” (Flightpath 2050). Flightpath 2050 adds further emphasis to the fact that aviation is an invaluable asset for Europe, whilst also identifying the challenges that aviation faces. Specific issues given focus (related to the theme of this paper) are innovation, global leadership, adequate skills and a research infrastructure. The objective for Europe to take a leading role in global leadership of the aviation arena has always been seen as a major priority (European Aeronautics, 2001).

Prioritising research, testing capabilities and development of education are all seen as objectives of the 2050 aviation vision. Again emphasis is accorded to industry and public-private partnerships in this. Research is identified as key, whereby research clusters are networked across Europe “to facilitate and secure the local collaboration of industry, universities and national research organisations” (Flightpath 2050). Interoperability and synergy of processes and training are areas addressed and highlighted, especially in respect to controllers, pilots and engineers, which, it is stated, would benefit from supported training and the use of simulation tools. There are four specific goals linked to the area of research, testing capabilities and education, namely, that:

1. European research and innovation strategies are defined jointly (by all stakeholders, public and private) and implemented in a coordinated way incorporating the entire innovation chain

2. a network of multi-disciplinary technology clusters are created based on collaboration between industry, universities and research institutes
3. strategic European aerospace test, simulation and development facilities are identified, maintained and continuously developed
4. students are attracted to careers in aviation.

In essence, this reinforces the fact that HE needs to adapt in order to cater for the needs of identified sectors. Although graduates leave university with degrees, attesting to their knowledge in a specific area, emphasis is clearly made to the need for transferability of competencies and skills that can be applied in the workplace. In this case, which would either suit a career in the aviation industry or/and whereby European universities ‘closely match’ the needs of the aviation industry. It has often been a criticism levied at HE that the curricula are sometimes slow to ‘respond to the changing needs of the economy’ and therefore, “fails to anticipate or shape the careers of tomorrow” (Europa: Quality and Relevance in Higher Education). In this regard, the emphasis to meeting the needs of the aviation industry by matching these to a HE provider, is suggestive of a continuous evolutionary process within the HE system, whereby degrees are more specific and tailored to the needs of the aviation industry. This, call for courses and degrees that meet the requirements of the industry, fits with the goal to make HE *more relevant*,<sup>3</sup> thereby allowing the EU to remain competitive, and to drive economic growth for Europe. Thus, inevitably, this fit for purpose HE model caters for the ‘well-being’ of the aviation industry, by making it more secure, through professional ‘future-proofing’ of the workforce. This model of delivering courses and degrees, by removing the *rigidity in education*, so as to address the specific needs of an industry, tends to sit more comfortably within the remit of the modern university, those that have their roots in colleges and polytechnics, rather than their ‘red-brick’<sup>4</sup> counterparts. Arguably, this approach also addresses the criticism levied by Mason et al. (2009), whereby employment skills are not just tagged on but are the focus of the degree. The true pedagogic approach to employability is one that teaches skills, knowledge within a real-life setting, whereby the graduate is able, capable and adaptable to the workplace they wish to enter into.

A purpose-built degree, whereby the degree is assembled through industry engagement, predictably leads to increased work opportunities for the graduate, especially when work attachments and internships form part of the degree.

This approach to degree development sits firmly within the UK and EU strategy, which recognised that HE requires ‘greater collaboration and partnership at every level including Government Departments and other organisations working in education, training and employment’ (BIS, 2014).

The emergence of ‘new universities’ offering such flexible and arguably diverse

programmes is seen as key to filling a skills shortage and training tomorrow's aviation professionals.

#### *4.2. The importance of aviation – a UK perspective*

As an island aviation has been a significant transport mode to the UK, which is served by many airports dotted throughout Scotland, Wales, Northern Ireland and England. UK airports transport more than 200 million passengers and over 2 million tonnes of freight yearly (UK Government, 2012). Capacity limitations have become a concern particularly in the south of England and increasing long-term capacity remains a primary government objective, although the long awaited Davies Commission Report arguably took some time to deliberate, consult, re-deliberate, consider and ultimately publish.

Having a shortage of airport capacity ultimately affects the economy, and therefore, not only the future prosperity of the UK but also the EU. Heathrow Airport is the UK's only hub airport, which presently is operating at 98% capacity and London Gatwick is estimated to reach its capacity by 2020, with all of the capitals airports predicted to have reached their limits by 2030. The economic benefit of expansion at either Heathrow or Gatwick translates to hundreds of billions of pounds, with the increase of jobs estimated to be anything from 30,000-108,000 by 2050 (Politics Home, 2015). Increasing capacity at Heathrow Airport and the south of the UK thus means that there will be an increased need for labour and aviation professionals to meet growing passengers and cargo requirements. This expansion sits nicely with the EU's goal of increased trade, jobs and economic growth, *the Europe 2020 Strategy*, which ultimately would make the UK and Europe more competitive in the international arena.

Whilst, the UK continues to investigate how to meet this capacity shortage it is recognised that most economic growth over the next 40 years will come from the Asian area and potentially North and South America. The UK-European market is likely to see less growth than the aforesaid areas, as the Asian and US markets develop due to related economic growth in these regions (IATA, 2014).

From a geographical perspective, the UK is best placed to capitalise on any growth from North and South America, whilst also serving as a hub for onward transit into Europe and through to Asia.

The West Midlands has certainly embraced this philosophy with the region having a larger trade surplus with North America than any other part of the UK, whilst also having a positive balance of trade with China (Blackett, Chief Executive of the Greater Birmingham Chamber of Commerce, 2015). Birmingham has also been named as the UK's most investible city (Birmingham Airport, 2015). In 2014, Birmingham Airport opened its new £40 m extended runway, with China Southern Airlines being the first flight to travel to the Far East (Beijing). The airport is now the UK's third largest airport (outside of London) and by 2020 it is predicted that Birmingham Airport will handle

around 15 million passengers (a growth of six million on today's figures). Fifty airlines operate to 143 direct routes, which includes daily flights to New York and Dubai and the airport now serves the West Coast of America, South America, the Far East and South Africa (as well as within Europe).

Birmingham Airport remains the best-connected airport to rail in the UK, with 23% of passengers using train to travel to and from the airport. With the development of High Speed rail (HS2) and the likely predicted congestion on roads, particularly in the south and around London, this will only become a bigger asset to the region.

The extra capacity released at Birmingham Airport translates to regional opportunity and inevitably greater prosperity. However, this needs to be supported through the development of appropriate professionals to meet these demands and needs. Coventry University is geographically positioned to play a part in the regions growth, through innovative 'professional' degrees that align education and wider government policies. This includes supporting students who come to the UK to study from both China and the USA. From a historical perspective, the city of Coventry has shown its ability to support the UK's needs through decades of industrial development and productivity. Subsequently, this translates through to the fact that Coventry University is excellently placed to train aviation professionals for the future by utilising the links to related industries and working collaboratively with partners.

## **5. Aligning policies – developing aviation professionals: a case study of transformative education – Coventry University**

Coventry University is located in the West Midlands, within the UK. Its origins are traceable back to the Coventry College of Design in 1843. In 1970, the then Coventry College of Art amalgamated with Lanchester College of Technology and Rugby College of Engineering Technology to become Lanchester Polytechnic. In 1987 the name changed to Coventry Polytechnic, and in 1992 the University was formed.

### *5.1. Coventry: a modern university challenging 'red brick' institutions*

Coventry University has had a meteoric rise in the UK HE hierarchy, and is currently the highest ranked modern university in all of the major league tables. The university was awarded the Times and Sunday Times Good University Guide's 'Modern University of the Year' compliment for three consecutive years, in 2014, 2015 and 2016, and is the highest ranked modern university in the guide's history.

In May 2015, Coventry University broke into the top 15 of UK universities in the Guardian University Guide 2016 (published in the Guardian newspaper).

In an interview (May, 2015) the Vice-Chancellor of Coventry University, John Latham, stated that Coventry University is "continually evolving"... whereby, there is an

underlining approach “that first-class education is not constrained by boundaries and can be accessed by all”. These two sentences clearly bear remarkable similarities to the UK’s policy of inclusive education, the EU ET2020 aims (particularly of accessibility) and also the need for responsive education (as echoed by the aviation industry) to satisfy tomorrow’s needs in the workplace.

In the same interview, emphasis was also accorded to the focus given to providing students with a “top class experience across all aspects of their academic life through ... innovative programmes of teaching and learning, excellent placement opportunities and ... facilities”. This therefore aligns to the strategy of putting students at the heart of development (as per the 2011 UK Government White Paper) whilst also recognising the value of purposeful student placements, and the need for public-private, industry partnerships.

The corporate plan refers to the overarching mission, namely, reinforcement of being a global, dynamic and enterprising university, which sees extensive partnership working with external organisations through student engagement and research. And Coventry University is indeed focused on establishing a growing reputation for research excellence, whilst continually developing links with industry which all assist to augment Coventry’s developing reputation.

The University also aligns its policy to adjacent areas, namely, the need to “contribute to economic prosperity and to social well-being” as well as “solving some of the most important problems or ‘grand challenges’ ... in society”. This clearly reinforces the links of the University policies to wider policy and strategies – regionally, nationally and at an EU level. Arguably, sustainability in aviation is also a ‘grand challenge to society’.

By tailor-making purposeful degrees and programmes, and whilst also realising the needs of the region and wider community, Coventry University has firmly shown that it recognises the bigger picture as within the EU2020 strategy.

### *5.2. Coventry University: aviation and aerospace*

The Faculty of Engineering, Environment and Computing offers degrees in aviation, whilst mixing industrial development, entrepreneurship and innovation, so as to encompass the concept of sustainability, which includes, environmental, social and economic factors. Noticeably, this is one key area where Coventry clearly aligns its mission statement and corporate strategy to external (EU and international) focus and policies. The School of Mechanical, Aerospace, and Automotive Engineering (located within the Faculty of Engineering, Environment and Computing) offers various taught degrees in aerospace and aviation management, at foundation, undergraduate and postgraduate levels, together with research degrees at both postgraduate and doctoral levels. These are delivered through the Coventry Campus (Table 1). Dependent upon the degree, there may also be the choice of part-time and full-time study either on the

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campus, online or via a distance learning method.

<i>Undergraduate</i>	<i>Postgraduate</i>
Aerospace Technology BEng. (Hons)	Aerospace Engineering MSc
Aerospace Systems Engineering BEng. (Hons)	Air Transport Management MSc
Aerospace Technology BEng. (Hons)	Human Factors in Aviation MSc
General Engineering BEng. (Hons) Top Up	
<b>Aviation Management BSc. (Hons)</b>	

**Table 1:** Coventry Campus (as at Dec. 2015)

*Source:* Authors

### 5.3. Aviation management – background

Coventry University started to offer a management degree in aviation in 2008, having received approval in 2007. The degree format has since been revalidated and enhanced in 2014. The intention of the BSc Aviation Management degree is to provide students with a ‘good understanding of the aviation industry’, (Programme Specification document 2015/16) and the related rationales (as identified within the respective modules). The degree is accredited by The Chartered Institute of Logistics and Transport (CILT), UK.

The degree is composed of various modules, which takes into account the Quality Assurance Agency for HE requirements for the development of the student at various levels and the QAA benchmark for engineering, business and management (Table 2 – re year 1; Table 3 re year 2 and Table 4 re final year composition: *as at Dec. 2015*).

<b>YEAR 1: Level 4 Module Title</b>	<b>Credit value C/O</b>	<b>Semester 1 or 2</b>	<b>Assessment regime %</b>	
Airport Operation and Air Transportation	20 C	S1	50 Exam	50 coursework
International Business & Information Management	20 C	S1		100 coursework
Professional Development (in Aviation Management)	10 C	S1		100 coursework
Fundamentals of Aeronautical Engineering	20 C	S2		100 coursework
Business Analysis Methods	20 C	S2		100 coursework
Business Information Systems	20 C	S2		100 coursework



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*Add+vantage module	10 C	Either		Variable
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**Table 2: Year 1 structure of the BSc degree**

Most modules are compulsory (C), although there is a choice between two options in year two and the final year (CO – as shown).

There is also a requirement to add a mandatory module selected from an advantage scheme, called ‘Add+vantage’, which is a career development scheme whereby the student achieves an additional ten credits (per module). The idea is to provide students with a choice which links to their interests and/or development needs and to make them stand out through the achievement of ‘extra’ credits to a prospective employer.

<b>YEAR 2: Level 5 Module Title</b>	<b>Credit Value C/O</b>	<b>Semester 1 or 2</b>	<b>Assessment regime</b>	
Airline Marketing and Management	20 C	S1	50 Exam	50 Coursework
Airport Operations – Passengers, Cargo and Airfield	20 C	S1	50 Exam	50 Coursework
Option 1 Introduction to Research (methods/data analysis) <b>or</b>	10 CO	S1		100 Coursework
Option 2 Aircraft Maintenance Management	10 CO	S1		100 Coursework
Transport and Logistics Management	20 C	S2		100 Coursework
Operational Research for Aviation Management	20 C	S2	40 Exam	60 Coursework
Aviation Safety, Security and Emergency Planning	20 C	S2	50 Exam	50 Coursework
*Add+vantage module – Global Experience in Aviation Management	10 C	S1		100 coursework (50 Portfolio 50 Presentation)

**Table 3: Year 2 structure of the BSc degree**

After Year 2 students then have the option to undertake an additional year, which is entitled an ‘enhancement year.’ This provides a choice between professional training, or a study year overseas. Both equate to an additional 40 credits, which would normally mean that a student passed their honours degree with the 360 credits, plus these extra 40 credits (all additional credits are therefore cited on the transcription of the degree).

The final year is then undertaken in either Year 3 or 4 (see Table 4).

<b>FINAL YEAR: Level 6 Module Title</b>	<b>Credit Value C/O</b>	<b>Semester 1 or 2</b>	<b>Assessment regime</b>	
Global Logistics and Supply Chain Management	20 C	S1		100 coursework
Project Management	20 C	S1	80 Exam	20 coursework (Presentation)
Individual Project Preparation	10 C	S1		100 coursework

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Aviation Strategy & Planning	20 C	S2	30 Exam	70 coursework
Individual Project Realisation	20 C	S2		100 coursework
Option 1 Airline Operations and Scheduling <b>or</b>	20 CO	S2		100 coursework
Option 2 Human Factors in Aviation	20 CO	S2	50 Exam	50 coursework
*Add+vantage module	10 C	Either		Variable

**Table 4: Year 3 structure of the BSc degree**

### 5.3.1. Educational aims

The educational aims of the programme are stated as being fourfold:

1. to study the constituent activities and current practice of the aviation industry, their management and the changing external environment in which they operate
2. the assimilation of engineering methods and their application to the analysis, design, and implementation of solutions to problems in the industry
3. the development of professional skills that enhance productivity in organisations concerned with air transport, to prepare for a career in aviation business and management
4. the enhancement of lifelong learning skills and personal development to contribute to society at large (Programme Specification Document 2015/16).

Reinforcement is given to the fact that the degree is responsive and adaptive to the current needs, changes and challenges of the industry, whilst developing professional skills, which are aligned to a career within the air transport industry. There is clear emphasis to the fact that the degree contributes to greater society. Thus, also showing alignment to the wider European 2020 Strategy (EU2020) which underpins many adjacent policy areas. Education is key to this strategy and therefore links to education are to be found in all three main topic areas, such as innovation; youth on the move (which encompasses study, learning, training and working) whilst the industrial policy for the globalisation era recognises the need for integration and coordination, as well as an agenda for new skills and jobs.

One key fact of the EU 2020 strategy (Europa) is the need for collaborative practices and *new skills for new jobs* which has three principle aims:

- . promoting the better anticipation of the needs for future skills
- . developing a better match between skills and the labour market
- . bridging the gap between the world of education and work.

Coventry University works closely to this agenda within the Aviation Management

degree. Industry links are cited as a unique selling point of the BSc Aviation Management degree, which utilises industry resources, skills and knowledge in a variety of ways, and at every opportunity possible. This reinforces the connectivity between the educational composition of the degree and the needs of the employer.

### *5.3.2. Preparing the professional – education and industry partnerships*

As with all degrees, it is important to verify that the student has the acquired knowledge and skills to progress, both through the degree and ultimately into employment. Therefore, there are learning outcomes, which must be tested and satisfied, as per the respective module specification documents. The modules are either 100% coursework or a combination of coursework and examinations (as per Tables 2, 3 and 4). The coursework is delivered through a diversity of methods, such as portfolios, online quizzes and tests, group project work and individual project work. Formative assessment is also undertaken by a variety of means, whereby students receive feedback on their learning so as to prepare them for the summative assessments on the module. In many instances there is a natural bridge between modules and across years, thus showing a stepped and progressive development pattern that builds upon acquired learning and student development. This diversity caters for the different needs of the students and provides a supporting mechanism to aid learning and advancement.

Much has been written in general of the value of work placements intertwined within a degree, and work-based learning has indeed been a factor in UK HE for many years, particularly by the *newer* modern universities which have their origins in the original ‘polytechnic’ college of further education. In the 1950s the National Council for Technological Awards advocated that engineering and technology undergraduate degrees and programmes would particularly benefit from a work-based placement period. Bowes and Harvey (1999) and Mason et al. (2003) identified the obvious advantage of work placements, one of which was to increase the students’ likelihood of securing employment after their degree. Evidence also suggests that students who have undertaken work experience also obtain higher grades in their degree, which also increases their opportunity of securing work.

Coventry University equally recognises the benefits of work placements. On the BSc Aviation Management degree, in order to progress to the sandwich year, which is either in industry or on the overseas study placement, a full-time student must obtain a total of 240 credits (or above). The industry placements have included unpaid and paid, short term and medium term positions at leading edge employers involved in the aviation sector; however, the vast majority are for just over the year, and are mostly fully paid positions. In some instances, this linkage has resulted in the student being offered a full-time position after they graduate. This is a *win-win* situation, with advantages to all parties. From the students’ perspective, this placement allows the student to gain a real-life experience of the industry and their chosen career; at the very least, it is seen as key CV building material. This linkage also allows the student to see and experience current

industry developments first-hand. The work placement inevitably sees the practical application and experience being linked and joined to the previously gained theoretical knowledge. Subsequently, the students return to the University for the last year wherein, there is an obvious and noticeable transformation, whereby the student is more confident in their abilities and is able to contribute to the remaining modules by relating and sharing their 'real-world' examples of work experience.

For industry, this placement method results in a system of *try before you buy*, whereby, the industry partners are able to gauge whether a student could be a potential full-time employee. Such initiatives enable an employer to gauge the interest and enthusiasm of a 'worker', their practical capabilities and skills, as well as the ability to facilitate and process 'new' information within a specific industry setting. Employers are able to measure and gauge the potential workforce against existing employees, and also, to feedback to the university any areas where further development of both the individual and the degree might be relevant and prudent to apply. This is an important relationship, wherein the university is responsive to the needs of the aviation industry. Course and degree development is therefore on going, and as the industry continues to progress, develop and even transform, so does the university degree. This therefore sees a closer match between the knowledge, skills and abilities acquired through university and the match to the labour market. This was identified as an earlier criticism, in terms of non-responsive curriculum – and demonstrates that the approach taken by Coventry University shows a continuous evolutionary process, whereby degrees are more specific and tailored to the requirements of the aviation industry. This collaborative partnership allows the future skills and needs of the workforce to be catered for and also changes to be predicted and planned for.

For the University there is an obvious measureable advantage, namely of increasing student satisfaction, which is evident by the University's current position within the respective University League tables. This takes into account student feedback of the degree, based upon the student experience, and employability of the student once the degree is completed. Ultimately this leads to increasing student numbers and industry validation of the 'value' of the degree, in terms of recognising a 'fit for industry' course with a responsive curricula designed to produce aviation professionals that cater for aviation's needs.

Both the Faculty and the University prides itself on a strong working relationship with the Faculty's Career and Employment Unit, called 'EC Futures', which helps to facilitate these placements and also prepare and develop the skills of the student ready for the workplace environment. This initiative clearly demonstrates that there is prominence given to transferable skills from the HE environment through to employment within the aviation sector and vice-versa. Emphasis is accorded to developing enterprising individuals with leadership skills, knowledge and experience, who are fit for the needs of the industry, today and in the future.

### 5.3.3. *Study abroad year*

Coventry University offers a ‘study abroad year’ as an alternative to the year out working experience. The university continues to develop and add to their exchange programmes both within Europe and further afield, citing North America in particular as an identified growth area, where they already have close connections with the University of Purdue (<https://polytechnic.purdue.edu/degrees/aviation-management>) which also specialises in aerospace. This development and collaboration in the USA is significant given that the West Midlands has extensive trading links there, and according to the HSBC’s (2012) ‘The World in 2050’ report, the USA is set to remain the world’s largest economy, at least until 2050 (when China ‘may’ eclipse the USA). From a geographical perspective this collaborative development strategy by the University sits well within the growth area of Birmingham Airport, which (May, 2015) introduced new daily direct flights between JFK, New York and the airport (Birmingham Airport). This is anticipated to provide almost 100,000 seats per year with the route being a collaborative joint venture between American Airlines and British Airways, as part of the *oneworld* airline global alliance. The USA remains the number one country for aerospace, which also translates to greater scope and potential, not only for manufacturing and trade, but, for Coventry University and the wider related degree courses being delivered. From a regional point of view, route network developments with the USA would see an increase in tourist numbers, visiting such destinations as Stratford-upon-Avon, Warwick, the Cotswolds, Coventry and Birmingham. In 2014, US tourists spent around £40 m in Birmingham and surrounding areas, whilst the Midlands also exported £4.8 bn to North America (Birmingham Airport, 2015a, 2015b; Visit Birmingham; Birmingham Chamber of Commerce).

From a wider perspective such route expansions once again reinforce the importance of aviation to the UK economy and the need to ensure that suitably trained aviation professionals are there to enhance and support productivity and growth. This also sits well with the EU2020 strategy in terms of job growth and sustainability within the wider EU.

The study abroad period provides the opportunity for students to experience and appreciate cultural differences, and therefore also to be better equipped to welcome visitors to the UK. The educational exchanges develop the character of the student and provides direct exposure to European and international diversity, whilst the student also studies subject areas closely related to the BSc Aviation Management degree. Students are afforded several choices within Europe,<sup>5</sup> mostly at universities offering engineering or management related subjects, as well as at universities that offer a specialist degree in aviation management. This is also extended to include opportunities outside of the EU, for example, the USA.<sup>6</sup>

All EU universities are part of the Erasmus (Plus) programme (with the exception of

Switzerland). Like the work placement year, this opportunity allows the student to gain invaluable exposure to the global environment that many of them will eventually be working in. It boosts both skills and knowledge, and thus increases the potential for employability. Erasmus ultimately provides the chance to continue studying overseas in a new environment, whilst also allowing the opportunity to develop or enhance language skills by the immersion into new cultures. Thus aiding to satisfy the criticism in terms of a deficit of language skills in the workplace.

The 'study abroad year' programme also encourages independence and confidence, which ultimately furthermore assists the student in gaining employment. This again demonstrates a natural connectivity between studying and preparation for industry.

In essence, this is the underlying concept behind the Coventry University BSc Aviation Management degree, which through its innovative design reinforces the hypothesis that transformational education means removing the rigidity of education through forging closer collaboration and partnerships with industry. In applying this philosophy and approach Coventry University negates the criticism that HE curricula is slow to 'respond to the changing needs of the economy and fails to anticipate or shape the careers of tomorrow' (Europa – Quality and Relevance in Higher Education).

## **6. Conclusions**

At the start of this paper, it was said that, "Europe has a long, strong and proud tradition [in]... higher education". Roots and origins of course remain significant but equally so, so does the need for HE to be sustainable. Sustainability is about *Our Common Future* (United Nations, 1987) whereby sustainability means ensuring the needs of today are satisfied but where future development is not compromised.

Within EU policy, sustainability remains a cross cutting measure. Although, debatably there has been competence creep into the area of education by the EU, this is perhaps arguably understandable, given the alignment of adjacent policy areas and the overarching European 2020 strategy. Education remains a key to ensuring that the EU is competitive within a globalised society and linked economy. Ensuring the workforce is trained and responsive to the needs of developing industries is crucial. Rigidity in education and training systems does not allow for skills shortages and deficits in the workforce to be tackled, and hence universities need to be responsive to the needs of both society and the economy. Yet, in the past, universities have been criticised for their failure to respond and adapt.

The 2015 Report into the investigation of the Bologna Process identified that the "[t]he Bologna Process [had] arrived at a crucial point", identifying that there was much more work to be done. Specifically the following comments were made: "[a]lthough countries are moving in the same direction, they do so at a widely varying pace". As a consequence, instability within the foundations of the European HE area was identified.

Areas of concern still related to the recognition of studies conducted abroad and recognition for further work or areas of study in general. It was also stated that “[g]raduates too often discover that they do not have the skills and competences they need for their future careers”. Whilst there were still issues concerning accessibility into HE for young people from disadvantaged backgrounds; and “[s]tudent-centred learning, based on carefully planned goals, [also] remains underdeveloped”.

However, most significantly the following was reinforced:

“Policy makers, academic staff and students must work together, within countries and across borders, to learn from each other and to identify and achieve measurable objectives.”

This, in essence, has been both the basis of the investigation as reinforced within the findings of this research – namely there is a need to join up approaches and specifically to align policies, within HE education (universities and other providers) regionally, nationally and at an EU level (and even, arguably also internationally). When this is undertaken the results can be quite dramatic for all parties - the university, the students, the industry and the economy (local, national and regional – EU).

The exploration of the approach taken by Coventry University in relation to development and specifically of the BSc Aviation Management degree has clearly shown that, with the right approach to education and the delivery of ‘fit for purpose’ collaborative degrees, not only are the policy objectives of education able to be met but that wider strategies are also able to be realised. In this case, future-proofing the needs of aviation so as to recognise and meet the anticipated short fall of professionals required in the industry.

Aviation is a new industry in comparison to education with commercial flights traceable back to just over 100 years. The velocity of growth of the industry was arguably not predicted, and so, in defence of education, it is perhaps not surprising that it has been slow to respond through the establishment of ‘new, innovative and fit for purpose’ degrees. However, what should be noted, from a UK perspective at least, is that it is the ‘newer breed of university’, with a modern approach to HE, such as Coventry University, that has identified the market potential and has implemented corporate plans that show close alignment to external strategies, not just in relation to education advancements, but to regional development (both in terms of the UK and the EU). This has translated through into modern degrees that confront some of the previous criticism of non-responsive education and dysfunctional employment pedagogy.

*Flightpath 2050* recognised the importance of education in maintaining global leadership and serving society’s needs in the EU. It aligns to the overarching Europe 2020 strategy and specifically to the realms and needs of aviation. And as within the more expansive Europe 2020 strategy, innovation and collaboration are identified as key elements to be utilised in addressing the challenges faced by the industry. The significance of aviation within this strategy should not be forgotten, for it remains a catalyst for growth, therefore

it lies at the very heart of the Europe 2020 strategy. Universities are equally recognising that their original concept of tunnel vision education for the elite, and concentration on stem subjects has a limited place to play in satisfying new world needs. In the UK, new, modern universities are beginning to lead the way, certainly in satisfying the skills shortage identified in aviation. Unquestionably the success and innovation in specifically designed aviation degrees clearly emphasises that, for the EU to hold a prominent position in this globalised era, there needs to be more policy alignment of adjacent and interlinked areas. This significantly also recognises the value of increasing collaboration between education providers and related industries. Yet whilst the UE reinforced that the challenges faced by HE are similar across the EU, the approach to address such challenges has not always been so consistent amongst the 28 member states. Within the UK, and in respect to aviation, new partnerships are beginning to be formed and degrees have been developed which will aid to directly satisfy the shortfall of aviation professionals in the future. This will inevitably result in higher skilled human capital that ultimately will translate into economic growth and prosperity in the EU. However, Europe cannot afford to sit on its laurels, with clear challenges coming from global expansion it must positively seek to develop opportunities. It must learn from such successful targeted degrees, which embrace the alignment of policies, and importantly, it must not lose track of the fact that as society continues to evolve, so must HE continue to reform. And only then will the EU fly high among its competitors.

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## Notes

1. Report to the European Commission from the High Level Group on the Modernisation of Higher Education, *Improving the Quality of Teaching and Learning in Europe’s Higher Education Institutions*, June 2013
2. The former Yugoslav Republic of Macedonia, Iceland, Liechtenstein, Norway and Turkey.
3. One of the identified 5 key priority areas for HE reform (see Section 3 above).
4. A term accorded to the Universities referred to the ‘six ‘civic’ British universities

As accepted (subject to minor formatting/footnote changes)

which were founded in England. These six institutions are also the members of the Russell Group' (formed by 24 leading research institutions in the UK) World ranking University Guide.

5. For example: Lucerne University of Applied Science and Arts, School of Engineering and Architecture, Switzerland <https://www.hslu.ch/en/>; Université Paris 13 (Paris Nord), France, <http://www.univ-paris13.fr/en/>; UPT Universitat Politècnica de València, Spain, <http://www.upv.es>; TU Delft University of Technology, Netherlands, <http://www.tudelft.nl/en/>; Beuth University of Applied Sciences, Berlin, Germany, <http://www.beuth-hochschule.de>.

6. IUBH International University of Applied Sciences, Internationale Hochschule, Bonn, Germany, <http://www.iubh.de/en/>; Ozyegin University in Turkey, <http://www.ozyegin.edu.tr>; and Purdue University in the USA, <https://polytechnic.purdue.edu/degrees/aviation-management>.