European Commission

THE STATE OF UNIVERSITY-BUSINESS COOPERATION IN EUROPE

FINAL REPORT

Education, Youth, Sport and Culture

THE STATE OF UNIVERSITY-BUSINESS COOPERATION IN EUROPE

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EXECUTIVE SUMMARY

ABOUT THE REPORT

This report presents the findings of the project 'The State of University-Business Cooperation in Europe'. The project has been conducted during 2016 and 2017 by a consortium led by the Science-to-Business Marketing Research Centre, Germany for the DG Education and Culture, European Commission.

The aim of the project was to get a more profound, comprehensive and up to date understanding of the state of University-Business Cooperation (UBC) in Europe, from the perspective of both the higher education institutions (HEIs) and the business sector. The project explored the state of play of UBC in different countries, examining the form and extent of main drivers and barriers for the different stakeholders, regulatory frameworks and the type and extent of existing measures supporting UBC at a national level.

The main components of the project were a series of expert interviews with 23 recognised UBC experts, 52 good practise case studies, a major policy and indicator review as well as a major quantitative survey of stakeholders within both HEIs and business. The survey was translated into 25 languages and sent to all registered European HEIs (numbering over 3,000), and over 22,000 contacts (CEOs, managers responsible for UBC, innovation, recruitment and HR) in over 16,000 businesses in 33 countries during October-November 2016. Through this, a final sample population of 17,410 representatives from within HEIs (14,318 responses including 2,285 HEI Managers, 10,836 Academics and 1,197 Knowledge Transfer Professionals) and business (3,113 responses) was achieved making it the largest international study into cooperation between HEIs and business yet completed.

THE STATE OF UBC IN EUROPE

The results showed that, given the right circumstances, UBC can be a highly positive activity for all parties involved. Particularly, businesses are starting to realise the benefits of partnering or working with HEIs as a source of future-oriented innovation as well as talent development that can build a competitive advantage. Moreover, since the last study in 2010-11, there is evidence that HEIs are being increasingly seen as a source of talent, entrepreneurship and a lead player in regional development.

The majority of academics and businesses still do not engage in UBC, although the vast majority of HEIs do, to a certain extent. This limited engagement is reducing the labour market relevance of the study programmes, the employability of graduates and the impact of research.

Despite significant efforts by European national governments and the European Commission to broaden the engagement in UBC, there is a lack of awareness of how HEIs and business can cooperate and how these activities (inter)relate.

A total of 14 UBC activities were identified in the areas of research, education, valorisation[1] and management but the level of cooperation is low for most of these, providing many opportunities for improvement. Cooperation in research (particularly

cooperation in R&D) is the most developed activity followed by education (particularly student mobility); whilst valorisation and management activities are far less common.

UBC activities are correlated, meaning that once either an academic (as an individual) or business (as an organisation) cooperates in one activity, they are more likely to cooperate in others. As an example, an academic who cooperates with a business in research, is more likely to invite one of their business colleagues to give a guest lecture or supervise a thesis. Additionally, even a lack of cooperation with business does not mean that academics do not cooperate externally at all, because nearly 75% of the academics not cooperating with business, do cooperate with government or other societal actors.

As such, the study suggests that rather than perceiving UBC as a set of transactions and managing them in siloes, UBC should be viewed as mutually beneficial relationships with a broad set of potential cooperation activities, that may also include government and other societal actors.

In order to broaden the understanding of UBC and widen its development, governments (EU and national / regional), HEIs and businesses can:

	EC	Nat/Reg Gov.	HEI Mngt.	Business
Finance project consortiums that extend their cooperation activities beyond research into education, valorisation and management cooperation.	■	■		
Provide funding for longer term cooperation initiatives, which allows the stability for expertise to develop and relationships to mature.			■	■
Promote the benefits of UBC through guides, videos, roadmaps, e-courses, forums and workshops as well as media articles.	■	■	■	■
Create more opportunities for cooperation with employers in education including more practical programmes, both within and cross-faculty.		■	■	■
Create small 'packaged' opportunities to collaborate e.g. master-thesis supervision, student 'consulting' project with business, a joint paper around a common area of expertise, etc.			■	■
Provide support to the creation of new curricula, to redesign existing curricula or undertake ongoing modernisation of curricula at HEIs.		■	■	
Develop improved employment and recruitment pathways from higher education to employers.		■	■	■
Embrace the HEIs role in providing entrepreneurship education, creating entrepreneurial ventures and facilitating a regional entrepreneurship ecosystem.		■	■	

1 Valorisation activities relate to the commercialisation of knowledge emerging from a HEI such as 'commercialisation of R&D', 'academic entrepreneurship' and 'student entrepreneurship'. Management activities relate to illustrate a more strategic nature to cooperation between HEIs and business with the activities grouped into three categories: 'governance', 'shared resources' and 'industry support'.

UBC BARRIERS AND DRIVERS

All stakeholders are still facing barriers to UBC. Academics, HEI managers and businesses agree that lack of funding and resources is a barrier to cooperation. However, academics specifically name bureaucracy and the lack of work time as inhibitors, and business identify cultural differences with respect to time management and differing motivations as specific obstacles.

Whilst it is important to remove barriers preventing UBC, policy should focus on developing the drivers of UBC. Study results show that the removal of barriers does not necessarily trigger UBC. Instead, if there are sufficient drivers for cooperation, collaborators will find a way to cooperate. These UBC drivers consist of (i) motivators and (ii) facilitators.

Each stakeholder group has its own motivation for UBC: academics cooperate primarily to benefit their research, HEI managers have diverse reasons for wanting the university to engage including funding, graduate employability and the use of research in practice, and businesses are motivated by the outcomes for their innovation process (especially, to access future perspectives), potential access to talent, and the competitive advantage they could develop in collaboration with HEIs.

At the same time, mutual trust and commitment, common interest and goals facilitate cooperation for all stakeholder groups. People and relationships drive UBC in Europe.

Overall, a shift in thinking about UBC policies is required from a focus on barriers to drivers, and from facilitating transactions to establishing and nurturing relationships.

In order to improve personal relationships, governments, HEIs and businesses can:

	EC	Nat/Reg Gov.	HEI Mngt.	Business
Provide funding to develop relationships between HEIs and business at different stages of development by differentiating between shorter-term funding for 'starting up' new collaborations and longer-term funding for 'scaling up' proven collaborations.	■	■		
Develop opportunities for more frequent and extensive professional mobility which builds better cultural understanding on both sides.	■	■		
Create greater opportunities for academics and business people to develop trust and UBC experience through small funding opportunities, emphasise relationship-building exercises in projects and by drawing upon existing relationships as a source for connecting academics with business and employers.		■	■	■
Develop new mechanisms to develop contacts and relationships by:				
Creating a community or network of like-minded external collaboration-driven academics to facilitate meetings, networking events and matchmaking, to build an external collaboration culture within the HEI as well as an experience set for UBC.			■	■
Creating and promote events that encourage networking of academics with business people to help the development of relationships e.g. research pitching competitions, topic-related networking breakfasts etc.		■	■	■
European-level initiatives such as the University-Business Forums and Knowledge Alliances can serve as inspiration for similar activities on Regional or National level		■	■	■

In order to improve research outcomes from UBC, governments, HEIs and businesses can:

Develop mechanisms and processes for more effective conversion of cooperative projects into research outcomes which benefit academics and business including a clear definition of desired outputs at the start of the project as well as funding for the conversion of results into outcomes.	■	■	■	■

MECHANISMS SUPPORTING UBC

For both HEIs and businesses, UBC is a discretionary activity that is not necessarily natural for the protagonists. As such, appropriate mechanisms need to be put in place to encourage and support cooperation.

These supporting mechanisms should aim to help reduce or eliminate the largest barriers (e.g. bureaucracy), offer facilitators (e.g. common aims) and provide incentives (e.g. recognition) that reward HEIs and business to undertake the activity. This can include creating new or building on old policies, strategies, structures and activities.

A number of misalignments are found between those involved in UBC and the rewards they receive.

Both cooperating academics and businesses perceived they receive some of the lowest personal benefits from UBC compared to other stakeholders. Despite HEI managers naming 'funding' as both a major barrier and driver for cooperation, national funding for HEIs is still mostly based on student numbers and research outcomes.

A brief UBC policy review across Europe showed the large variety of policies that national governments use to support each of the UBC activities, highlighting many gaps and overlapping areas. Additionally, it shows the involvement of different ministries (research, innovation, education, employment, etc.) and agencies in different aspects of UBC policymaking, which could potentially create misaligned or even conflicting policies.

Whilst most HEIs include UBC in their mission and vision, this strategic commitment is often not reinforced by dedicated resources (e.g. a responsible high-level person, budget, personnel or facilities). HEIs need to make a greater and longer term commitment to UBC. Incentives for academics are the least developed UBC mechanisms, so this provides an immediate area of focus for policymakers.

Over a third of businesses commit to UBC as part of their strategy and they generally support this commitment with resources, a responsible executive and allocation of work time. Therefore, the major challenge is to get more businesses to recognise and understand the importance of UBC and how it can support their competitive advantage.

A greater commitment to UBC from government, HEIs and businesses in Europe is required to develop it, firstly ensuring that there are no barriers actually preventing UBC and put in place the fitting incentives for each stakeholder to engage in the activity.

In order to increase the strategic commitment to UBC, governments, HEIs and business should:

	EC	Nat/Reg Gov.	HEI Mngt.	Business
Ensure that both academics and business get greater benefits from their cooperation that contribute to both their short-term and long-term objectives, with focus on research / innovation outcomes.		■	■	■
Reward HEIs for undertaking UBC by linking part of their funding to their UBC activities and outcomes.		■	■	
Expand the benefits from cooperation beyond research to deliver more employable graduates, support better employment pathways, more streamlined valorisation of research results and management level cooperation.	■	■	■	
Prior to implementing UBC mechanisms, audit the environment to have clarity about which supporting mechanisms are already in place and what is needed.			■	■
Provide a clear UBC strategy and development policy which is aligned and included in the mission of the organisation.			■	■
Establish an executive-level position that is responsible for UBC and a person responsible for its execution.		■	■	■
Seek opportunities to remove barriers for UBC, which primarily relate to lack of funding and resources.	■	■	■	■
Seek ways to develop improved cross-cultural understanding between the academic and business environment.	■	■	■	■
Create external engagement offices, overseeing all external engagement activities, incl. alumni, graduate and technology transfer offices.		■	■	

CONTEXT IN WHICH UBC OCCURS

UBC is still a fragmented and indistinct field, and the understanding of UBC remains inadequate because most policies focus on specific parts of the system. UBC needs to be understood as an encompassing, overarching and interconnected ecosystem instead, which comprises individuals, organisations and regions. Each of these levels affect UBC and are therefore important to understand.

At the individual level, academics who cooperate perceive their own cooperation, their HEIs' and the region's UBC capabilities as superior to those who do not cooperate. The implication is that UBC needs people with the right skills, experience and environment to engage successfully. However, all of these aspects can be improved with the right interventions and policy mechanisms.

The recognition of HEIs as a central player of a knowledge-driven regional or national innovation system is increasing. This role includes supporting regional industry and creating growth and employment, which suggests a holistic set of regional interactions. However, HEI managers state that their knowledge of UBC and business can be improved as can their amount of external contacts.

Business are increasingly looking to a more open innovation process, which includes other business and HEI co-operators. Cooperating businesses perceive that they have higher organisational UBC capabilities than non-cooperating business, but both cohorts perceive the UBC capabilities of their region similarly. Most businesses cooperating with HEIs in R&D also cooperate with other businesses or have their own R&D capability.

Building UBC experience drives cooperation. Once academics and business cooperate, they tend to cooperate in multiple ways and at increasing levels. Those academics and businesses that cooperate are mostly willing to recommend research cooperation to their colleagues and 98% predict that they will collaborate at similar or higher levels in the future.

FACTORS AFFECTING UBC

At an individual and institutional level, a number of additional factors affect UBC positively or negatively, including:

I. **The 'university influence'** – The greater the number of years that an academic works at an HEI the less they tend to cooperate with business.

II. **The 'understanding effect'** – The greater the number of years that an academic works in business the more they tend to cooperate with business.

III. **The 'experience multiplier'** – The greater the number of years that an academic cooperates with business the more cooperation they undertake.

IV. **The 'faculty / industry' focus** – Whilst most faculties at HEIs and industries in the business world collaborate mostly in research, each has their own mix of UBC activities specific to them.

V. **The 'size effect'** – Larger HEIs and businesses tend to cooperate more, especially in UBC areas with a longer term payoff e.g. education and management.

VI. **The 'proximity effect'** – Most collaborating partners are in the same region (or at least country).

Considering the influence of these factors, the combined individual, institutional and regional strengths and weaknesses need to be considered to advance UBC and develop a UBC ecosystem. Policy should therefore focus on developing the UBC capabilities at an individual, organisational and regional level to develop a regional ecosystem that supports UBC.

In order to increase the UBC skills and experience of academics and business people, governments, HEIs and business can:

	EC	Gov.	HEI Mngt.	Business
Provide programmes that develop specific UBC knowledge and skills for both academics and business people. This can be done through buddy-programmes, workshops, e-courses, forums and promoting positive examples of successful UBC.		■	■	■
Employ 'boundary-spanners' or 'connectors who have a deep understanding of business and academia, to support transfer and exchange of knowledge.			■	■

In order to increase the recognition of UBC, governments, HEIs and business can:

Seek to increase the profile and reputation of UBC including national / regional prizes for excellence in UBC, empowering UBC champions or ambassadors, publishing stories on the university website and in newsletters.	■	■	■	■
Recognise, promote and regulate for a differentiated HEIs sector with different models of external engagement e.g. collaboration in high quality research, in education, entrepreneurship, lifelong learning, society etc.	■	■	■	■

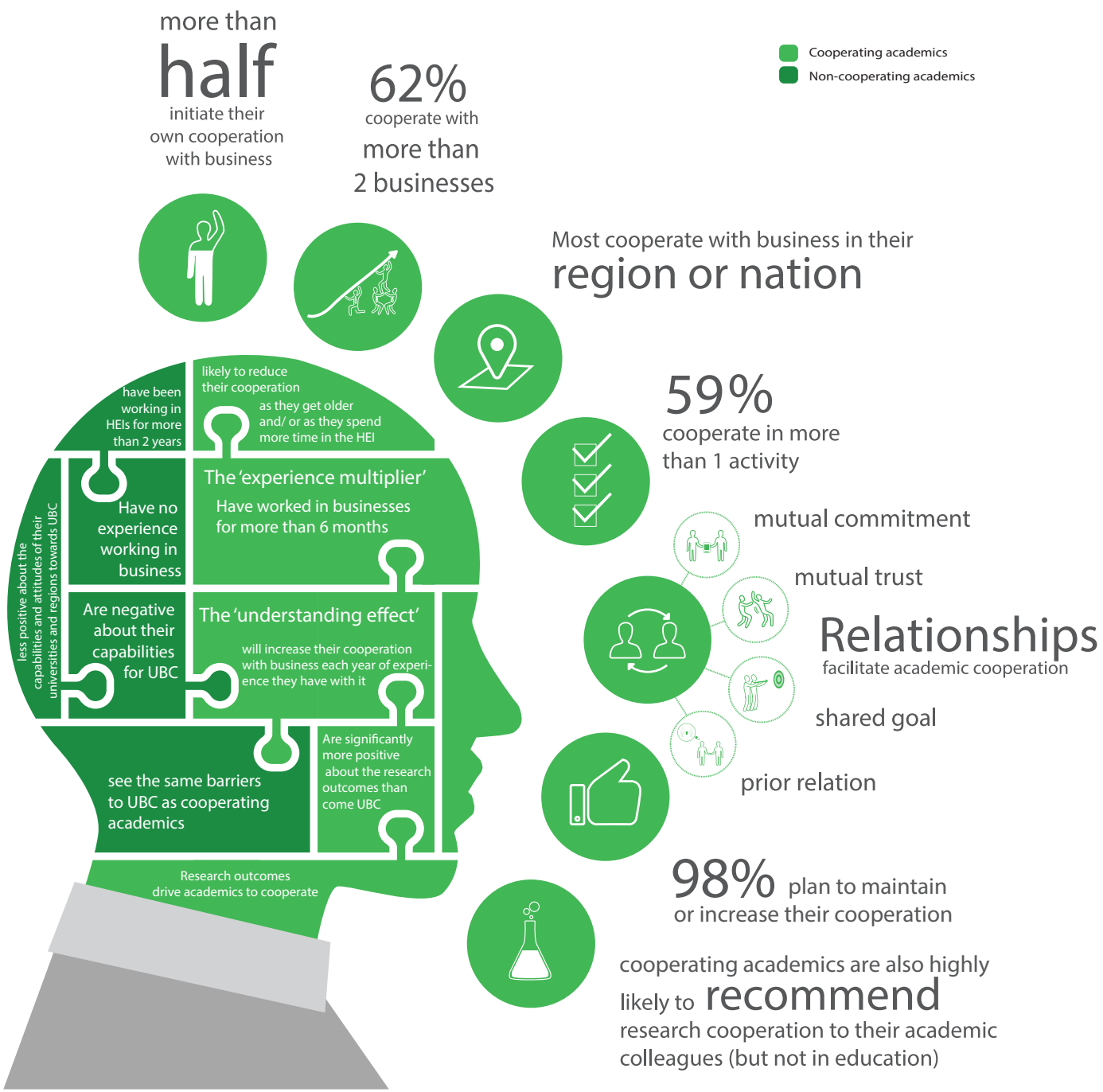
In order to increase the collaboration between HEIs and SMEs, governments can:

Reduce and simplify regulations for SMEs in their cooperation with HEIs to allow SMEs more flexible access to project consortiums and research and development results.	■	■	■
Offer SMEs and academic institutions incentives for initiating collaboration through devices such as research vouchers and support in their expectation management on both sides.	■	■	■

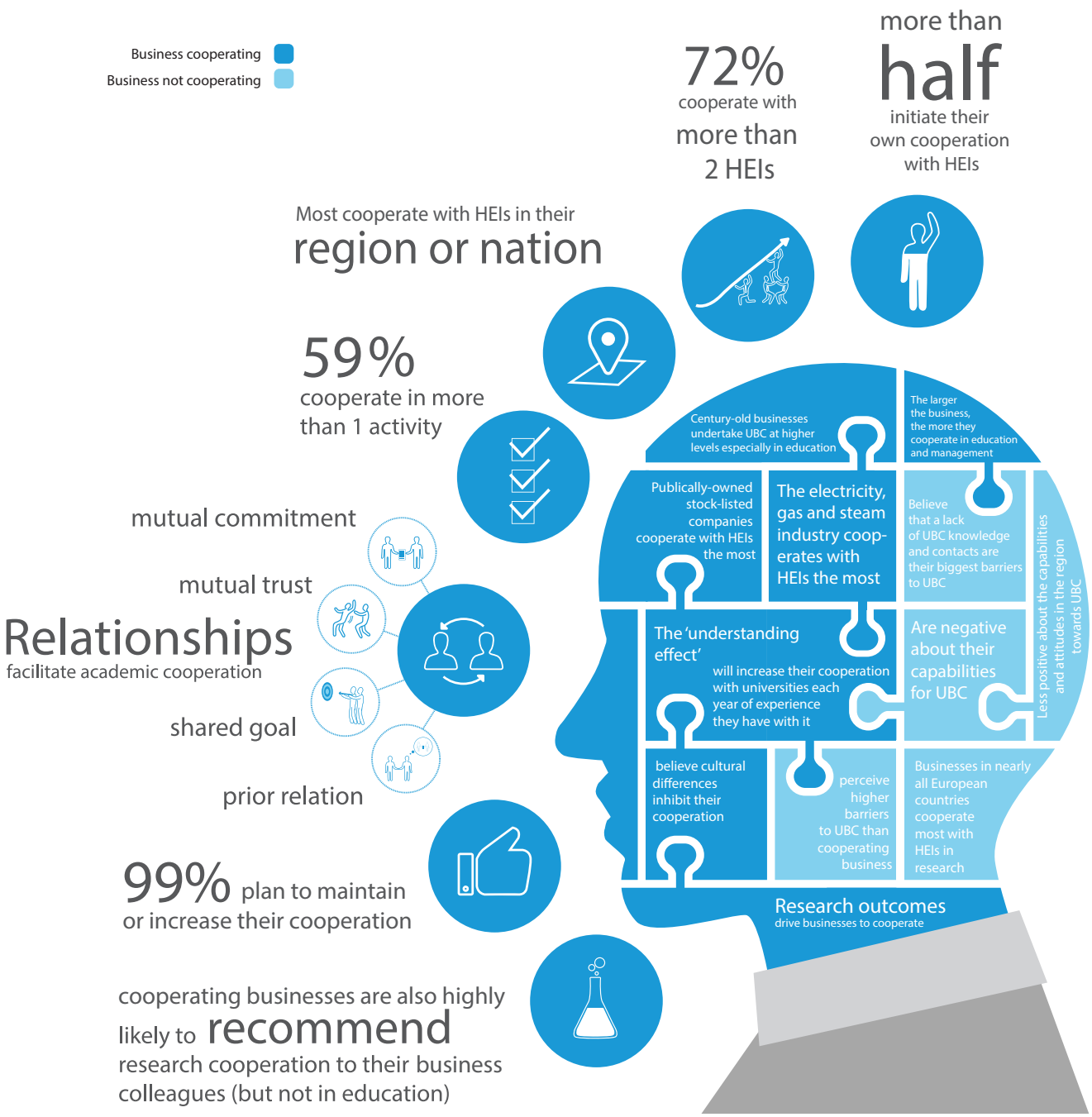
At the same time, SMEs could:

Join a collaborative regional and/or supply chain consortiums, allowing them to exchange knowledge, skills and technology with both large companies who can support knowledge translation and HEIs.	■
Include larger partners designated as 'anchor' partners committed to the life of the research and/or development project and combine this with other smaller players that have more feedback to come and go from the initiative.	■

PROFILE OF THE 'ACADEMIC COLLABORATOR'



PROFILE OF THE 'BUSINESS COLLABORATOR'



A VISION FOR UBC IN EUROPE

The State of UBC in Europe study presents a mixed picture. In order to increase the low levels of cooperation, UBC needs to focus on drivers rather than barriers, the mechanisms of UBC need to be developed and aligned and relationships need to be placed at the core of UBC. In short, UBC needs to be seen as an ecosystem that requires careful management. For UBC to institutionalise and increase its impact, there should be a concerted effort between governments at national and regional level, HEI and faculty boards, and business managers.

The study underlines the potential for UBC in Europe:

- UBC in education offers potential for better aligning curricula and the skills of graduates with the labour market, improving employment pathways for students, and recruitment for employers as well as lifelong learning programmes for business.
- For research, HEIs offer the greatest benefit to business as a partner for innovation with a longer-term horizon as well as shorter-term problem solving. Conversely, business offers HEIs insights, opportunities, data for high quality research and the ability to bring research into practice and create impact.
- Through valorisation, HEIs become part of a regional innovation system acting as a source of next generation innovations, high tech new companies and entrepreneurial talent for the value chains of industry.
- Cooperation in management, provides possibilities for improved regional and institutional governance, the sharing of facilities, equipment and other resources to better leverage strategic assets.

The potential exists for HEIs to act as an 'anchor tenant' on which their cities and regions can build competitiveness upon. In this scenario the campus acts as a platform or hub, a modern collaborative precinct, which brings together excellence in HEIs and business. UBC has the potential to increase the ability of the higher education system to keep pace with the rate of change in our societies in the areas of education and research, to create and develop talent as well as rise Europe's competitiveness in a globalised and rapidly changing world.

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ABBREVIATIONS

E&T	Education & Training
HEI	Higher Education Institution
KTP	Knowledge Transfer Professional
ICT	Information Communications Technology
IP	Intellectual Property
LLL	Lifelong Learning
R&D	Research and development
SME	Small and Medium-sized Enterprise
STEM	Science, Technology, Engineering and Mathematics
STI	Science, Technology and Innovation
UBC	University-Business Cooperation

CHAPTER 1

THE PROJECT: THE STATE OF UBC IN EUROPE

1.1 INTRODUCTION TO THE STATE OF UBC IN EUROPE STUDY

The **State of University-Business Cooperation** (UBC) **in Europe** study has been executed for the DG Education & Culture at the European Commission (EAC/10/2015) and ran from January 2016 until October 2017. It investigated UBC from the perspective of both university and business, seeking clarity on mechanisms supporting it; drivers and barriers affecting it and challenges facing it across Europe.

1.2 PROJECT AIMS AND ACTIVITIES

The aim of the project was to get a more profound, comprehensive and up to date understanding of the State of UBC in Europe, from the perspective of both the HEI[1] and the business sector[2] in order to provide policy conclusions and recommendations for improving UBC.

The major project activities included:

(i) an extensive literature review (internal document),
(ii) an analysis of 23 expert interviews with insights into UBC in Europe (internal document),
(iii) two major quantitative surveys representing both the HEI and business perspectives (the main results are presented in this report),
(iv) a compilation of 52 good practice case studies of UBC that highlight the state of the art (the case studies can be accessed at www.ub-cooperation.eu/index/casestudies). They are published as: The State of University-Business Cooperation in Europe: 52 Good Practice Case Studies,
(v) a review of policy instruments applied at national level (internal document),
(vi) a review of indicators that measure UBC and a proposal of possible scenarios for the implementations of UBC monitoring in Europe (internal document),
(vii) project dissemination activities, such as 11 keynote presentations, 5 workshops, 40+ blog articles, 2 magazine special issue, 4 case study videos, 6 newsletters, 40,000+ visitors to ub-cooperation.eu

1.3 PROJECT CONSORTIUM

The project consortium was led by the Science-to-Business Marketing Research Centre, Germany, with the partner organisations including:

- Technopolis Group Limited, United Kingdom
- Ingenio (joint research centre Spanish National Research Council and Polytechnic University of Valencia), Spain
- University of Ljubljana, Slovenia
- The Centre for Science & Technology Studies, Leiden University, Belgium
- University Industry Innovation Network (UIIN)

1 HEIs are defined as all types of institutions, which provide higher education and are the source of new knowledge and technology. These institutions are formally recognised by the relevant national/regional authority and include: universities, universities of applied sciences, polytechnics /technical universities, colleges and tertiary schools.

2 Business is considered in a broad sense in the study to include: privately and publicly owned organisations, non-government organisations and not-for-profit organisations.

- The Association of European Chambers of Commerce and Industry (Eurochambres)
- European Association of Institutions in Higher Education (EURASHE)

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Hungary	University of Szeged
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Latvia	Technopolis Group Latvia
Liechtenstein	Liechtenstein University
Lithuania	Technopolis Group Lithuania
Luxembourg	University of Luxembourg
Macedonia	Ss.Cyril and Methodius University in Skopje
Malta	Malta Business Bureau
Netherlands	VU University / Hogeschool van Amsterdam
Norway	Stavanger University
Poland	Krakow University of Economics
Portugal	TechMinho
Romania	The Babes-Bolyai University
Slovakia	Slovak University of Agriculture in Nitra / Comenius University in Bratislava
Slovenia	University of Ljubljana
Spain	Ingenio
Sweden	Linkoping University
Turkey	USIMP / Ege University Technology Transfer Office - EBILTEM-TTO
United Kingdom	Technopolis Group UK

Diagram: The project consortium

1.4 METHODOLOGY

1.4.1 Triangulation approach

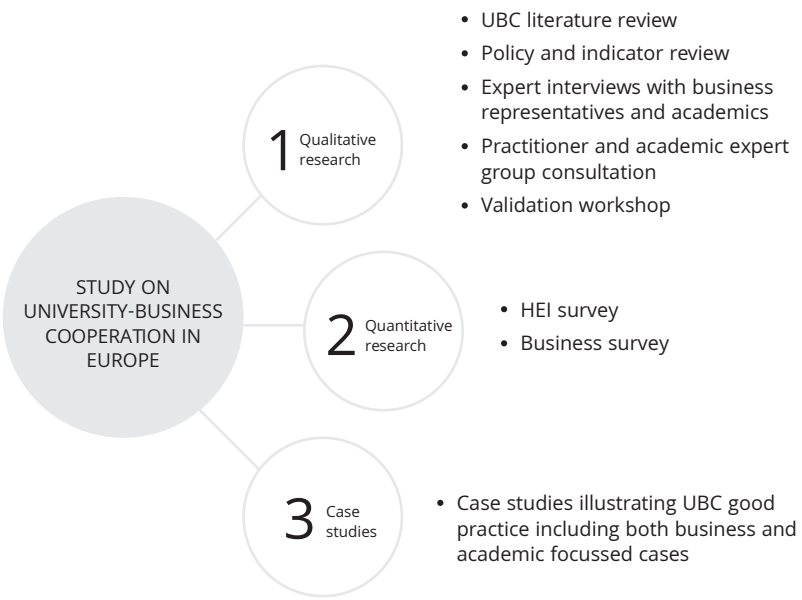


Figure 1: Triangulation research method applied to this project

The project applied a triangulation method to provide more robust and reliable results. This includes qualitative research, quantitative research and case studies to investigate the phenomenon of UBC in Europe.

The qualitative research started with an extensive literature review (both scientific literature and governmental reports) on the topic of UBC, providing a solid theoretical basis and incorporating the latest findings on the interaction of HEIs and the private and public sector. At the same time, reviews of the main policy initiatives at national level in the 33 countries and the main indicators to measure any aspect of UBC were undertaken.

These reviews provided a framework for the semi-structured interviews with UBC experts that were analysed qualitatively. With the results of the qualitative research, and based on the 2010-2011 UBC survey, two quantitative surveys were designed. This design received multiple rounds of input from the project expert group and was subsequently validated in a workshop with members of the expert group, project team and the European Commission.

Based on the previous qualitative work, and the quantitative survey conducted by the Science-to-Business Marketing Research Centre in 2010-2011, the consortium developed an online quantitative survey with three different versions for (1) HEI representatives (HEI managers and knowledge transfer professionals), (2) academics and (3) business representatives (CEOs, managers responsible for UBC, innovation, recruitment and human resources). These surveys were translated into 25 languages (Bulgarian, Croatian, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Italian, Latvian, Lithuanian, Macedonian, Norwegian, Polish, Portuguese, Romanian, Slovak, Slovenian, Spanish, Swedish, Turkish) covering the majority of Europe's languages. Subsequently, the survey was sent to all European HEIs (3,616) and to over 22,000 contacts from business in 33 countries from 28th September till 27th November 2016.

Additionally, 52 case studies were created to illustrate particular examples of good practice in UBC including cases focusing on both business and academics and cases depicting different UBC activities in different countries. The cases and key insights from the cases are gathered together in an individual publication and each of the cases can be accessed at www.ub-cooperation.eu/index/casestudies.

1.4.2 Quantitative data handling

During the data collection stage, a total of 25,402 responses were received from HEIs and business combined. To allow for data analysis, the data was cleansed removing incomplete responses that could not be analysed as well as responses that were not possible (e.g. a future date for the year of foundation of their institution). This resulted in a total of 17,410 responses including 14,318 from HEIs and 3,113 from business.

An analysis on the demography of the HEI respondents, showed that respondents are representative in respect to age (both of academics and institutions) and gender when compared with available Eurostat data on the European higher education sector.

In areas where an overrepresentation or underrepresentation existed, a weighting system was utilised. The weighting system for the three target groups was applied in the following way:

1. HEI representatives – the responses from HEI representatives were weighted using Webometrics data from 2016 based upon the number of responses per country,
2. Academics – the responses from academics were weighted using the latest Eurostat data from 2014 based on the number of European academic staff per country.
3. Business – the responses from business were weighted using Eurostat data of 2014 based on the number of business entities per country as well as the representation of large, medium, small and micro enterprises.

The data was analysed using IBM's SPSS software, primarily using descriptive analysis methods such as frequencies, descriptive and comparative means tests. Factor analyses and reliability analyses were performed to enhance the understanding of the results for more complex analysis within the study. The data was, where appropriate and feasible, compared to the results of the 2010-2011 State of University-Business Cooperation in Europe study conducted by the Science-to-Business Marketing Research Centre.

1.4.3 Work packages

The project objectives were executed through a number of coordinated and integrated work-packages:

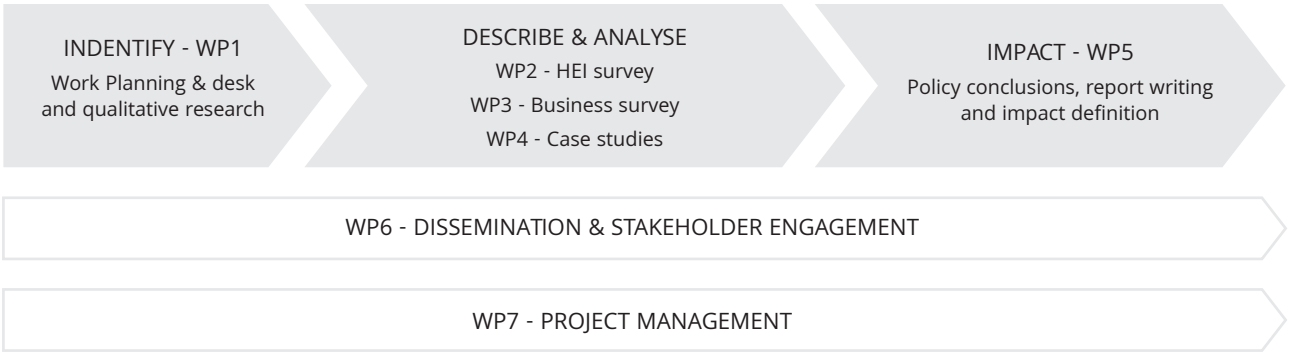


Figure 2: Basic project methodology

1.4.3 Target group and geographical area covered

The project describes and analyses the current state of development of UBC in the countries covered by the Erasmus+ programme: the 28 EU Member States, plus Former Yugoslav Republic of Macedonia, Iceland, Liechtenstein, Norway and Turkey.

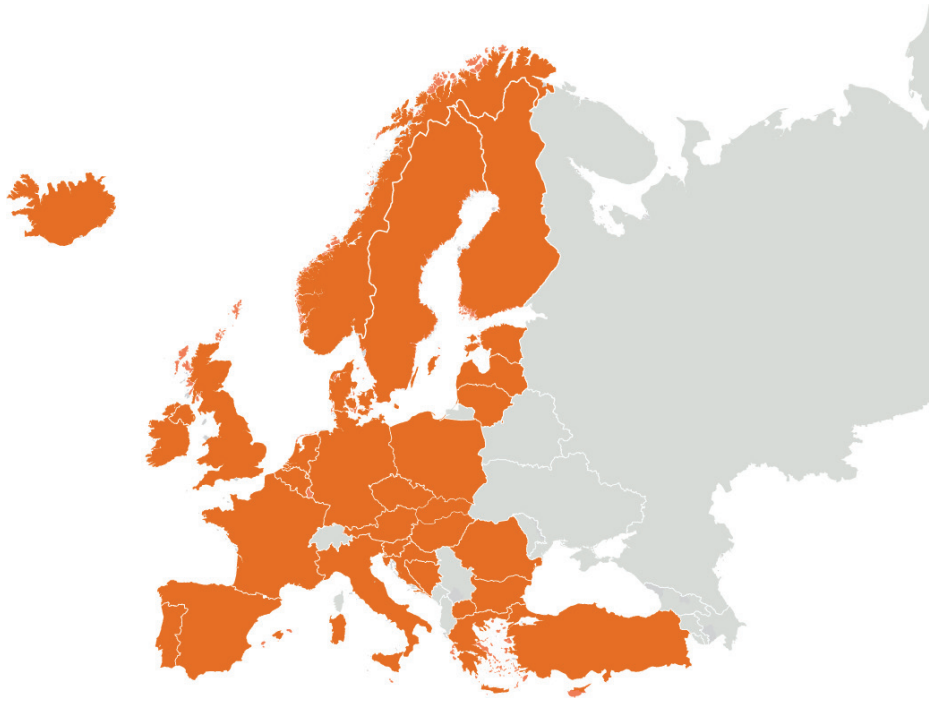


Figure 3: Project area of study

1.4.4 Conceptual framework for the study

A model for UBC from the HEI perspective was originally developed by Todd Davey, Thomas Baaken, Victoria Galan-Muros and Arno Meerman from the Science-to-Business Marketing Research Centre and first used in the State of UBC in Europe Report published in 2011. The framework helped to better organise the project results, tied together the respective project activities, providing a common thread for reporting results and making recommendations. This UBC Ecosystem Framework possesses a number of interrelated elements including the process of undertaking UBC, factors that are influencing UBC, mechanisms supporting UBC and finally the context in which UBC occurs.

In the subsequent years, the framework has been further developed, considering the advance in the state of the literature and practice and the current trends. New elements, sub-elements and relationships have been included, and the current version of the framework, the UBC Ecosystem Framework is published in a scientific journal, as Galan-Muros, V.; Davey, T. (2017) The UBC Ecosystem: Putting together a comprehensive framework for university-business cooperation. Journal of Technology Transfer. DOI: 10.1007/s10961-017-9562-3. This UBC Ecosystem, where both HEIs and businesses interact, contains a series of related elements and the most relevant ones are:

1. UBC process – which includes:
    a. Inputs – resources utilised to undertake UBC activities.
    b. UBC activities – 14 types of UBC actions undertaken to bring about the intended outcomes in the education, research, valorisation and management areas.
    c. UBC Results:
        i. Outputs – products, services or other properties that are delivered as a direct result of the UBC activities.
        ii. Outcomes – results that flow from the UBC outputs and directly affect stakeholders.
        iii. Impacts – social, economic, civic and/or regional consequences or changes resulting from the UBC outcomes, intended or unintended.

2. Influencing factors – factors that can have an effect on UBC and can be modified in the short/medium term classified as barriers, motivators or facilitators, depending on whether they are positive or negative by nature.
3. Supporting mechanisms – interventions in the form of strategic, structural, operational and policy mechanisms that support UBC.
4. Context – Individual, organisational and environmental characteristics that can have a positive or negative influence on UBC and cannot be changed in the medium term.

Each of these elements exist for both HEIs and business. The framework also shows the complex interrelationship and co-reliance among these elements within the UBC Ecosystem and provides a basis of understanding for UBC. This project framework ties together the respective project activities, providing a common thread for reporting results and making recommendations. The following figure represents the current UBC Ecosystem Framework.

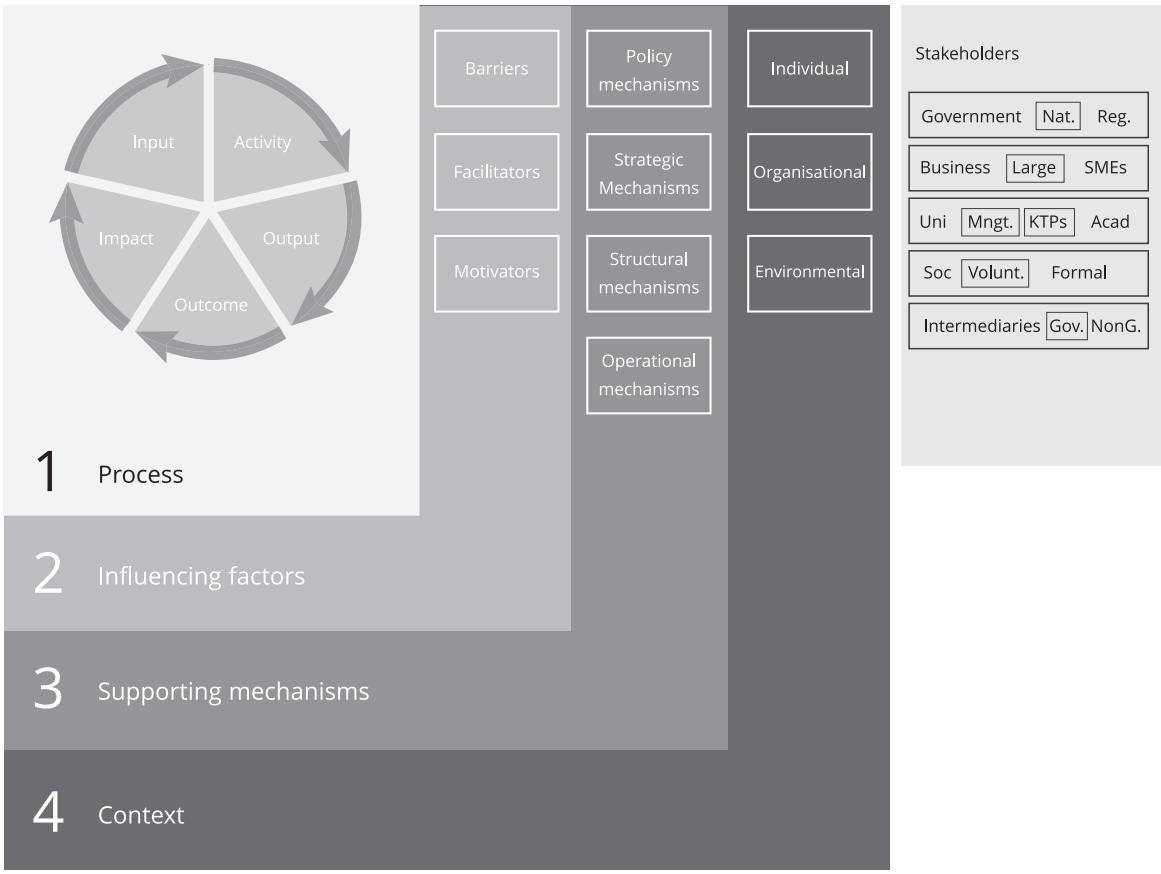


Figure 4: UBC Ecosystem Framework

Source: Galan-Muros, V.; Davey, T. (2017) The UBC Ecosystem: Putting together a comprehensive framework for university-business cooperation. Journal of Technology Transfer. https://doi.org/10.1007/s10961-017-9562-3, adapted from Davey, Baaken, Galan-Muros and Meerman (2011)

1.5 HOW TO READ THE REPORT

The following information provides instructions for the comprehension of the results.

1.5.1 Who answered the survey

Questions were posed to three groups of respondents in total, with two respondent groups within HEIs and one within business. These groups were asked about their perception of UBC from a given perspective:

1. Individual academics were asked to respond on behalf of their own cooperation with business (Individual level). Two different types of academics were analysed:

   I. Academics cooperating with business
   ii. Academic not cooperating with business

2. HEIs representatives (HEI managers and knowledge transfer professionals working within the HEI) were asked to respond on behalf of their HEI (Institutional level)

3. Business representatives were asked to respond on behalf of their business (Institutional level). Two different types of businesses were analysed:

   I. Businesses cooperating with HEIs
   II. Businesses not cooperating with HEIs

Colour coding

Colour codes have been used though the report to identify those results received from the academic (green) and those results received from the HEI (orange).

COLOR	INSTITUTION	STAKEHOLDER GROUP	ANSWERING ON BEHALF OF
	Higher Education Institution	Academic cooperating with business	Themselves
		Academic not cooperating with business	Themselves
		HEI manager / knowledge transfer professional	Their HEI
	Business	Business manager of a business cooperating with HEIs	Their business
		Business manager of a business not cooperating with HEIs	Their business

1.5.2 Text boxes throughout the report

CASE STUDIES RESULTS

Content found in a box like this includes relevant information from the case study analysis carried out as part of the entire study.

Comments and findings from experts

Content found in a box like this portrays comments relevant to the section from the qualitative interviews with experts/practitioners in UBC in Europe.

1.6 REPORT STRUCTURE

The next sections of the report are structured following the main elements of the UBC Ecosystem Framework. For each of these elements, insights from all the deliverables are brought together.

REPORT SECTIONS	SOURCE OF INSIGHT FOR EACH SECTION
2. Introduction	- Literature review
3. Development of UBC activities 4. Results from UBC 5. Factors that influence UBC 6. Mechanisms that support UBC 7. Context around UBC 8. Recommendations	- Literature review - Quantitative survey - Qualitative expert interviews - Case studies - Policy mapping - Indicators review

Table 1: Report structure

CHAPTER 2

INTRODUCTION TO UBC

2.1 IMPORTANCE OF UBC

UBC is understood as any sort of interaction between HEIs and business for mutual benefit (Davey et al., 2011) and is considered an essential driver of knowledge-based economies and societies. This means that UBC not only helps individual organisations to address some of their most pressing challenges, such as the need of funding and innovation, but it can also have a significant impact upon the regional economy in which they operate.

UBC is increasing in intensity in Europe. This is supported by an upsurge in public policy support for UBC as governments at all levels have also increased their support to UBC in order to tackle social issues. In the case of Europe, initiatives such as Europe 2020 or the higher education modernisation agenda show the need to create a more connected relationship between government, business and HEIs in order to increase employment, productivity and social cohesion.

Particularly, Galan-Muros (2016) identified a number of organisational and societal factors that are driving a greater need for cooperation and integration of university and business in Europe. The most prominent include:

WHY CARE ABOUT UBC?

- UBC can address organisational problems for HEIs, such as decreasing funding.
- UBC can address organisational problems for businesses, such as low levels of innovation and the need for skilled human capital.
- UBC can address social and economic issues currently faced by European countries, such as high unemployment rates, lack of competitiveness, ongoing economic and social problems or increased competition.
- UBC is considered to be the engine towards knowledge-based societies and economies. EU funding schemes such as Horizon 2020 embrace the need to create a more connected relationship between government, business and HEIs.

2.1.1 Decreasing levels of funding for HEIs

European HEIs are encouraged to be more efficient, competitive and connected due to the lower amount of direct public funding and the higher amount of competitive funding (OECD, 2012).

UBC helps HEIs to diversify their funding sources and increase their funding base, either attracting business funding (Wood, 2011), applying the HEI research (Lee, 2011), offering lifelong learning programmes (Caniels and van den Bosch, 2011) or applying to a governmental programme exclusively targeting collaborative projects with industry (European Commission, 2010).

Successful examples, like Chalmers University of Technology (Jacob, Lundqvist, and Hellsmark, 2003) or University Twente in the Netherlands, show how UBC can change the funding stream for HEIs, increasing their independence from governments and their responsiveness.

2.1.2 Low levels of innovation in most business

Innovation is essential in today's market, but most businesses lack the financial and human resources to undertake innovation in a systematic way, particularly SMEs. UBC can offer them access to new knowledge, technologies, methods, processes

and talent (OECD, 2014) to gain and maintain their competitive advantage (Tresserras, MacGregor, and Espinach, 2005).

2.1.3 High rates of unemployment (specially youth unemployment)

After the economic and financial crisis, high unemployment rates, particularly youth unemployment, remain an issue in some European markets (Eurostat, 2016). Perhaps UBC's greatest contribution to employment is in its role of developing improved skills and competencies, and consequently better job prospects for students (Dutrenit, De Fuentes, and Torres, 2010).

UBC helps to counter the problem of graduates' knowledge and skills not being adapted to market needs, and in particular their lack of entrepreneurial thinking and acting (Herrmann, 2008). UBC can help education to meet the demands of the labour market providing more relevant knowledge and skills to graduates (Razvan and Dainora, 2009), which increases their employability as well as upskilling business employees through training and lifelong learning activities.

2.1.4 Lack of competitiveness of many regions and need to create regional innovation ecosystems

Many European regions have reinvented themselves to remain competitive (OECD, 2014). Governments seek more innovative and efficient ways to connect science, talent, technologies and markets, with HEIs as key stakeholders (Dowling, 2015). A connected and efficient regional innovation ecosystem is mostly guided by the Science, Technology and Innovation (STI) policy mix. UBC is a core part of policies that link the Triple Helix actors[3] to create synergies and value and contributing to the economic development on regional or national level (Drucker and Goldstein, 2007; OECD, 2014).

Therefore, some of the results attributed to successful UBC for the different stakeholders include:

- Improving the skills (Gibb and Hannon, 2006; Razvan and Dainora, 2009; Storm, 2008) and future job prospects of students (Bozeman and Boardman, 2013; Drucker and Goldstein, 2007; Dutrenit, De Fuentes, and Torres, 2010; Van der Sijde, 2012).
- Increase the number and impact of publications for academics (Jones and Clulow, 2012; Abramo et al., 2009; Beaver, 2004; Zucker and Darby, 1996) together with the opportunity to apply their research in practice (Ginzburg and Houli, 2013).
- Increasing the relevance and innovativeness of research in the HEI (Debackere and Veugelers, 2005) and the employability of HEI graduates (Bozeman and Boardman, 2013; Van der Sijde 2012; Dutrenit et al., 2010; Lamichhane and Nath Sharma, 2010; Maggiora, 2008), thus making the HEI more attractive for potential talented students and researchers.
- Improving innovation and competitiveness for business (Tresseras et al., 2005; Tucker 2002).
- Creation of jobs, stimulating social and economic growth, increasing living standards and reducing hindrances to good living are the main results for governments and the society as a whole (Davey et al., 2011; Drucker and Goldstein, 2007; The Library House, 2006; Chatterton and Goddard, 2000).

3 The concept triple helix of university, business and government was first mentioned by Etzkowitz and Leydesdorff (1995) as the predominant way to foster innovation and economic progress

2.2 NEED FOR A STUDY OF UBC

Due to the justified importance of UBC for all stakeholders involved, individually and organisationally, along with its key contribution to tackling essential challenges in society, UBC is receiving greater support in terms of human resources, infrastructure investments and funds invested, and consequently an increasing desire to justify past and future investments. Therefore, the practice of UBC is expected to grow in the future and this project aims to contribute to that growth increasing the understanding of the current state of the UBC in Europe.

The importance of UBC, and thus the importance of undertaking a study on the topic, lies in the fact that UBC helps to tackle some very relevant organisational and societal problems in European countries. However, UBC is still a fragmented and indistinct field of research, and the understanding of UBC remains inadequate since most research is undertaken around specific elements, rather than as an encompassing, overarching and interconnected system. Furthermore, its practical and scientific development remains a major challenge for managers, policy makers and researchers (Galan-Muros, 2016).

Some of the specific reasons why a study in UBC is needed are as follows:

- A holistic view of UBC in Europe is required – Few studies focus directly on the full breadth of UBC activities, instead there is a focus on those UBC activities offering more direct, measurable and promotable benefits (Davey et al., 2011a) such as R&D cooperation and commercialisation of R&D (Hughes, 2006). Additionally, still not much is known about the diversity of UBC activities within the European context. This study aims to deepen the knowledge established in the Study on the State of University-Business Cooperation in Europe 2010-11 (www.ub-cooperation.eu/pdf/final_report.pdf) and to benchmark the UBC development in HEIs in 2016-2017 against the previous data, adding relevant emerging UBC activities.
- Both the business and HEI perspectives on UBC should be incorporated – There is little knowledge about the extent of cooperation between HEI and business actors across Europe from the perspective of business. This study provides a historical first major insight into the perspective of European business on UBC compared with the HEI one. In doing so, it will provide a clear picture of the extent of UBC in Europe and a better understanding of how UBC can be fostered, promoted and strengthened from the business perspective. Special attention is required for SMEs, since they constitute over 95% of European companies and face the greatest difficulties in engaging in UBC.
- Greater understanding of the national UBC ecosystem is required – Very little is known about the national initiatives that support the development of UBC, how the socio-economic conditions and regulatory framework conditions in the countries affect UBC. Very few empirical studies have generated necessary insights into the extent of available mechanisms supporting UBC or how regional systems and institutional cultures support UBC activity. This is in spite of substantial evidence of their roles.
- The existence and use of UBC monitoring and measurement indicators should be colleced – UBC is measured and monitored in a large variety of ways, collecting a wide range of diverse relevant data. Current approaches are disjointed and sometimes initiative specific and there is lack of research on the different indicators that have been created in Europe to measure the different UBC activities. By bringing all of the indicators together, this study can contribute towards the future development of an appropriate European wide monitoring system.

2.3 EUROPEAN POLICY RELATED TO UBC

With Europe threatened by increased global competition, ongoing economic and financial issues and regions with high levels of unemployment, there is an urgent need to create a more sustainable, adaptable and responsive European market. In the last decade, UBC has been a strong policy priority for the European Commission, referenced consistently in Commission communications and supported through numerous initiatives. UBC is a driver and a connector that links different policy areas: innovation, higher education, enterprise, entrepreneurship, social development, globalisation and economic recovery among

others. As a consequence of its importance across many policy areas, UBC is supported strongly by many different DGs of the European Commission including DG EAC, DG GROW, DG REGIO and DG RTD. A common thread, which runs through the policy agenda, is the importance of UBC to support jobs and growth in Europe, providing an array of benefits for HEIs, students, business and society alike.

2.3.1 The starting point for UBC in European policy

Historically, the first Communication on the Modernisation Agenda was published in 2006 'Delivering on the Modernisation Agenda for Universities: Education, Research and Innovation' (European Commission, 2006), and highlighted the key role HEIs play in Europe's future. Alongside the Bologna reform process, the modernisation agenda called for the restructuring and modernisation of HEIs, with a particular focus on the knowledge triangle of education, research and innovation. Without a fundamental change to the state of higher education and research, Europe could lose out in global competition. This moved HEIs centre stage in relation to their potential to 'underpin Europe's drive for more growth and more jobs' (European Commission, 2006). With a call for more autonomy, accountability, structured partnerships with businesses and a need to provide the right mix of skills and competencies for the labour market, the European Commission positioned itself as a central player in supporting Member States to invest in improving UBC and encouraging the changes needed, through policy dialogue, mutual learning and financial support.

2.3.2 The establishment of the University-Business Forum

One of the most significant EC-level responses to supporting dialogue for UBC was the establishment of the European University-Business Forum (UB-Forum) in 2008. The Forum was set up to support the academic and business communities, who called for 'regular and sustainable dialogue, exchange, sharing and learning'. The UB-Forums facilitate this through exchange of good practices and networking, also giving time for new ideas and recommendations to emerge from the debates, which in turn inspire further activities in the EU Member States. The UB-Forums so far have identified a number of activities that are responding to the need of higher education to extend its role in the knowledge economy through working with business at all levels (research, education and innovation). This has proven to be much more than a talk-fest and has delivered input into a number of new initiatives going forward.

The forums have led to a number of initiatives to address particular issues associated with UBC in the European context, including: 'HEInnovate' a joint EC/OECD Guiding Framework for Entrepreneurial Universities, 'The State of University-Business Cooperation in Europe' a study commissioned by DG EAC in 2010 designed to overcome the lack of information on a European level in respect to UBC (preceding this current study), and the Knowledge Alliances, structured partnerships bringing together businesses and HEIs to stimulate innovation in, and through, higher education.

Since its inception in 2008, more than 20 University-Business Forums have been convened. Consisting of main Forums in Brussels and other Thematic Forums held across the Member States, reflecting a variety of themes, which are of interest at the national and international level.

The Forum themes have reflected global, European and national trends in relation to higher education and its role in the knowledge economy and innovation. The Forums attract interest from all over Europe, and beyond, attracting high-level representatives who are engaged or influence the university and business world, from projects, initiatives, European and international organisations, associations, public bodies and authorities.

2.3.3 The Lisbon Strategy and the European Institute of Innovation and Technology

Over the same period, the Lisbon Strategy (2005-2010) was the guiding framework for supporting growth and jobs. It set out the plans for the establishment of the European Institute of Innovation and Technology (EIT) the first significant investment

from the EU to integrate the three sides of the so-called Knowledge Triangle (higher education, research and innovation). The first three Knowledge and Innovation Communities (KICs) were designated in December, 2009. The HEIs participating in the KICs developed Master and PhD programmes and other KIC education activities, to equip students, researchers and teachers with skills for creativity, risk taking and entrepreneurial capacity. The EIT KICs offer EIT-labelled degrees, which are characterised by entrepreneurial education and highly integrated learning-by-doing.

The EIT since 2014 has been part of Horizon 2020, although it remains under the responsibility of DG Education and Culture. This is both historical and also significant as it provides a clear signal of the importance of education in the pursuit of innovation and as a key component of the research, entrepreneurship/education and innovation nexus. The EIT is breaking down the traditional silos witnessed in HEIs in relation to research, education, business and innovation. There are now six KICs established, with a total proposed budget of EUR 2.7 billion of the EUR 80 billion of Horizon 2020.

2.3.4 Education and Training 2020 and Europe 2020 – partnerships for smart sustainable and inclusive growth

In 2009, the Strategic Framework for European cooperation in education and training ('ET 2020') was drawn up. ET2020 included the need to enhance creativity and innovation, including entrepreneurship, at all levels of education and training, stating 'the acquisition of transversal competences by all citizens should be promoted and the functioning of the knowledge triangle (education-research-innovation) should be ensured. Partnerships between enterprises and educational institutions as well as broader learning communities with civil society and other stakeholders should be promoted.'

This was just before the time of the severe financial crisis, and in response the strategy for smart, sustainable and inclusive growth: Europe 2020 (European Commission, 2010a) came into play in 2010. Europe 2020 has education, training and youth at one of its priorities. Together with research, innovation and the digital society these issues form the Smart Growth pillar of the initiative. Smart Growth directly refers to effective investments in education, research and innovation and to more operational use of digital advances for improving EU's performance. ET2020 continues to support and make a major contribution to achieving Europe 2020's objectives, in particular through recognising the need to reflect on and adjust its working priorities, tools and governance structures on a regular basis. Another important part of the overarching Europe 2020 strategy, which supports UBC, was the European Commission's Agenda for New Skills and Jobs (European Commission, 2010) This agenda identified, among other things, the value of ventures and networks between business and higher educational establishments to address new skill requirements and labour market needs, again reflecting the significant importance of UBC in supporting core European policy priorities.

2.3.5 Updating European higher education priorities to reflect the Europe 2020 targets

An update of the Communication on the Modernisation of Higher Education was published in 2011 'Supporting growth and jobs – an agenda for the modernisation of Europe's higher education systems' (European Commission, 2011), which describes how public and private employers, including those in research intensive sectors, increasingly report mismatches and difficulties in finding the right people for their evolving needs. This integrated the targets of Europe 2020, and in line with the ET2020 strategy, set out five key priorities for higher education in the EU: (i) increasing the number of higher education graduates, (ii) improving the quality and relevance of teaching and learning, (iii) promoting mobility of students and staff and cross-border cooperation, (iv) strengthening the 'knowledge triangle', linking education, research, and innovation, and (v) creating effective governance and funding mechanisms for higher education.

2.3.6 The Knowledge Alliances and HEInnovate (contributions of UB-Forums)

In 2011, the University-Business Forum was instrumental in the decision for the European Parliament to support pilot actions on Knowledge Alliances, structured partnerships between HEIs and the business community to stimulate innovation in, and through, higher education. The importance has been illustrated by the significant interest generated in the target community, which resulted in the initiative being scaled up and made part of the Lifelong Learning Programme in 2013 and as part of Erasmus+ from 2014. The main Forum in 2011 also sowed the seeds for the development of HEInnovate (www.heinnovate.eu), a self-assessment tool for HEIs wishing to explore their entrepreneurial and innovative potential. As HEIs respond to social and economic needs of society, there are many different issues to address. HEInnovate provides a tool which can be used by HEIs to create the right environment for discussion and debate around these challenges and to determine future actions to facilitate the necessary change. One area of the HEInnovate self-assessment tool explores statements on the way in which HEIs relate to their external environment for knowledge exchange.

2.3.7 The use of diverse European funds to support partnership between HEIs and business

In 2013, the High Level Group on the Modernisation of Higher Education further developed the thinking on UBC as a core element of the EU's Agenda for the Modernisation of Higher Education. The high level group recommended that Member States, in partnership with the regions, 'prioritise in their Partnership Agreements under the Structural Funds, initiatives to support the development of pedagogical skills, the design and implementation of programmes relevant to social and labour market needs, and the strengthening of partnerships between higher education, business and the research sector'. This signalled, again, the continued commitment to stimulating UBC through a range of European funding opportunities. The new operational programmes are currently being published and approved, many of which intend to inspire regions to commit to such activities.

2.3.8 The need for continued efforts to understand UBC as a driver for social and economic growth

UBC has therefore maintained its position as a key driver of social and economic growth, being present in the political priorities of the EC for a decade. However, it remains underexploited, the mechanisms are still not fully understood and formulated and its potential for impact is difficult to quantify. The UB-Forums have provided important opportunities for raising and debating the issues of UBC and in the last 3 years of the Forums, there have been some important trends which highlight the direction of debate in this area. These include joint responsibility for the development of talent and skills; the role of the HEI and business in the development of regional ecosystems; inter-sectoral and interdisciplinary approaches to teaching and learning; measuring the impact of UBC and incentives and reward mechanisms for collaborative activities

2.3.9 Fragmentation of regional and national initiatives supporting UBC

Effective European approaches to UBC might be limited by the fact that each European nation and region has its own UBC policies and initiatives (Geuna and Nesta, 2006). This can be one of the causes of the substantial differences between different European nations in the level of development of the different UBC activities (Davey et al., 2011). Most regional and national initiatives are rather unknown, missing the opportunity to learn from each other and increasing the understanding of UBC.

The UK is a country whose UBC initiatives have been most recognised at European level, particularly the data and analysis of the reality in order to undertake evidence-based policy. Apart from the case of the UK, there are only a few initiatives that have been promoted in different publications, such as the '30 Good Practice Case Studies on UBC in Europe' (Davey et al., 2011b). The authors are aware of two 2017-18 studies on a national level in Denmark and Finland which are focused on university-business cooperation, which are set to increase the focus of policy on the area of UBC.

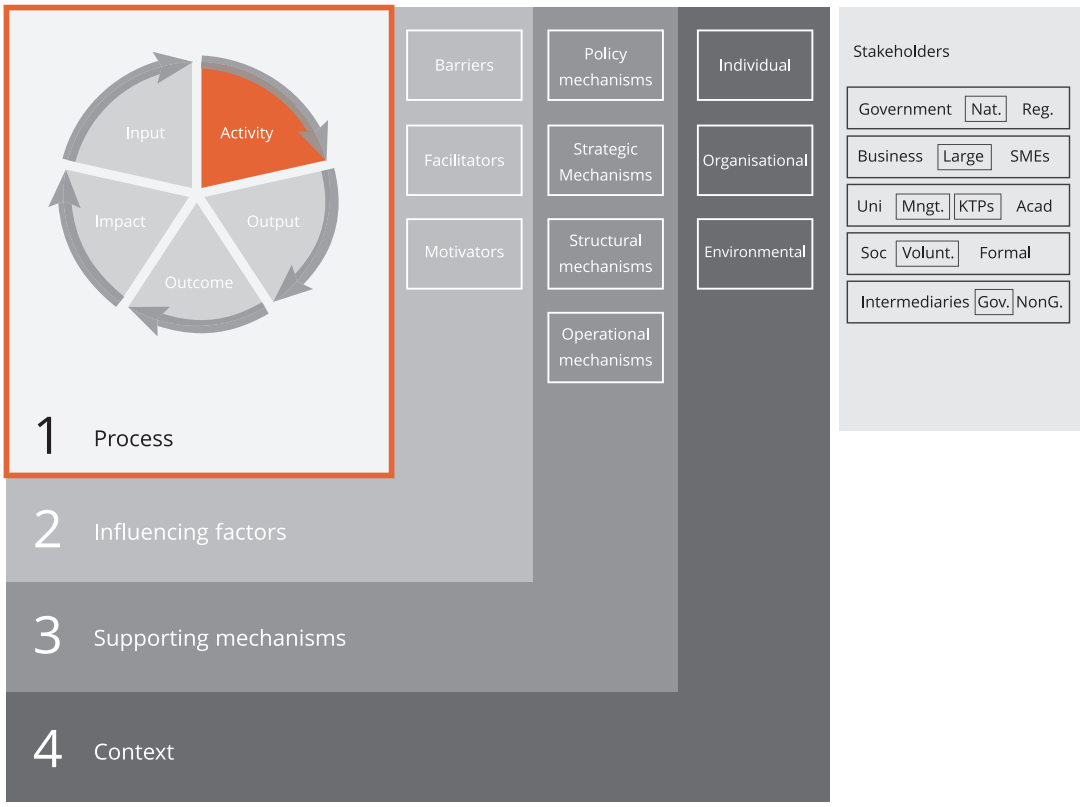
CHAPTER 3

DEVELOPMENT OF UBC ACTIVITIES

3.1 COLLABORATION ACTIVITIES BETWEEN HIGHER EDUCATION INSTITUTIONS AND BUSINESSES

Notwithstanding the broad range of UBC activities, literature tends to focus more heavily on certain forms including commercialisation through patents, licenses and spin-outs (Shane, 2004; Steenhuis and De Bruijn, 2002) as well as cooperative R&D (Perkmann et al., 2011; Bekkers and Freitas, 2010), and has often been dominated by literature from the US (Teixeira and Mota, 2012).

However, more recently, the understanding of cooperation has broadened to include more UBC activities, particularly those related to HEIs' missions of education and a broader notion of valorisation (Chatterton and Goddard, 2000). This broader view includes UBC activities, such as entrepreneurship (Bercovitz and Feldmann, 2008; Etzkowitz, 2002), lifelong learning (European Commission, 2009; Davey et al., 2011), the movement of students temporarily to business as part of their curriculum (Lamichhane and Sharma; 2010), professional staff mobility (Lamichhane and Nath Sharma, 2010; Kitagawa and Lightowler, 2013), and governance (Kitagawa and Lightowler, 2013) as well as shared services including equipment and resource sharing (Kitagawa and Lightowler, 2013).



3.1.1 Which informal interactions exist between HEIs and businesses?

Whilst not measured in the project through the quantitative survey, informal interactions between academics and business people are increasingly being recognised for their value in developing relationships and in transferring or exchanging knowledge, despite (or because of) their informality. Based upon the premise that UBC often relies on both informal and formal social links (Owen-Smith and Powell, 2004; Audretsch and Stephan, 1996; Jaffe, 1989), these informal interactions can include:

- attendance at industry sponsored meetings (Caniels and Van den Bosch, 2011; D'Este and Patel, 2007),
- attendance at conferences (Grimpe and Fier, 2010; Geuna and Muscio, 2009; Bekkers and Freitas, 2008; D'Este and Patel, 2007),
- personal informal contacts (Bekkers and Freitas, 2008),
- informal contacts, talks and meetings (Grimpe and Fier, 2010; Cohen et al., 2002; Bonaccorsi and Piccaluga, 1994),
- ad-hoc advice and networking with practitioners (Abreu et al., 2009; Bonaccorsi and Piccaluga, 1994; D'Este and Patel, 2007; Meyer-Krahmer and Schmoch, 1998; Perkmann and Walsh, 2008),
- informal technology transfer (Link et al., 2007), and
- career talks, interviews, career fairs (Shahabudin, 2006).

There are 14 recognised UBC activities

Coming from the literature review and aligning with the UBC Ecosystem framework, 14 UBC activities have been identified, which are grouped into the following areas:

UBC AREAS	UBC ACTIVITIES
Education	1. curriculum co-design (e.g. employers involved in curricula design with HEIs) 2. curriculum co-delivery (e.g. guest lectures) 3. mobility of students (e.g. student internships/placements) 4. dual education programmes (e.g. part academic, part practical) 5. lifelong learning for people from business (e.g. executive education, industry training and professional courses)
Research	6. joint R&D (incl. joint funded research) 7. consulting to business (e.g. contract research) 8. mobility of staff (i.e. temporary mobility of academics to business and of business people to HEIs)
Valorisation	9. commercialisation of R&D results (e.g. licencing/patenting) 10. academic entrepreneurship (e.g. spin offs) 11. student entrepreneurship (e.g. start-ups)
Management	12. governance (e.g. participation of academics on business boards and business people participation in HEI board) 13. shared resources (e.g. infrastructure, personnel, equipment) 14. industry support (e.g. endowments, sponsorship and scholarships)

Table 2: UBC areas and activities

3.1.2 Which UBC areas are the most developed?

Cooperation in the first two missions of education and research are most developed

Survey results show that both academics and business believe the research area is more developed, followed by the area of education. HEI representatives perceived that education-related UBC is more developed than research most probably because they have a broader overview of cooperation, at the management of level of the HEI, which is often responsible for curriculum development.

Valorisation and management are the least developed areas for the three groups and at a very similar level of development. Overall, the HEI representatives perceived the development of all areas higher than academics and these higher than businesses as they are commenting on the cooperation across the entire HEI.

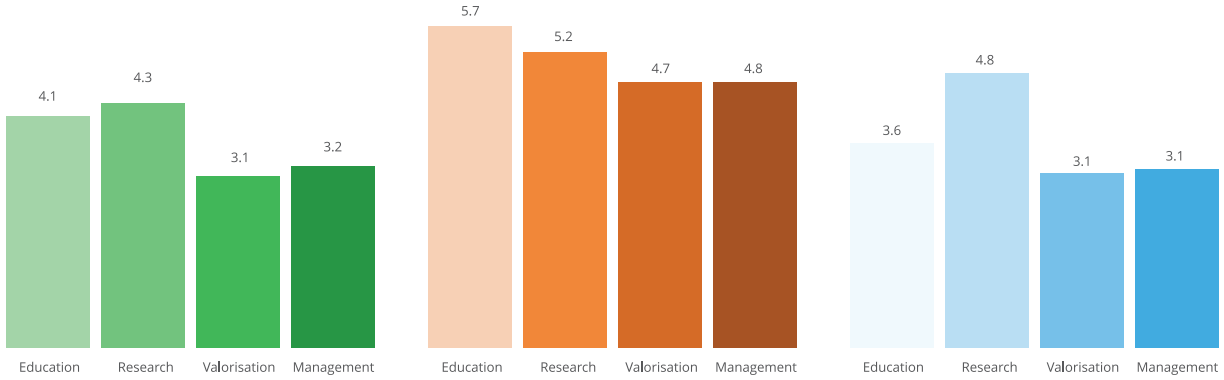


Figure 5: In which UBC areas and to what extent do you cooperate with business/universities?

Answered by academics, HEI managers and business. Scale: 1 = not at all developed, 10 = highly developed

> ### Lukasz Sulkowski, Vice-President at the Polish Accreditation Committee
>
> "In Poland, there is a wide range of ways in which universities and businesses cooperate, although the most developed one is student mobility, which is common in all universities. Some universities are recently developing student and academic entrepreneurship, through the creation of incubators. Additionally, employers are part of university boards (a legislation is in place to encourage this), so the cooperation in governance has increased lately."

It is worthy of note however, that when it comes to UBC activities, some activities are easier than others to identify, describe and quantify. In the collection of case study candidates particularly, the identification on activities in the areas of research and valorisation, and to a lesser degree management, were easier to identify than collaborative activities in respect to education.

The reasoning for this could be that some activities have the ability to be 'packaged' into more promotable or newsworthy stories than others, for example, new joint R&D activities, entrepreneurship programmes, shared facilities, industrial support. Compare these with new lifelong learning courses, collaboration in governance, collaboration in curriculum design and delivery or the movement of staff between the two protagonists, which all tend to be either too small to capture, not recognised as something that is a UBC activity, are executed more in an ad-hoc manner or do not have an office or person responsible for its promotion.

The implication is that HEI and business need to find ways of identifying, explaining and measuring these activities in improved ways to ensure that they are recognised, understood and promoted.

3.1.3 How do academics engage in UBC and with whom?

Mobility of staff and governance have the lowest level of involvement

Mobility of students and joint R&D are the most developed UBC activities, with 35% and 34.9% of academics respectively reporting a high level of development. At the other end of the scale, 49% and 47.9% of academics reported that they are not at all involved in mobility of staff and governance related UBC activities.

Even for cooperating academics, there is still room for increased cooperation

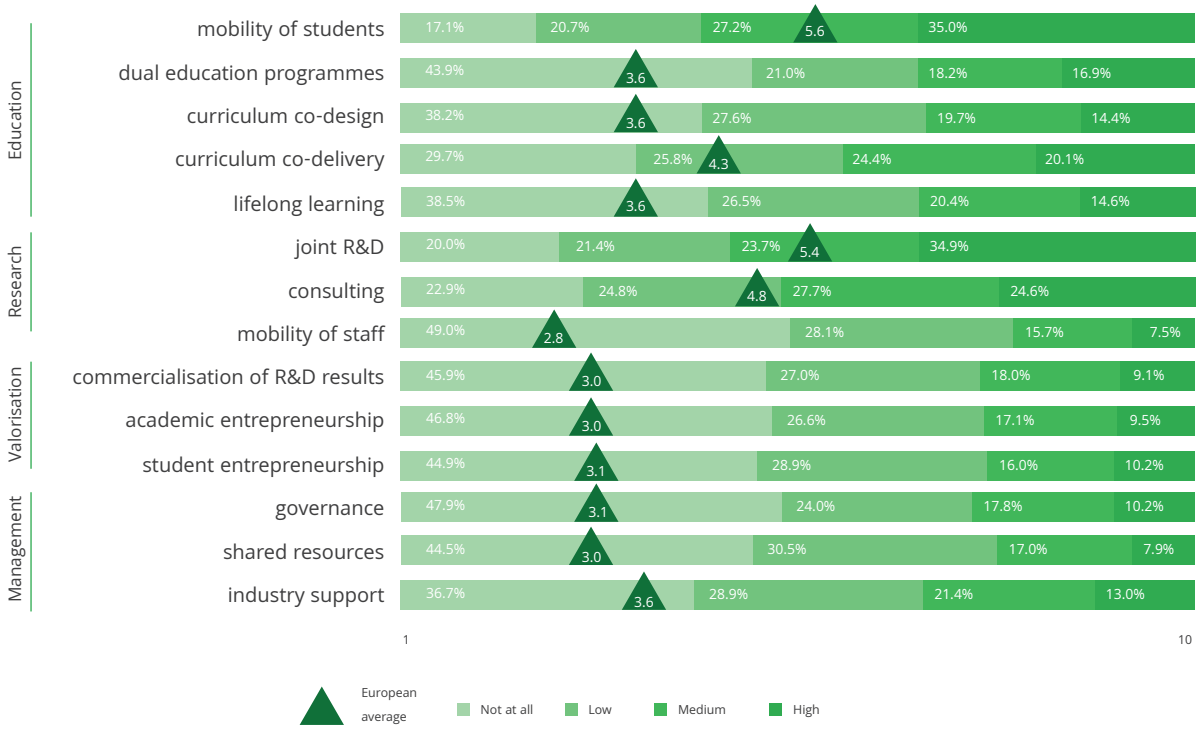


Figure 6: To what extent do you cooperate with business?

Answered by only cooperating academics. Scale: 1 = not at all, 10 = to a high extent

The most prevalent cooperation activities by cooperating academics are mobility of students, joint R&D and consulting. However, the results also show that academics who cooperate in one activity are more likely to cooperate in multiple UBC activities. In fact, of those academics that cooperate, only 136 (1.3%) cooperate with business in only one activity.

Nevertheless, there is still quite a high proportion of cooperating academics who do not undertake any cooperation in staff mobility or in the UBC areas of valorisation and management.

No business cooperation does not mean no cooperation

The survey results provide a breakdown of how and if academics cooperate externally, including their cooperation with 'business', 'government' or 'societal stakeholders' in respect to research and education.

ACADEMICS WHO COOPERATE WITH...	COOPERATING PARTNERS		NUMBER OF ACADEMICS	%	%UBC
	Business	Business, Government and societal stakeholders	2,879	26.6%	56.1%
		Business and Government only	1,417	13.1%	
		Business and societal stakeholder only	687	6.3%	
		Business only	1,090	10.1%	
	Others	Government and societal stakeholders only	1,371	12.7%	43.9%
		Government only	1,019	9.4%	
		Societal stakeholders only	1,098	10.1%	
		No external cooperation	1,273	11.7%	
			10,835	100%	100%

Table 3: Do academics cooperate with business, government or societal actors in respect to research and/or education?

Whilst 56.1% of academics cooperate with business, only 10.1% of all academics do so exclusively. The remaining 46% of academics also cooperate with other external actors, either government or societal stakeholders. The largest cohort is the 26.6% of academics who collaborate with not only business, but also government and societal stakeholders. The remaining 19.4% of academics cooperating with business are those that cooperate also with government (13.1%) and those that cooperate also with societal stakeholders (6.3%).

However, to say that the non-cooperating academics[16], do not cooperate at all externally would be incorrect because 32.2% cooperate with other external stakeholders. Only 11.7% of academics stated that they did not cooperate externally at all.

These results suggest that in order to accurately reflect external academic cooperation, the frame of reference should include cooperation with government and societal stakeholders.

Figure 7: To what extent do you cooperate with government and societal actors in respect to...
Answered by only academics 'cooperating' and 'non-cooperating' with business. Scale: 1 = not at all, 10 = to a large extent

Survey results confirm that academics who do not cooperate with business, still cooperate with other external actors. Non-cooperating academics undertake a higher level of publicly-engaged research, community-engaged learning and education material provided to the public and only lag substantially behind cooperating academics in communication and dissemination, collaborative regional development activities and technical assistance, expert testimony and legal advice.

Considering the areas of cooperation (left side of the graphic), whilst the extent of cooperation is similar for education and research, non-cooperating academics lag a little behind in valorisation and more so in management cooperation areas.

These results further reinforce that academics who do not cooperate with business, often cooperate with other external actors. This relationship should be explored in further research. However, for HEI managers looking to foster greater external collaboration and / or increase the HEIs impact on society, it would be advisable to speak about 'external cooperation' and 'cooperation with employers' rather than a more limiting 'cooperation with business' in order to secure a greater buy-in from academics.

16 This term is used in the study to identify academics who do not cooperate with business

3.1.4 How do European businesses cooperate and with whom?

European businesses cooperate most in joint R&D and student mobility while other activities are less developed

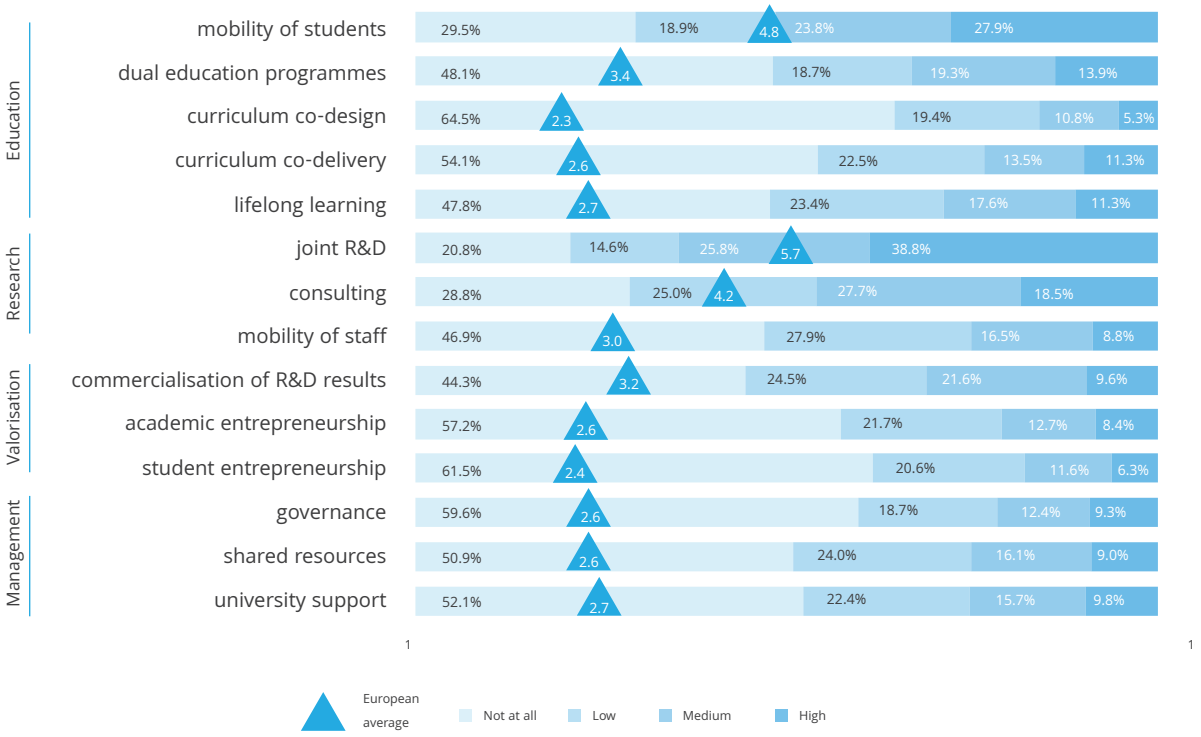


Figure 8: To what extent does your business cooperate with universities?
Answered by business representatives. Scale: 1 = not at all developed, 10 = highly developed

Overall the survey highlights that the cooperation of business with HEIs is low in the majority of activities and certainly suggests that there are opportunities for greater collaboration with HEIs. The most developed activity is joint R&D (5.7), with two thirds of businesses stating a medium or high extent of cooperation in this activity, whilst close to half of all businesses also claim a medium or high development of consulting, another research-related UBC activity.

Cooperation in education with HEIs is mixed with regard to the extent of its development. Occurring at a medium or high degree with over half of the business respondents is mobility of students (4.8), the second most developed activity, showing that it is a fairly common activity to host students as interns in their companies. Curriculum co-design and co-delivery as well as lifelong learning initiatives however are much less developed (2.3 and the lowest developed activity, 2.6 and 2.7 respectively).

Those businesses that are engaged in UBC often undertake more than one activity

A positive correlation can be found in the survey results between the development of the different UBC activities. The correlation is particularly high for cooperating in management: governance, shared resources and industry support. The generally higher and longer-term commitment required for each of these management cooperation to occur, as well as their interrelationship (when you commit to one, you often are already committed to another) mean that they are also facilitated by the other management activities. Said differently, in order for these types of activities to occur it is more important for longer term commitment to be in place.

Specifically, shared resources and commercialisation of R&D results are highly correlated with UBC research activities, as sharing resources most often happens in research activities and commercialisation of R&D is a potential consequence of research cooperation. The fact that mobility of staff is correlated with all the valorisation and management activities potentially suggests that both areas require higher levels of understanding of the other stakeholder, which is something that occurs when business people go into academia.

Compared to the academic view, the UBC activities undertaken by business are slightly less correlated. The activities that are more likely to occur in isolation are joint R&D, consulting and mobility of staff. This result could suggest that when businesses engage in research cooperation, they tend to do so as a fit-for-purpose activity and undertaking one form of research cooperation does not indicate a likelihood to undertake another.

This contrasts with the education cooperation area, where a high correlation between activities exist meaning that if a business undertakes one form of cooperation in education, they are likely to cooperate in others.

The survey results suggest that businesses that cooperate with HEIs in R&D not only engage in more activities, but are also engaged in open innovation as 81% of businesses cooperating with HEIs in R&D also cooperate with other business, whilst 82% of those businesses with their own R&D capability cooperate with HEIs in R&D.

3.1.5 Who initiates UBC?

Academics and businesses initiate their own cooperation

According to European academics in the survey, a colleague or themselves are the greatest initiators of cooperation (56% stated they 'always' or 'usually' initiated the cooperation), followed by HEI management / leadership (31.2%), internal intermediaries (30.5%) and government (29.9%). They see a limited role for business, current students and former students.

Business managers also see their organisations as the major initiators ('always' or 'usually') of cooperation (58.6%). Alumni of the HEI working within the organisation are the second most likely initiator of UBC (27.4%) and individual academics within the HEI (21.3%) the third most. Conversely, business managers perceive the role of intermediaries within the HEI (69.7% rarely or never initiate cooperation), external intermediaries (64.1%) and the university management (54.4%) as more minor initiators of UBC. Therefore, business managers see a more passive role of academics, university leadership, and internal intermediaries than academics and a more active role of themselves.

3.1.6 Who are the collaboration partners?

The majority of academic and business collaborators have more than one collaboration partner

Survey results show that most cooperating academics have more than 2 partners, which tend to be medium-sized and large business partners. These partners are more often than not businesses in their region or country and to a much lesser extent international.

Furthermore, the survey highlighted that most cooperating businesses collaborate with fewer than five HEIs and that the cooperating partners are primarily polytechnics and traditional universities. These partners are generally located within their region or in the country which, together with the results for academics, shows that geographical factors matter in cooperation.

3.1.7 What is the relationship between UBC activities?

Once academics and businesses cooperate, they tend to cooperate in multiple UBC activities

Using the survey results a correlation analysis was undertaken for both academic (green) and business (blue) to highlight the relationship between UBC activities. The table below highlights both the medium and highly significantly correlated activities. For reasons that will be explored further in this report, survey results clearly show that when HEIs and businesses cooperate, they do not do it in only one activity, they tend to cooperate in multiple activities.

Legend: dark green/blue = high correlation: .5 to 1.0, medium green/blue = medium correlation: .3 to .5

Figure 9: To what extent does your university/business cooperate with businesses/universities?
Answered by all academics and business representatives.

For academics, with respect to the education-related UBC activities, all activities are positively correlated to either a medium or high level indicating that when an academic cooperates in one education UBC activity, they cooperate in multiple education activities.

In the area of research, cooperation in R&D is correlated to both consulting and mobility of staff, but consulting and mobility of staff are not correlated to each other. This potentially highlights that consulting can result from previous relations in research,

or can be acquired independently of existing research relationships.

Valorisation activities are highly correlated, meaning that if an academic is open to be involved in one valorisation activity, they are open for all valorisation activities. Management UBC activities are similarly (highly) correlated suggesting once there is an openness to management cooperation by academics then it is more likely to apply to all UBC management activities.

The relationship between UBC activities in education and research is less developed than research UBC with valorisation and management, or indeed education UBC with valorisation (except commercialisation of R&D) and management.

In contrast, joint R&D, consulting, mobility of staff and commercialisation of R&D have the least number of associations with other UBC activities meaning that they are more likely to be conducted in isolation by academics.

For academics, the UBC activities that are more connected to others are academic entrepreneurship (related to all except mobility of students), student entrepreneurship (related to all except joint R&D), governance (related to all except consulting), and industry support (correlated with all other activities). This suggest that these activities are either a sign of openness to UBC generally or they are a conduit to other UBC activities.

The lower correlation of commercialisation of R&D (not related to 6 other UBC activities), cooperation in R&D (not related to 7 UBC activities), consulting and mobility of staff (both not related to 5 UBC activities) with other UBC activities, suggest that cooperation in research, and the commercialisation of research, are more independent of other UBC activities and don't necessarily lead to, or result from, other forms of cooperation.

With respect to business, the positive correlation (marked in blue) between the development of the different UBC activities, is particularly high for those in management, governance, shared resources and industry support. This is potentially explained by the higher and longer-term commitment for these activities to occur, which are also facilitated by the other management activities.

Specifically, shared resources and commercialisation of R&D results are highly correlated with UBC research activities, as sharing resources most often happens in research activities and 'commercialisation of R&D' is a potential consequence. The fact that mobility of staff is correlated with all the valorisation and management activities potentially suggests that both areas require higher levels of understanding as previously stated.

Compared to the academic view, the UBC activities undertaken by business are slightly less correlated. The activities that are more likely to occur in isolation are joint R&D, consulting and mobility of staff. This result could suggest that when businesses engage in research cooperation, they tend to do so as a fit-for-purpose activity and undertaking one form of research cooperation does not mean indicate a likelihood to undertake another.

This contrasts with the education cooperation area, where a high correlation between activities exist meaning that if a business undertakes one form of cooperation in education, they are likely to cooperate in others.

The high number of correlations for both academics and business emphasise that the nature of UBC in Europe is such that when the protagonists cooperate in one UBC activity, they then tend to cooperate in others and potentially with the same or similar collaboration partners (although this cannot be determined from this analysis). Therefore, creating policy or management structures, which encompass or consider all UBC activities as well as multi-faceted UBC relationships, seems justified.

These results also suggest a potential need to adapt the roles of technology-transfer offices (TTOs) and other intermediaries to include the management of all UBC activities under a TTO 2.0 or 'External collaboration office'.

Furthermore, the case studies and expert interviews also highlighted the complexity of the cooperation between HEIs and businesses. They reinforced the survey results that cooperation is rarely undertaken in one activity to the exclusion of others, identifying that once a relationship commences, cooperation becomes more fluid and the avenues for cooperation open up.

As an example, the case study on Harper Adams University and Dairy Crest, illustrates a cooperation which started as research consultancy and student placement and evolved into longer term research cooperation, which resulted in the establishment of the new innovation centre as a shared facility. This has taken the partnership to a new more comprehensive level. This collaboration flourished due to joint goals, clear benefits on both sides and the promise of future benefits as the collaboration matured. It was also clear that this occurred, not least because of the synergies of the activities as well the opportunity to fully exploit the collaboration to get a broader set of benefits.

Robert Sorrell, Vice President for Public Partnerships at British Petroleum (BP)

"BP has a number of activities in cooperation with universities which include: executive education, research, policy and recruitment. (...) We engage in many cooperation activities with universities in education including: Centres for Doctoral Training, cooperative PhDs through research, post-doctoral research collaborations, endowed Chairs – support for various professors, and the provision of lectures as part of the curriculum ("I believe we have some visiting lecturer and professors that come into BP but I am unaware of BP staff working within universities."). We also have plenty of internships, which are seen as a 'soft' recruitment process. We can see how people operate within the company and that this may lead to us offering them a job offer. Finally, we have BP staff which are sitting on the councils of universities and 'spill-overs of knowledge' that come from informal or formal interactions which indirectly contribute to insights in new areas"

MULTI-AREA UBC CASE STUDY EXCERPT: AUDI HUNGARIA ZRT. AND SZECHENYI ISTVAN UNIVERSITY

The greater than decade-long collaboration between Audi Hungaria Zrt. and Szechenyi Istvan University (Gyor, Hungary) resulted in a newly established Audi Faculty at the university, which provides a basis for cooperative research as well as education-related cooperation. It provides an institutionalised framework for the educational, professional and scientific collaboration between academics and Audi Hungaria, set within the broader ecosystem of Gyor city and the Western-Hungarian region. By establishing this faculty, engineering students have access to state-of-the-art technical and technological knowledge, which helps them meet industrial requirements and are better prepared for the world of work. The elements of cooperation between Audi and Szechenyi are transferable, and provide a model for collaboration that embraces not only academia and industry, but their broader ecosystem as well.

For more information go to www.ub-cooperation.eu/pdf/cases/E_Case_Study_Audi.pdf

3.1.8 Which UBC indicators exist in Europe?

The measurement of UBC, through the use of relevant indicators, is essential in order to assess the state of the UBC. Many universities worldwide are nowadays held accountable for their 'third mission'[17] activities and achievements, and need to show their commitment and interactions with society at large. Collaboration with the business sector is one of the pathways for universities to engage with society, and university managers need metrics on UBC to show their level of engagement with the business sector.

Also policymakers, moved by the potential positive impacts of UBC on the economy, try to implement policies aiming at fostering synergies between high quality science and business sector innovation. In this context, it is also essential to have reliable and valid metrics informing on the state of UBC in order to design effective interventions (through ex-ante evaluation), also to analyse the effects and impacts of previous policy implementations (through ex-post evaluation).

However, the measurement of UBC is not straightforward. University-industry interactions are considered a multi-faceted phenomenon with several 'channels', 'mechanisms' or more generically called 'linkages', acting as informational or social pathways through which information, knowledge and other resources are exchanged or co-produced across universities and industry (Perkmann and Kathryn, 2007).

17 Molas-Gallart et al. (2002) define third mission as the 'generation, use, application and exploitation of knowledge and other university capabilities outside academic environments. In other words, the Third Stream is about the interactions between universities and the rest of society'

UBC AREA	PERCENTAGE OF INDICATORS
Education 10.4%	curriculum co-delivery (1.7%)
	curriculum co-design (2%)
	dual education programmes (1.7%)
	lifelong learning (2.3%)
	mobility of students (2.7%)
Research 21.6%	consulting (6.6%)
	joint R&D(12%)
	mobility of staff (3%)
Valorisation 54.8%	academic entrepreneurship (15%)
	commercialisation of R&D results (39.5%)
	student entrepreneurship (0.3%)
Management 10.7%	governance (3.7%)
	industry support (4.7%)
	shared resources (2.3%)
Other 2.5%	other (2.5%)

Table 4: The percentage of indicators dedicated to each UBC area and activity

UBC indicators are focused on valorisation at the expense of education and research cooperation indicators

UBC indicators currently measuring UBC are unequally distributed as nearly 55% of the indicators collected are in the area of valorisation (54.8%), followed by research (21.6%). Management related indicators represent 10.7% of all indicators, while those related to education account for only 10.4%, despite it being the most developed area of cooperation, as stated by HEI managers.

Reflecting the findings in literature, commercialisation of R&D results (39.5%) and academic entrepreneurship receive a disproportionately high focus with respect to indicators across Europe, particularly when compared to the most developed UBC activities: mobility of students (2.7%) and joint R&D with industry (12%).

When the availability of the indicators is considered, the analysis shows that almost half of the indicators reviewed (48.8%) are available for use, while 11.3% are available for use but with some limitations, and 39.9% of the indicators are not available at all. Furthermore, the information collected for the various indicators available indicates that there is a high variance in the time period over which the indicators are measured.

Natascha Eckert, Director University Relations at Siemens

"Siemens documents and monitors the extent of UBC (PhD, lectures, contract research, joint research funded by government, etc.) carried out in an accurate way, however, their measurement is not done with fixed indicators, since university engagement is extremely diverse and there is no set of indicators that can capture the complexity of this engagement. Different collaborative activities cannot be compared and even within the same activity, for example, contracted research, it is extremely difficult to say whether a project has been successful or not. For example, a project might have been very successful in respect to IP (number of patents), another one in human capacity building (hiring of researchers / PhD students) or another one in results exploitation (as a product within Siemens or as research papers)."

3.2 UBC ACTIVITIES IN EDUCATION

3.2.1 Literature on UBC activities in education

Whilst education is the original mission of the HEI, education-related UBC has received little focus in the literature. An account of research informing practice and practice informing curricula can be found in mid-to-late 1800s in the US, with land-grant universities beholden to the local community, especially prominent in leading the movement (Rosenberg and Nelson, 1994). With new intellectual inventions proving themselves practically, they were then proactively returned to inform the curricula in a natural HEI-industry-HEI cycle, which also subsequently generated the skilled human capital that fed the industry (Rosenberg and Nelson, 1994). The main UBC activities in education. The main UBC activities in education, which were identified in the literature review and subsequently used in the survey, are grouped into four categories: curriculum development and delivery, mobility of students, dual education and lifelong learning.

> **Panayiotis Ketikidis, Vice Principal for Research, Innovation and External Relations at the University of Sheffield International Faculty, CITY College**
>
> "Academics are often supported by industry in terms of the syllabus development and its redesign in order to make it more relevant and adequate for the real business world, so that the students after graduating from university possess the required employability skills. Another form of UBC is industry-led academic curricula, which mean that the business representatives are invited as guest lectures by academia to co-teach at the university. Another way of collaborating is the incorporating the professors of practice within the academia, which means that qualified people coming from industry receive such title and can be allowed to work at the university. Basically, they provide practical lectures."

Cooperation in curriculum development and delivery includes student projects in cooperation with business (Boersma et al., 2008), development of a fixed programme of courses modules majors or minors (Davey et al., 2011), definition and organisation of new study programmes (European Commission, 2009), planned experiences in business for students (Davey et al., 2011), professional courses on a fee-basis to respond to the particular skill and training needs of industry (Ssebuwufu et al., 2012), guest lectures by business representatives (Science Business Innovation Board, 2012), training relationships with firms (Caniels and Van den Bosch, 2011), training of postgraduates and internships at firms e.g., joint supervision of PhDs (Caniels and Van den Bosch, 2011), temporary exchange of personnel (Caniels and Van den Bosch, 2011), training of firm employees provided by the HEI (Caniels and Van den Bosch, 2011), curriculum-integrated work placement programmes (Strunz et al., 2003), curriculum evaluation (European Commission, 2009b), further professional education (Davey et al., 2011), and training of employees (Bonaccorsi and Piccaluga, 1994).

Mobility of students includes temporary or permanent movement of students from HEIs to business (Davey et al., 2011), internships or apprenticeships as part of formal education (Lamichhane and Nath Sharma, 2010), co-operative student work placements in the productive sector (Ssebuwufu et al., 2012; Lamichhane and Nath Sharma, 2010), doctoral studies hosted inside industrial labs (Henrekson and Rosenberg, 2001), hiring of students through the academics contact (Borrell Damian, 2009) and work placement in doctoral research (Pym et al., 2014).

Lifelong learning includes the provision of adult education (Davey et al., 2011), HEI academics delivery company courses (Rakesh and Chandra, 2007), non-academic 'in-residence' professionals from local communities (Kitagawa and Lightowler, 2013), continuing education (European Commission, 2009), collaborative doctoral education (Borrell Damian, 2009), and professors of practice (Kitagawa and Lightowler, 2013).

Dual education programmes are an emerging hybrid form of higher education, with its origins in Germany, which includes offering the participant the opportunity to complete a degree programme at a HEI whilst simultaneously receiving a certification of practical vocational training or work experience in a company (Acatech, 2014). In such programmes, students spend extended

periods of time in both an academic and an employer setting (Euler, 2013).

3.2.2 Survey results on the development of UBC in education

Mobility of students is the most prevalent form of UBC in education

AREA OF COOPERATION	TYPE OF ACTIVITY	RESPONDENT GROUPS	AVE.
Education	mobility of students	Academic	4.1
	dual education programmes	HEI manager	5.7
	curriculum co-design	Business	3.6
	curriculum co-delivery		
	lifelong learning		

		Academic	HEI manager	Business
Curriculum co-design	not at all	38.2%	12.8%	58.8%
	low	27.6%	26.3%	22.6%
	medium	19.7%	33.2%	12.5%
	high	14.4%	27.7%	6.2%

		Academic	HEI manager	Business
Dual education programmes	not at all	43.9%	14.5%	39.9%
	low	21.0%	28.6%	21.6%
	medium	18.2%	32.3x%	22.4%
	high	16.9%	24.6%	16.1%

		Academic	HEI manager	Business
Curriculum co-delivery	not at all	29.7%	9.2%	46.8%
	low	25.8%	24.3x%	26.1%
	medium	24.4%	35.0%	15.6%
	high	20.1%	31.5%	11.5%

		Academic	HEI manager	Business
Lifelong learning	not at all	38.5%	10.1%	39.4%
	low	26.5%	27.5%	27.1x%
	medium	20.4%	33.9%	20.4%
	high	14.6%	28.5%	13.1%

		Academic	HEI manager	Business
Mobility of students	not at all	17.1%	4.8%	18.3%
	low	20.7%	14.1%	21.9%
	medium	27.2x%	31.1%	27.5%
	high	35.0%	50.0%	32.3%

Table 5: To what extent do you undertake university-business cooperation?
Answered by academics, HEI managers and business. Scale: 1 = not at all, 10 = to a high exten

The findings indicate that mobility of students is the most developed UBC activity. This activity is highly developed in 50% of the HEIs, 32.3% of the businesses and for 35% of academics surveyed . Curriculum co-delivery, lifelong learning and curriculum design followed, with the lowest degree of development reported on dual education programmes.

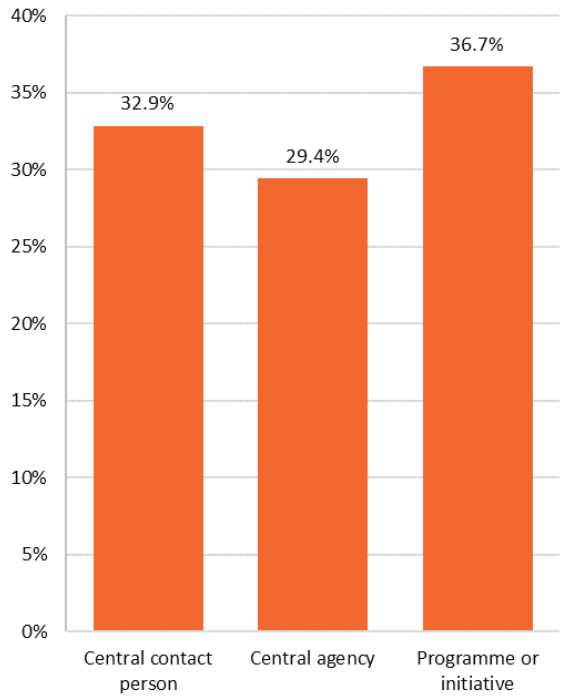


Figure 10: Presence of supporting features for mobility of students – as answered by European HEI managers

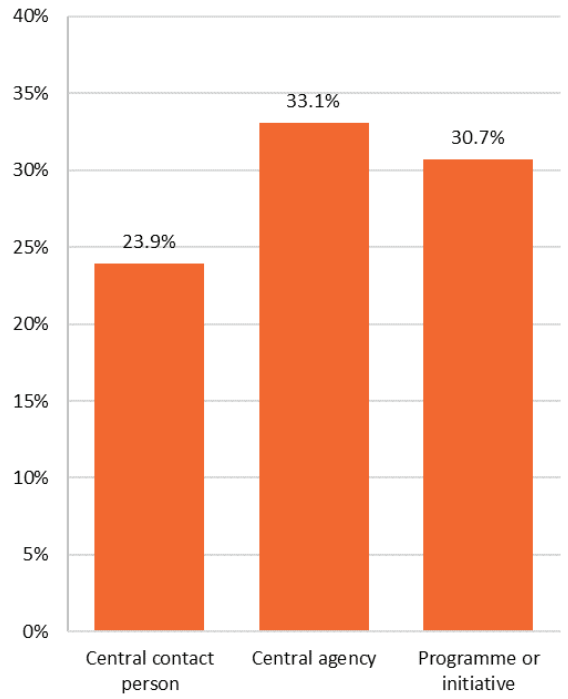


Figure 11: Presence of supporting features for lifelong learning – as answered by European HEI managers

Having a programme or initiative within the HEI supporting mobility of students is the most common form of support offered, although still only 36.7% of the HEIs report to have this feature. Nearly one third of the HEIs have a central contact person to support mobility of students, and the least reported supporting mechanisms within the university is the central agency with 29.4% of the HEI managers reporting to have this within their institution.

Comparison to 2010-11 study – It appears that the number of HEIs with programmes or initiatives supporting mobility of students has increased the most compared to 2011 (30.0%), whereas the presence of a central contact person decreased proportionally (38.8% in 2011).

The most developed mechanisms supporting lifelong learning activities is the presence of a central agency (33.1%), closely followed by a programme or initiative (30.7%). A central contact person within the HEI seems less common, with only 23.9% of the HEIs indicating the presence of this feature within their institution.

Comparison to 2010-11 study – The presence of a central agency and programme or initiatives seems to have slightly increased (25.5% and 26% in 2010-2011), whereas the central contact person is now reported to be present in fewer HEIs (23.9%).

3.2.3 Expert interview contributions

Lena Christiaans, Head of Corporate Employer Branding & Recruitment at Henkel AG & Co. KGaA

"In education, Henkel cooperates with universities in a number of ways: student-business projects with different universities. Henkel employees, especially business colleagues, are involved in presentations and cases. Internships can also be part of the curriculum delivery. In the areas of student mobility / student employability we have a number of activities including: students participate in our Innovation Challenge, which is a business game and we use it as door opener especially in countries in which Henkel is not yet so well known. It is an attractive opportunity to approach the universities and that we have a business game which is highly interesting to students. Internships and typical university career events such as career fairs"

3.2.4 UBC case studies in education

LLL CASE STUDY EXCERPT: LIFELONG LEARNING STRATEGY AT DANUBE UNIVERSITY KREMS

Founded in 1994 as a centre for continuing education, Danube University Krems is one of the most pioneering HEIs in Europe in offering university-based lifelong learning. Continuing education is a core competence. The university's mission and vision, together with existing expertise in continuing education, mean that the entire educational structure is geared towards the particular standards and requirements of middle-aged professionals and executives. DUK's student profile is unlike any other, with more than 50 per cent of students having worked in their fields for more than 10 years, now benefiting from further career development or professional re-orientation. With over 9,000 students from 90 countries studying on over 200 different courses, DUK is leading the way in facilitating LLL across the Austrian and European educational arenas.

For more information go to https://ub-cooperation.eu/pdf/cases/W_Case_Study_Danube_Krems.pdf

CURRICULUM CO-DESIGN AND CO-DELIVERY CASE STUDY EXCERPT: CORPORATE UNIVERSITY GORENJE AT GORENJE GROUP

The Gorenje Group, one of the leading European manufacturers of white goods, established its first education centre in the '70s. In 1991, they established the first form of management training programme, which in 2013 developed into Corporate University Gorenje with five academies: Management, International Business, Executive Business, Digital Business and Create. They educate and train employees to acquire knowledge and develop skills needed to support the strategy implementation and enable them to run corporate business in the demanding international environment. The Create Academy runs its programme in cooperation with three well-established universities in order to achieve the transfer of theoretical and practical knowledge. CUG generates new challenges for cooperating professors and their universities, improves the development of the employees' professional expertise, and constitutes a competitive advantage for the company.

For more information go to https://ub-cooperation.eu/pdf/cases/E_Case_Study_Gorenje.pdf

STUDENT MOBILITY CASE STUDY EXCERPT: STUDENT SUPPORT AND CAREER DEVELOPMENT CENTRE AT UNIVERSITY OF ZAGREB

The Student Support and Career Development Centre at the Faculty of Organisation and Informatics of the University of Zagreb is a key intermediary connecting students and employers in and around the cities of Varazdin and Zagreb. Built around a number of mechanisms that shape students competences and presentation for the labour market, the centre also uses an innovative approach to providing comprehensive employer branding services that make companies highly visible and attractive to suitable talented graduates. Tis centre also acts as a focal point for the modular integration of industry problems and challenges into educational curricula for undergraduates or as topics for master theses.

For more information go to https://ub-cooperation.eu/pdf/cases/S_Case_Study_CPSRK.pdf

DUAL EDUCATION PROGRAMMES CASE STUDY EXCERPT: PROGRAMMES AT THE INSTITUTE FOR WORK-BASED LEARNING OF MIDDLESEX UNIVERSITY

For over 20 years, the Institute for Work Based Learning at Middlesex University has joined forces with professionals and industry leaders internationally to explore new ways by which they can use work-based learning processes to improve their skills and knowledge, resulting in tangible personal and organisational benefits. The Institute negotiates individual programmes to recognise the learning taking place in the workplace and provides official university recognition ranging from credits to level 8 awards. The institute has a strategic and flexible approach flexible to engage employer-employee-university in a 3-way learning agreement. Their transparent process and the quality of their courses has made them leader in professional education in the UK.

For more information go to https://ub-cooperation.eu/pdf/cases/N_Case_Study_Middlesex_University.pdf

3.2.5 UBC policy in education

Lifelong learning is highly recognised in policy

The policy review highlighted that UBC policies (instruments, programmes, strategies) for education activities were found in each of the 33 countries. The education activity that gets more policy attention is lifelong learning, since many countries have a national strategy for this activity. The second more regulated education activity is student mobility, although most of them are programmes. The education activity that appears less often in policy is joint curriculum design and delivery. Therefore, this activity is mostly instigated at the university / faculty or individual professor level.

Some of these policy initiatives in education-related UBC are:

Industrial Ph.D. Scheme in Norway. It fosters joint curriculum design and delivery and aims to develop the link between research institutions and companies. The doctoral candidate completes studies which are of personal benefit and interest, while simultaneously endowing industrial players with academic links and research institutions with a business network.

The Estonian Lifelong Learning Strategy 2020. This strategy provides essential support and reference points for the advancement of adult learning in the coming years and is viewed as a main strategic document influencing lifelong learning-related funding decisions as well. The goals set by the lifelong learning strategy reinforce the country's main development objectives as described in the reform programme entitled 'Estonia 2020'.

The Strategic Plan for Higher Education Institutions 2016 – 2020, in Czech Republic. One of the aims of the policy is supporting joint curriculum design. It promotes the inclusion of external stakeholders through consultation with employers, local administrations and other partners in the design of curricula during the accreditation process.

3.2.6 UBC indicators for education

Despite UBC in education being highly developed, there are only a few UBC indicators that measure it

The European review of UBC indicators revealed that 10.3% of all UBC indicators were dedicated to UBC in education and that all were measured quantitatively. The most indicators exist for mobility of students (2.7% of all UBC indicators), which reflects that student mobility is one of the most developed UBC activities in each of the target countries and it is easier to create metrics for such an activity.

UBC AREA	TYPE OF ACTIVITY	PROPORTION OF INDICATORS	QUALITATIVE	QUANTITATIVE	AVAILABLE	PARTIALLY AVAILABLE	NOT AVAILABLE
Education 10.3%	curriculum co-delivery	1.7%	0%	100%	0%	0%	100%
	curriculum design	2.0%	0%	100%	0%	0%	100%
	dual education programmes	1.7%	0%	100%	20%	0%	80%
	lifelong learning for business people	2.3%	0%	100%	57.1%	28.6%	15.3%
	mobility of students	2.7%	0%	100%	0%	25%	75%

Table 6: European indicators for UBC in education

3.3 UBC ACTIVITIES IN RESEARCH

3.3.1 Literature on UBC activities in research

> **Gonzalo Leon, Vice President for Research at Universidad Politecnica de Madrid**
>
> "One of the main UBC activities is contract research, whereby the business needs can be fulfilled by carrying out research conducted by a university research group. However, today this model changed being extended to the consortium-based research projects conducted on national or even regional level."

The literature review highlighted that the primary focus for studies on UBC is research-related UBC, which is one of the earliest documented forms of cooperation, dating back to time of the industrial revolution. Originally focused on practical problem-solving (Rosenberg and Nelson, 1994), in the US an 'industrial extension' emerged, which was the practice of academics visiting manufacturing firms to assist in modernisation and optimisation of processes (Etzkowitz, 2001).

In Europe, some examples of research consulting, contract research and academic spin-offs by poorly paid academics were evident in Germany at the turn of the 20th century. Industry-funded basic research emerged in a much stronger way after WWII (Van Looy et al., 2004) as part of the second academic revolution (Etzkowitz, 2001).

The main UBC activities in research, which were identified in the literature review and subsequently used in the survey, are grouped into three categories: joint R&D, consulting and staff mobility.

Joint R&D between universities and business documented includes joint R&D activities (Cohen et al., 2002), research joint ventures (Bercovitz and Feldmann, 2006; Link and Siegel, 2005; Lubango et al., 2007; Boardman, 2009), cooperative research projects (Bonaccorsi and Piccaluga, 1994), joint publications with firm scientists/researchers (Bonaccorsi and Piccaluga, 1994), joint supervision of theses with firm scientists/researchers (Davey et al., 2011), research grants and donations (Bonaccorsi and Piccaluga, 1994; Elmuti et al., 2005), informal information exchange (Cohen et al., 2002) and co-financing a PhD student and industrial PhD (Kolmosa et al., 2008).

Consulting includes contract research (D'Este and Perkmann, 2011; Cohen et al., 2002; Henrekson and Rosenberg, 2001), R&D consulting (Cohen et al., 2002; Etzkowitz, 2001; Henrekson and Rosenberg, 2001) and business services such as testing and certification (Basant and Chandra, 2007).

Staff mobility between universities and business is the temporary movement of teaching staff or researchers from HEIs to business (D'Este and Perkmann, 2011), sabbatical periods for professors (Bonaccorsi and Piccaluga, 1994), professional secondments (Bonaccorsi and Piccaluga, 1994), adjunct professorships for professional from industry within the HEI (Henrekson and Rosenberg, 2001) and employees' managers and researchers from business to HEIs (Davey et al., 2011).

3.3.2 Survey results on the development of UBC in research

Most cooperating academics and businesses undertake research cooperation

AREA OF COOPERATION	TYPE OF ACTIVITY	RESPONDENT GROUPS	AVE.
Research	collaboration in R&D	Academic	4.3
	consulting	HEI manager	5.2
	mobility of staff	Business	4.8

		Academic	HEI manager	Business
joint R&D	not at all	20.0%	9.8%	8.1%
	low	21.4%	20.4%	17.0x%
	medium	23.7%	33.9%	29.9%
	high	34.9%	35.8%	45.0%

		Academic	HEI manager	Business
consulting	not at all	22.9%	8.6%	17.3%
	low	24.8%	27.3%	29.1%
	medium	27.7%	37.3%	32.1%
	high	24.6%	26.8%	21.5%

		Academic	HEI manager	Business
mobility of staff	not at all	49.0%	16.2%	38.3%
	low	28.1%	40.0%	32.4%
	medium	15.7%	30.5%	19.1%
	high	7.2%	13.3%	10.2%

Table 7: To what extent do you undertake university-business cooperation?
Answered by academics, HEI managers and business. Scale: 1 = not at all, 10 = to a high extent

Survey results show joint R&D is identified as the most developed UBC activity, rated medium to highest by businesses (74.9%) followed by HEI managers (69.7%) and academics (58.6%). After consulting, mobility of staff is ranked the least developed type of cooperation by the survey participants. Joint R&D is the most developed activity for the three groups, followed by consulting and finally by mobility of staff, which is still less well developed.

	Academic	HEI manager	Business
collaboration in R&D	5.4	5.9	6.4
consulting	4.8	5.5	4.8
mobility of staff	2.8	4.3	3.3

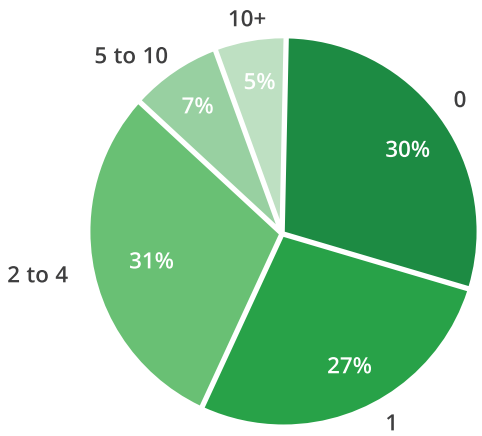


Figure 12: Contracted research projects with business (last 12 months) – as answered by cooperating academics

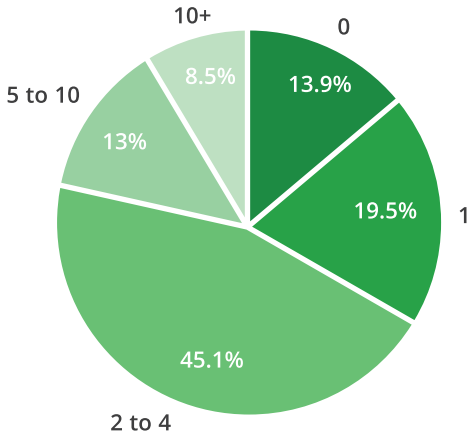


Figure 13: R&D projects involving business (last 12 months) – as answered by cooperating academics

70% of cooperating academics have participated in at least one contract research project in the last 12 months, with 43% participating in more than one. Conversely, 30% of academics reported they haven't been involved in any contract research during the past year.

Overall, 32.3% of all academic respondents undertook contract research in the last 12 months.

Comparison to 2010-11 report – More academics are involved in contract research projects compared to 2011, when 37.5% indicated they had not participated in this activity.

Over 45.1% of cooperating academics have participated in 2-4 R&D projects in the last 12 months, the most prevalent number of projects, whilst 19.5% participating in only one. Almost 14% of the participants indicated they have not been involved in any R&D project involving business during the past year.

Comparison to 2010-11 report – With 23.4% of academics indicating that they did not participate in any projects with business in 2010-11, the results suggest that there has been an increase in academics participating in R&D projects involving business. Also the number of projects academics participate in increased.

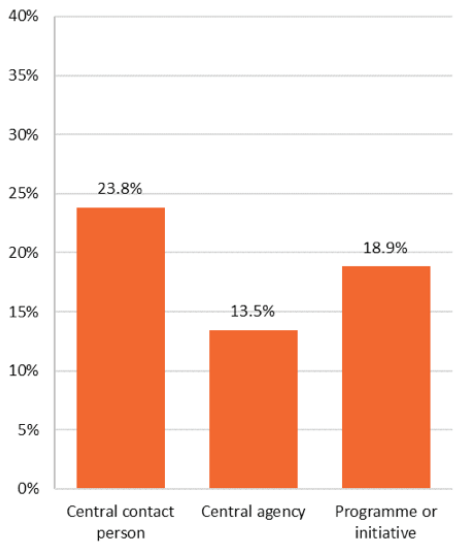


Figure 14: Presence of supporting features for professional mobility – as answered by European HEI managers

For each activity, the survey asked respondents to indicate the extent to which there were supporting mechanisms (and which ones). In the case of the mobility of academics, the supporting mechanisms were much less prevalent than for other types of UBC (e.g. mobility of students, lifelong learning, entrepreneurship and mobility of academics).

The results show that a central agency is present in only 13.5% of the HEIs, and in a programme or initiative form in only 18.9% of HEIs. It is the central contact person, which is reported to be the most common form of supporting features, with 23.8% of HEIs having one.

3.3.3 Expert interview contributions

R&D in the field of 'grand challenges' has been an emerging form of cooperation in research between HEIs and business in recent years. These challenges generally have a long-term perspective and they are focused on major issues or challenges affecting society.

> **Markus Perkmann, Professor of Innovation and Entrepreneurship at Imperial College London**
>
> "Sometimes companies are very happy to be involved in Grand Challenges. [...] You see these initiatives which are large, ambitious innovation projects aimed at solving big problems perceived by a variety of different stakeholders (e.g. the aging society). We see this in the pharma industry where companies are for instance happy to sponsor research on human proteins and then allow for the results to be made public, there is no IP.
> This is creating a kind of 'industry commons' or 'knowledge commons' that industry relies upon, and this is why they sponsor these initiatives. Another scenario is where a business look at a collaboration with a university more like an out-sourced R&D function, this is a model being used by Rolls Royce, and it is working well. [...] All of these UBC activities can be really useful for academics to access resources and developing capabilities."

> **Robert Sorrell, Vice President for Public Partnerships at British Petroleum (BP)**
>
> "BP are involved in the Centres of Doctoral Training created by the last government in the UK. It has helped to create a critical mass of research capability in a particular area and it supports the development of a cohort of PhD students. These CDTs develop a cohort of students, 10-20 students per year over a 5-year period creating, so 50 to 100 highly skilled PhD students, to which industry also contribute in-kind support through lecturing or coaching input"

3.3.4 UBC case studies in research

STAFF MOBILITY CASE STUDY EXCERPT: CHANGE OF PERSPECTIVE AT POTSDAM CHAMBERS OF COMMERCE

The initiative 'Perspektiv Wechsel' was designed by the Potsdam Chamber of Commerce to foster knowledge transfer between industry and academia and to increase the level of innovativeness of SMEs in the state of Brandenburg. A business representative and a university academic exchange their workplaces for one day to experience their exchange partner's professional environment. By getting a glimpse of working life in industry or in a HEI respectively, the academic or business representative has the opportunity to broaden their horizon and form new contacts that can result in long-term partnerships.

For more information go to https://ub-cooperation.eu/pdf/cases/W_Case_Study_Perspektivwechsel.pdf

JOINT R&D CASE STUDY EXCERPT: COOPERATION OF GROGLASS AND THE UNIVERSITY OF LATVIA

Groglass is an innovative Latvian SME whose R&D is undertaken mostly in cooperation with universities and research centres. The main reason for setting up this cooperation was to develop new and existing products. After collaborating with international consultants, they realised they needed local support. In 2008 established close cooperation with the University of Latvia and its Solid State Physics Institute (SSPI), which is the leading institute in this domain. Together they have developed new products and solved various production related problems, which has increased Groglass competitiveness and position it as a European leader in its sector.

For more information go to https://ub-cooperation.eu/pdf/cases/E_Case_Study_GroGlass.pdf

CONSULTING CASE STUDY EXCERPT: WMG AT WARWICK UNIVERSITY

At the core of the University of Warwick, WMG is a large department with over 500 academic and research staff that supports many sectors with advanced and leading innovation and technologies. Their wide range of services includes consulting services for companies ranging from multinationals to regional SMEs, which particularly benefit from this knowledge. Consulting is done by a multidisciplinary team, many possessing industry backgrounds, coupled with extensive experience of technology applied R&D. This allows them to relate with both businesses and academics. The team can provide consulting directly and also tap into the extensive academic resources of the University of Warwick when required.

For more information go to https://ub-cooperation.eu/pdf/cases/N_Case_Study_WMG.pdf

JOINT R&D CASE STUDY EXCERPT: KOLEKTOR GROUP AND SLOVENIAN UNIVERSITIES

The Kolektor Group, a large knowledge-based Slovenian company, lacked specific knowledge to develop new technology and products. Therefore, Kolektor established joint R&D with the faculties of mechanical and electrical engineering of the universities of Ljubljana and Maribor. Kolektor's small team of R&D personnel manage the absorption of R&D knowledge and technologies back into the company. Their long-term joint research is aligned to Kolektor's long-term research goals and is co-financed by Kolektor and the universities. The daily project solutions are conducted on a consultancy basis to find immediate solutions and are funded by Kolektor.

For more information go to https://ub-cooperation.eu/pdf/cases/E_Case_Study_Slovenia.pdf

3.3.5 UBC policy in research

UBC policies for research are focused on cooperation in R&D

Overall, as previously identified, the policy measurements for UBC in research are more common than in education. Within research, there are considerably more policy initiatives for cooperation in R&D than for staff mobility. The most common policy measures for both activities are programmes, followed by strategies and then instruments.

Some of these policy initiatives for UBC research include:

Innovation Fund Denmark. The main research funding body in the country, established the Industrial PhD Programme as part of the Industrial Researcher Programme. The Industrial PhD programme aims at fostering UBC through joint curriculum design and delivery. Students supported are enrolled in a PhD programme at a university whilst also working for a private enterprise. The competitive grants provide funding for three years and the model became an international good practice example adopted in many European countries.

In France. The regulation for the mobility of researchers in France gives a possibility for researchers to undertake a mobility of at least two years with another research organisation, abroad, in public administration or in a business.

The Concordat to Support the Career Development of Researchers in the United Kingdom. This is an agreement between the funders and employers of researchers in the UK aimed at promotion of inter-sectoral mobility of researchers, including business placements.

The Catapult Programme in the United Kingdom. The Catapult Programme created not-for-profit, independent physical centres where businesses can connect with the research and academic communities. The centres are designed to address specific thematic and subject areas to help improve the science base of UK companies. With almost 3,000 SMEs supported since their launch, academic cooperation is at the core of these Centres.

3.3.6 UBC indicators for research

The high extent of cooperation in R&D contributes to it having the most developed UBC indicators

21.6% of all UBC indicators discovered in the European review are dedicated to UBC in research and most were measured quantitatively. Most indicators exist for cooperation in R&D (12% of all UBC indicators), which reflect that cooperation in R&D is one of the most developed UBC activities in each of the target countries. It is also relatively easy to create measures for and its measurement is relatively well developed in Europe.

UBC AREA	TYPE OF ACTIVITY	PROPORTION OF INDICATORS	QUALITATIVE	QUANTITATIVE	AVAILABLE	PARTIALLY AVAILABLE	NOT AVAILABLE
Research 21.6%	collaboration in R&D	6.6%	5%	95%	40%	10%	50%
	consulting	12.0%	2.8%	97.2%	36.1%	19.4%	44.4%
	mobility of staff	3.0%	0%	100%	0%	11.1%	88.9%

Table 8: European indicators for research UBC

3.4 UBC ACTIVITIES IN VALORISATION

3.4.1 Literature on UBC activities in valorisation

> John Goddard, Professor Regional Development Studies at Newcastle University
>
> "Student entrepreneurship is a key issue, and is currently getting a great deal of attention. It is incredibly important for students to gain the skills to think and act entrepreneurially. It increases their employability and it is even better if they end up setting up their own business."

Valorisation[18]-related UBC activities which relate to the 'third mission' of the HEI have featured very prominently in literature (Shane, 2004; Steenhuis and De Bruijn, 2002). Whilst there are documented cases of valorisation-related UBC early in the last century, the creation of the Bayh Dole Act in 1980 in the USA corresponded with a surge focus on academic entrepreneurship globally. As HEIs were provided with the right and obligation to commercialise their research results, the focus on cooperation in the commercialisation of patents, licences and spin-outs became much more prominent (Siegel et al., 2003).

The main UBC activities in valorisation, which were identified in the literature review and subsequently used in the survey, are grouped into two categories: commercialisation of R&D and entrepreneurship.

Commercialisation of R&D results including disclosures of inventions (Jensen et al., 2010; Bercovitz and Feldmann, 2008),

18 Valorisation comes from the Dutch word Valorisatie, which means to make value of something and was chosen to describe this area as an all-encompassing name for commercialisation and entrepreneurship UBC activities.

patenting (Bekkers and Bodas Freitas, 2008; Cohen et al., 2002; Schartinger et al., 2002; Klofsten and Jones-Evans, 2000), sales (Klofsten and Jones-Evans, 2000) and licenses (Bekkers and Bodas Freitas, 2008; Cohen et al., 2002; Schartinger et al., 2002; Klofsten and Jones-Evans, 2000).

Entrepreneurship including creation of new ventures (spin-outs) by researchers based upon their research (Jensen et al., 2010; Bercovitz and Feldmann, 2008; Shane, 2004; Siegel et al., 2003; Etzkowitz et al., 2001; Bonaccorsi and Piccaluga, 1994), creation of new ventures (spin-outs) by researchers not based upon their research (Etzkowitz et al., 2001), creation of new ventures by students (Davey et al., 2011; Tornatsky et al., 2002) and co-creation of firms by academia and industry (Henrekson and Rosenberg, 2001).

3.4.2 Survey results on the development of UBC in valorisation activities

A large portion of cooperating academics and businesses do not engage in valorisation

AREA OF COOPERATION	TYPE OF ACTIVITY	RESPONDENT GROUPS	AVE.
Valorisation	commercialisation of R&D results	Academic	3.1
	academic entrepreneurship	HEI manager	4.7
	student entrepreneurship	Business	3.1

		Academic	HEI manager	Business
comm. R&D results	not at all	45.9%	18.4%	35.4%
	low	27.0%	35.4%	28.40%
	medium	18.0%	31.0%	25.10%
	high	9.1%	15.1%	11.20%

		Academic	HEI manager	Business
academic entrepre-neurship	not at all	46.8%	17.0%	50.4%
	low	26.6%	33.1%	25.1%
	medium	17.1%	30.2%	14.7%
	high	9.5%	19.7%	9.8%

		Academic	HEI manager	Business
student entrepre-neurship	not at all	44.9%	13.7%	55.2%
	low	28.9%	29.9%	23.9%
	medium	16.0%	30.7%	13.5%
	high	10.2%	25.7%	7.3%

Table 9: To what extent do you undertake university-business cooperation?
Answered by academics, HEI managers and business. Scale: 1 = not at all, 10 = to a high extent

Survey results indicate student entrepreneurship is the most developed activity, rated medium to highest by HEI managers (56.4%) and academics (26.2%). Cooperation in commercialisation of R&D emerged as the least developed valorisation activity overall, whereby for businesses, it is assessed as the most developed activity among others.

Furthermore, results show the different perceptions of the groups about student entrepreneurship, which is the most developed UBC valorisation activity for academics and HEI managers and the least developed for businesses. Businesses perceive commercialisation of R&D results as the most developed activity, which is the lowest one for academics and HEI managers.

	Academics	HEI manager	Business
commercialisation of R&D results	3.0	4.4	3.6
academic entrepreneurship	3.1	5.1	2.7
student entrepreneurship	3.0	4.7	2.9

Aligned with the literature review, survey results also show that commercialisation of R&D is still not a common practice for most academics. Around 81% of European academics that are engaged in UBC have not created start-ups or spin-offs in the last 12 months. 81% did not register patents and 87% did not make any licence deals based upon their own research in the last 12 months.

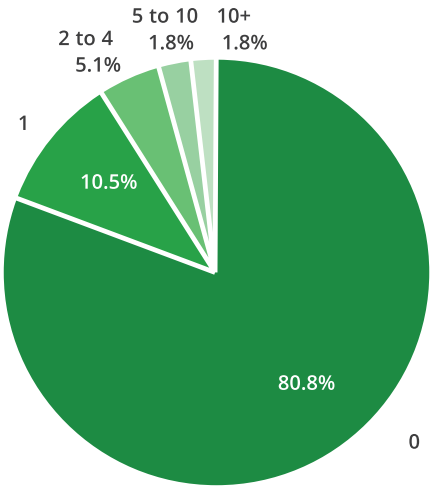


Figure 15: Start-ups not created from your own research (last 12 months) – as answered by cooperating academics

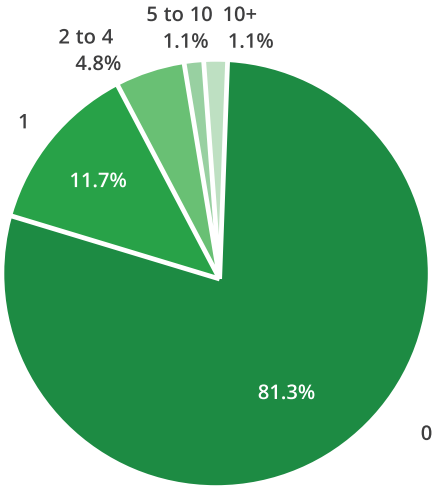


Figure 16: Spin-offs created from your own research (last 12 months) – as answered by cooperating academics

Fewer than 20% of academics have been involved in creating start-ups resulting from own research.

Comparison to 2010-11 study – This is a slight increase compared to 2011, when 83.6% of the respondents indicated to not have been involved in the creation of a start-up not from their own research.

18.7% of academics have been involved in the creation of one or more spin-offs created from their research in the last 12 months.

Comparison to 2010-11 study – This is a decrease of 10.3 points compared to 2011. Similar to the licence deals, there is a decline in those academics creating more than one spin-off.

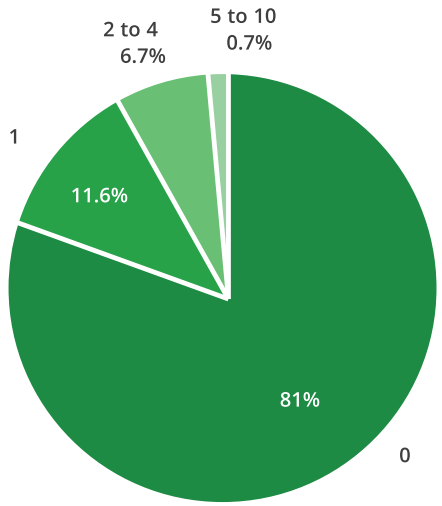


Figure 17: Patents registered based upon your own research (last 12 months) – as answered by cooperating academics

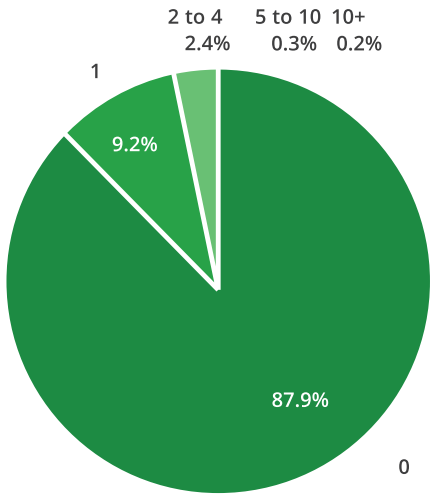


Figure 18: Licence deals based upon your own research (last 12 months) – as answered by cooperating academics

Fewer than 20% of academic respondents have registered a patent based on their own research in the last 12 months.

Comparison to 2010-11 study – Similar to the licence deals and spin-offs, also this activity appears to have declined compared to 2011, with only 75.1% of the 2011-respondents reporting to not have registered any patents.

Just under 3% of the cooperating academics has reported to have been involved in more than 2 licence deals in the last 12 months. Whereas 87.9% of the respondents having not made a license deal in the last 12 months.

Comparison to 2010-11 study – This is a reduction to the 79.7% of the academics reported to not have been involved in this activity in 2011. There is a decline amongst those academics that were more frequently involved in this activity, as 12.3% indicated to have done more than 1 deal in the last 12 months, compared to 2.9% now.

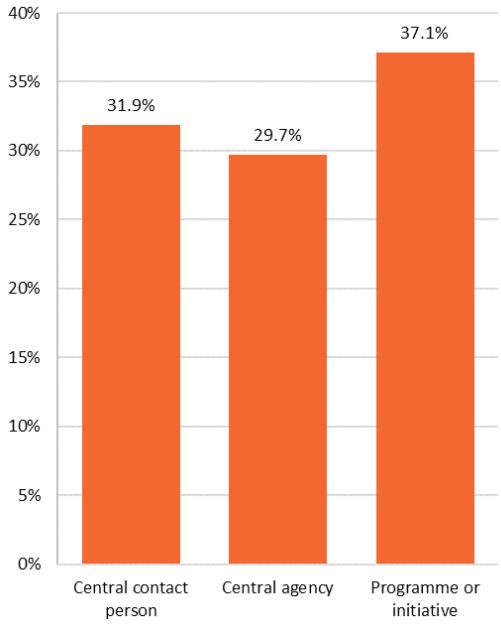


Figure 19: Presence of supporting features for entrepreneurship – as answered by HEI managers

As can be seen in the graphic on the left, having a program or initative are the most common forms of support features offered for entrepreneurship (37.1%).

Comparison to 2010-11 report – The presence of a 'programme or initiative' for entrepreneurship has significantly increased (6.7), compared to the 2010-11 study. Similarly, there is also an increase in respect to central agencies supporting entrepreneurship, with 23.2% of HEIs reporting the presence of this feature in 2010-11, compared to 29.7% reporting its presence in 2016-17. The presence of a central contact person seems to have remained nearly stable, with 31.9% reporting its presence in 2016-17, which is a 1.4 point increase.

3.4.3 UBC case studies in valorisation

STUDENT ENTREPRENEURSHIP CASE STUDY EXCERPT: TIIMIAKATEMIA AT JYVASKYLA UNIVERSITY

Imagine an undergraduate learning environment where there are no exams, no classrooms, no teaching or teachers and no control over what students should learn. Although this model seems somewhat futuristic, it already has a successful 23-year history: Tiimiakatemia (Team Academy). Located in Jyvaskyla, Finland, students run their own cooperative businesses, supported by coaches, and learn with real money and real customers to earn their Bachelor of Business Administration. Students emerge with well-developed individual soft skills crucial for business administration as well as a well-developed network of potential customers, employers, mentors and investors. With high student employability and rates of entrepreneurship in graduates, Team Academy has justifiably attracted interest from educators across the world, leading to its adoption at over 30 locations in 15 countries.

For more information go to https://ub-cooperation.eu/pdf/cases/N_Team_Academy.pdf

STUDENT ENTREPRENEURSHIP CASE STUDY EXCERPT: GHENT ENTREPRENEURSHIP ECOSYSTEM

Student Ghentrepreneur is an initiative that brings together disparate regional stakeholders to support student entrepreneurship for all students in the city of Ghent. Previously, each HEI worked on their own to encourage students to develop their innovative ideas. However, in bringing together regional entrepreneurship actors to create economies of scale, a more supportive environment for entrepreneurship was born with the formation of the Student Ghentrepreneur Alliance. The alliance offers a broader network, a larger variety of events, coaching and many support and educational activities in comparison to the previous isolated and institutionally-bound offerings. The primary goal of the alliance is to create an ecosystem that fosters entrepreneurship, which is directly beneficial for the city, the business partners and the HEIs.

For more information go to https://ub-cooperation.eu/pdf/cases/W_Case_Study_Ghent.pdf

COMMERCIALISATION CASE STUDY EXCERPT: UNIVERSITY CITY SCIENCE CENTER

The Science Center, established in 1963, is the oldest urban research park and one of the pioneers of the business incubation model. The core aim of the Science Center is to facilitate technology-based economic development in the region through helping entrepreneurs, amplifying the commercialisation of research and enriching the innovation ecosystem. The Science Center is supported by more than 30 stakeholders, amongst which some of the leading universities, industry and government stakeholders, which provides a strong regional support for its activities. Through its business incubation services, the Quorum (the entrepreneur's clubhouse) and its connections to capital it has brought forward more than 500 companies which account for €12b in economic output per annum which is 2.2% of the region's total.

For more information go to https://ub-cooperation.eu/pdf/cases/I_Case_Study_Science_Center.pdf

COMMERCIALISATION CASE STUDY EXCERPT: AREA SCIENCE PARK

AREA Science Park is located in Trieste, North east of Italy, Friuli Venezia Giulia Region. Its mission is to develop the growth and competitiveness of enterprises through innovation and technological research, technology transfer, innovation management, management of R&D programmes and knowledge-intensive enter-prise creation. AREA has an in-house incubator Innovation Factory, which supports would-be entrepreneurs from their initial idea to the birth of their start-up. From business plan validation to company acceleration, In-novation Factory accompanies start-ups along their growth path. Since Innovation Factory was founded in 2006 more than 1,600 business projects have been evaluated and 281 entrepreneurial ideas have embarked upon a valorisation process. Fifty new start-up companies have been founded, of which 20 are co-founded by Innovation Factory.

For more information go to https://ub-cooperation.eu/pdf/cases/S_Case_Study_Area.pdf

3.4.4 UBC policy in valorisation

Policy focuses heavily on valorisation activities at HEIs

The policy review revealed that valorisation is the UBC area that gets more policy attention and within valorisation, both commercialisation and entrepreneurship are similarly covered. They also have a similar number of instruments, programmes and strategies.

Some of these policy initiatives for valorisation are:

The Fund for Innovations in FYROM. It offers co-financed grants for newly established enterprises with an innovative project or product in the prototype phase. There is preferential funding available for projects that support cooperation between private sector and HEIs/ research institutions. The grant supports the continued development of innovative ideas emerging from research institution or HEIs. It also offers grants and loans for commercialisation of research results and innovations.

Financial Instruments-Start Programme in Latvia. Funded by the European Social Fund, it provides start-ups with financial backing to expand their business as well as offering consultations and advice on how to progress further. The Entrepreneurship Support Centre located at the Stockholm School of Economics in Riga, organises entrepreneurial field activities for young people who show a propensity towards innovation, helping to make Riga the Baltic hub for entrepreneurship.

Doctor Startupper Programme in Italy. It grants annual scholarships to Italian and foreign research doctors who intend to launch an innovative start-up / spin-off in Italy based on research conducted in one of the twelve areas of national specialisation. The Research Start-up Programme selects beneficiaries among Doctor Startupper scholars and provides them with zero-interest financing.

The Strategy for Education, Science and Technology in Croatia. It supports the development of entrepreneurial skills through the engagement of networks of industrial mentors and trainers in the educational process. The Industrial Strategy and the Strategy for Development of Entrepreneurship both support entrepreneurial skills development within educational institutions as a key characteristic of education at all levels.

3.4.5 UBC indicators for valorisation

Most valorisation UBC indicators are for commercialisation of R&D results

Indicators for valorisation represent over half of the UBC indicators collected. The majority of valorisation indicators are those related to commercialisation of R&D results, which are mostly quantitative and over half of them are available fully or partly. Entrepreneurship indicators are also almost entirely quantitative and just above half are fully or partly available.

UBC AREA	TYPE OF ACTIVITY	PROPORTION OF INDICATORS	QUALITATIVE	QUANTITATIVE	AVAILABLE	PARTIALLY AVAILABLE	NOT AVAILABLE
Valorisation 54.8%	entrepreneurship	15.3%	2.2%	97.8%	48.9%	4.4%	46.7%
	commercialisation of R&D results	39.5%	0.9%	99.1%	67.2%	10.9%	21.8%

Table 10: UBC indicators for cooperation in valorisation in Europe

3.5 UBC ACTIVITIES IN MANAGEMENT

3.5.1 Literature on UBC activities in management

The management-level UBC activities illustrate a more strategic nature to cooperation. As an example, Guimón (2013) describes shared-resources as a high-intensity UBC activity, whilst Cosh et al. (2005) nominate that providing a 'public space' is also a role of the HEI. Sponsorships have a long history as a form of cooperation (Etzkowitz, 1998) with funds being received in return for exposure and perceived support.

Whilst governance is being increasingly recognised as an area of UBC, there are early illustrations of UB governance, whereby business people were present on HEI boards and vice-versa. Examples of this early governance cooperation can be found in HEIs established to promote the interests of business, like Coventry University, the former Coventry College of Design that has been rewarded with the 2013 UK Entrepreneurial University of the Year and 2015 UK Modern University of the Year.

The main UBC activities in management, which were identified in the literature review and subsequently used in the survey, are grouped into three categories: governance, shared services and industry support.

Governance including academics involved in firm decision-making or sitting on the boards of firms (Davey et al., 2011), business leaders involved in HEI decision-making or sitting on the boards of HEIs (Davey et al., 2011), business leaders involved in university decision-making involved at a faculty management level (Davey et al., 2011), hierarchic structures and models of hierarchic governance (Jessop, 1998), policy communities (Kitagawa and Lightowler, 2013), advisory roles (Kitagawa and Lightowler, 2013) and regional leadership (Drucker and Goldstein, 2007).

Shared services including association contracts (Bonaccorsi and Piccaluga, 1994), university-industry research consortia (Bonaccorsi and Piccaluga, 1994; Rahm and Hansen, 1999), university-industry cooperative research institutes/centres (Henrekson and Rosenberg, 2001; Rahm and Hansen, 1999; Bonaccorsi and Piccaluga, 1994), specialist research centres (Bercovitz and Feldmann, 2006), shared human resources (Henrekson and Rosenberg, 2001), financial and advisory aid to research-based firms (Henrekson and Rosenberg, 2001), innovation/incubation centres (Bonaccorsi and Piccaluga, 1994), research, science and technology parks (Rahm and Hansen, 1999; Bonaccorsi and Piccaluga, 1994), creation of electronic networks (Geuna and Muscio, 2009) and equipment and resource sharing (Kitagawa and Lightowler, 2013).

Industry support include sponsorship (D'Este and Perkmann, 2011; Boardman, 2009), course sponsorship (Kock et al., 2000), sponsored or adjunct professorships/sponsored university chair in an area of interest (Ssebuwufu et al., 2012), informal exchange forums and workshops (Bonaccorsi and Piccaluga, 1994), scholarships and postgraduate linkages (Bonaccorsi and Piccaluga, 1994) and industry sponsored meetings and conferences (Caniëls and Van den Bosch, 2011).

3.5.2 Survey results on the development of UBC in management

All management UBC activities are at low levels of development

AREA OF COOPERATION	TYPE OF ACTIVITY	RESPONDENT GROUPS	AVE.
Management	governance	Academics	3.2
	shared resources	HEI manager	4.8
	industry support	Business	3.1

		Academics	HEI manager	Business
governance	not at all	47.9%	10.9%	53.1%
	low	24.0%	28.7%	21.7%
	medium	17.8%	34.1%	14.4%
	high	10.2%	26.3%	10.8%

		Academics	HEI manager	Business
shared resources	not at all	44.5%	18.1%	36.7%
	low	30.5%	38.5%	28.9%
	medium	17.0%	29.9%	21.4%
	high	7.9%	13.5%	13.0%

		Academics	HEI manager	Business
industry support	not at all	42.9x%	13.5x%	44.4%
	low	27.9x%	35.1%	26.0%
	medium	18.7%	33.4%	18.2%
	high	10.5%	18.0%	11.4x%

Table 11: To what extent do you undertake university-business cooperation?
Answered by academics, HEI managers and business. Scale: 1 = not at all, 10 = to a high extent

Survey results highlight that industry support is ranked as the most developed form of activity, reported medium to highest by academics (29.2%) and businesses (29.6%), whilst governance ranked the least, except HEI managers who assessed it as the most developed form of activity compared to others.

Additionally, results show that the three groups perceive governance activities at a low level of development, however, each of them rate their level of development differently.

	Academics	HEI manager	Business
governance	3.1	5.3	2.9
shared resources	3.0	4.2	3.2
industry support	3.6	4.7	3.2

3.5.3 UBC case studies in management

SHARED RESOURCES CASE STUDY EXCERPT: JOINT CENTRE OF UC3M AND AIRBUS GROUP

A formal UBC agreement between University Carlos III Madrid (UC3M) and the Airbus Group has been in place since 2008. It covers education, R&D, knowledge transfer and innovation in the aerospace industry. A key element of the agreement is the Airbus-UC3M Joint Centre for Aeronautic Systems Integration, situated at the UC3M Science Park. The Joint Centre hosts 38 research groups which reflect the match between the multi-disciplinary demands of the aerospace sector and the engineering and systems capabilities of UC3M. Direct collaboration of interdisciplinary teams on R&D projects drives the competitiveness of Airbus Group technology.

For more information go to https://ub-cooperation.eu/pdf/cases/S_Case_Study_Airbus.pdf

GOVERNANCE CASE STUDY EXCERPT: THE ENGAGED UNIVERSITY CONCEPT AT SIMON FRASER UNIVERSITY

Simon Fraser University (SFU) has developed and implemented its vision and strategy to be the leading engaged university. The university undertook a dialogue-driven and iterative sense making process that aimed to better understand what SFU stood for at that time and what it should stand for. The term 'engagement' emerged from the extensive consultation process with internal and external stakeholders as the core attribute to all functions, including education, research and SFU's linkage to the community. Based on this, SFU developed a strategy and various initiatives that today contribute to the university's vision of being an engaged university.

For more information go to https://ub-cooperation.eu/pdf/cases/I_Case_Study_SFU.pdf

SHARED RESOURCES CASE STUDY EXCERPT : TIM JOINT OPEN LABS AT ITALIAN HEIS

Joint Open Labs (JOLs), research and innovation laboratories set up within university centres, are the result of partnerships and agreements between Telecom Italia and major Italian HEIs in specific fields of scientific and technological interest. JOLs are fully-functioning joint interdisciplinary laboratories where ideas and solutions are generated and new value added to the shared goals of research and in-novation. Activities at the JOLs are part of a virtuous cycle of three main components: Education (implementation and teaching of Master courses), Research (joint laboratories for selected areas of interest) and Trial and Industrial Transfer (field testing in areas of interest to the company, in which the HEIs excel).

For more information go to https://ub-cooperation.eu/pdf/cases/S_Case_Study_Telecom.pdf

INDUSTRY SUPPORT CASE STUDY EXCERPT CASE:
DAIRY CREST INNOVATION CENTRE AT HARPER ADAMS UNIVERSITY

Dairy Crest, a leading British dairy company, set up a £4m (€4.8m) innovation centre on the campus of Harper Adams University in Shropshire (England). Starting from the partnership aimed at joint research and development R&D projects between the company and the specialist university, the establishment of the new innovation centre as a shared facility is taking the partnership to a new more comprehensive level. Beyond research, development and innovation (RDI) collaboration, Dairy Crest also helps provide additional business-relevant education and input to the design and delivery of curricula.

For more information go to https://ub-cooperation.eu/pdf/cases/N_Case_Study_Harper.pdf

3.5.4 UBC policy in management

No policies directly aiming at UBC in management were found.

3.5.5 UBC indicators for management

Industry support has the most UBC indicators for management cooperation

UBC indicators for management are more developed than those for education despite being a far less developed type of cooperation. The majority of management indicators are those related to industry support and shared resources and are quantitative in their nature. Governance indicators are also almost entirely quantitative and just like industry support and shared resources indicators are not available at all.

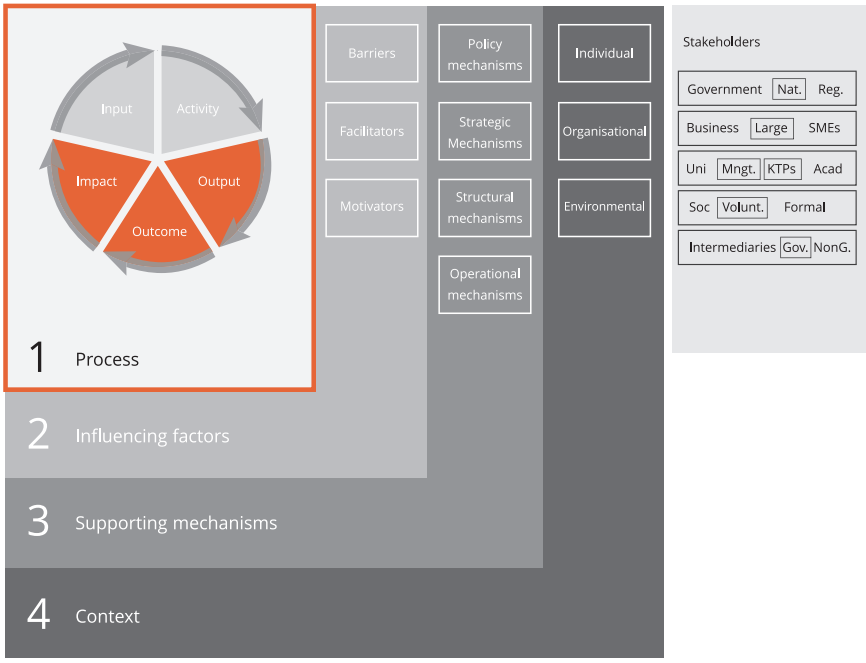
UBC AREA	TYPE OF ACTIVITY	PROPORTION OF INDICATORS	QUALITATIVE	QUANTITATIVE	AVAILABLE	PARTIALLY AVAILABLE	NOT AVAILABLE
Management 13.3%	governance	3.7%	27.3%	72.7%	45.5%	0%	54.5%
	industry support	4.7%	0%	100%	71.4%	0%	28.6%
	shared resources	2.3%	0%	100%	0%	0%	100%

Table 12: European indicators for UBC in management

3.6 RESULTS OF/FROM UBC AND FUTURE INTENTIONS

This section details who gets the results (output, outcome, impact) of UBC according to the UBC stakeholders.

Benefits are the perceived positive outcomes (financial and non-financial) from undertaking UBC as relevant for the different stakeholder groups that can potentially participate in UBC. One's perception regarding who benefits from such cooperation can influence the decision of the stakeholders to increase or decrease their participation in UBC activities. For example, if academics perceive their own benefits to be low, they may refrain from engaging in UBC. Yet, if they perceive benefits for students to be high, they might undertake actions that contribute to students' involvement in UBC.



3.6.1 Negative consequences of UBC

There is a possibility that UBC can result in negative consequences for all stakeholders

Even when most of the results for UBC are positive for all stakeholders involved, which give them many reasons for engaging (van der Sijde, 2012), it cannot be ignored that UBC is sometimes perceived as something that can have negative results for different stakeholders. These potential negative perceptions create resistance and thus it is critical to understand whether and to what extent they are present in the environment in order to design strategies to reduce them. The main concerns of UBC are related to:

For academics/HEI managers:

- Questionable influence of business on the curriculum (Gillis and McNally, 2010; Barnett, 2002) or the research agendas.
- Potential manipulation by industry (Krimsky, 2003; Carayol, 2003; Slaughter and Leslie, 1997).
- A shift of focus for research and knowledge production away from societal interests towards industry interest (Ssebuwufu et al., 2012).
- Potential interference (instead of integration) with research and education (Chatterton and Goddard, 2000).
- Potential decrease research productivity (Goldfarb, 2008; Carayol, 2003; Agrawal and Henderson, 2002) and ability to publish (Carayol, 2003).
- Possible disclosure of research results (Nelson, 2004; Carayol, 2003; Blumenthal et al., 1996).
- Too heavy influence of business in the researcher's choice of research topic (Cooper, 2009; Mendoza, 2007; Behrens and Gray, 2001; Blumenthal et al., 1986).
- Questionable net value of focussing on technology transfer (Kenney and Patton, 2011).
- Technology transfer operations could often run at a loss (Breznitz and Feldman).
- Possible exploitation of students in their mobility to industry (Slaughter et al., 2002).
- Questionable net return from knowledge transfer efforts considering the extensive resources that are invested into UBC (Bozemann et al., 2012a; Sonnenwald, 2007; Hagedoorn et al., 2000; Allen, 1977).

For businesses:

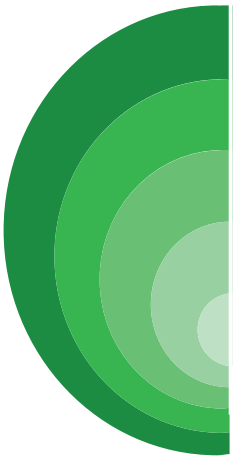
- Time required to integrate HEIs' research into the production process of an industrial setting is considered a time consuming complex process (Wissenschaftsrat, 2007).
- HEIs potentially lack the capabilities to respond to the short-term solutions that businesses require (Howells, Ramlogan, and Cheng Shu-Li, 2012), delaying the company's objectives.
- Potential financial risk (Ankrah, 2007).

3.6.2 Who benefits from UBC?

Academics and businesses perceive that they get less benefits from UBC than other stakeholders

Benefits are the perceived positive outcomes (financial and non-financial) from undertaking UBC as relevant for the different stakeholder groups that can potentially participate in UBC.

One's perception regarding who benefits from such cooperation can influence one's decision to increase or decrease their participation or the involvement of other groups. For example, if academics perceive their own benefits to be low, they may refrain from engaging in UBC. Yet, if they perceive benefits for students to be high, they might undertake actions that contribute to students' involvement in UBC.



	ACADEMICS		HEI MANAGERS		BUSINESS	
1	Businesses	4.1	Businesses	4.0	Students	4.1
2	Universities	3.9	Universities	4.0	Universities	3.9
3	Students	3.8	Students	4.0	Businesses	3.9
4	Academics	3.8	Society	3.8	Academics	3.8
5	Society	3.7	Academics	3.6	Society	3.6
6	Government	3.3	Government	3.4	Government	3.0

Figure 20: To what degree do you think these stakeholders benefit from UBC?
Answered by academics, HEI managers and business. Scale: 1 = not at all, 10 = to a high extent || Legend: > = lowest

In the survey, academics, HEI representatives, and business managers were asked to what extent various stakeholders receive benefits from UBC. Overall, academics and HEI managers have similar perceptions on the benefits of UBC compared to businesses. The former two perceive higher UBC benefits for businesses than for HEIs and students, while business managers perceive it is students and universities who receive the highest benefits. Additionally, all groups selected academics and society as two stakeholders unlikely to gain positive outcomes from UBC. Government is ranked by all groups as the least likely stakeholder to gain benefits from cooperation.

Oliver Bücken, Head of Entrepreneurship and Technical Education at UnternehmerTUM

"Some of the major results of our entrepreneurship education programme include new start-ups, patents and licenses, companies benefitting from new ideas, students better equipped for the world of business"

Keith Herrmann, Director of Employability and Careers at University of Surrey

"From the human capital point of view, the outcomes can be seen in graduates securing jobs resulting from university-business collaboration. Companies get the talent they need to be productive, to compete and to be future oriented. Beyond this, from the commercial research perspective, IP and new technologies derived from partnerships as well as licence revenues are one of the key results of UBC. Furthermore, there are also benefits for academic publications resulting from UBC, which is obviously also a crucial outcome for academics. This too extends the value derived from co-operating with industry beyond the commercial. Finally, UBC can also enable social dividends, which, even if they are hard to measure, have an impact on society, particularly in the areas or regions where the partnerships are located."

3.6.3 Willingness to recommend cooperation: The Net Promoter Score

Both academics and businesses in Europe would recommend UBC in research, less so in education

Cooperating academic perspective

Net Promotor Score[19] for academic UBC in E&T

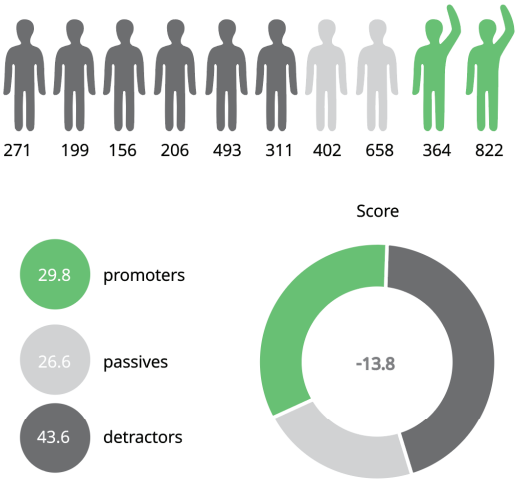


Figure 21: How likely is it that you would recommend to an academic colleague to engage in UBC in education?

Net Promotor Score for UBC in R&D

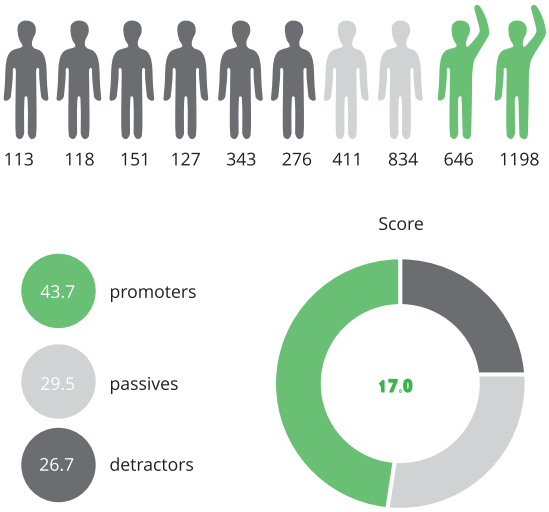


Figure 22: How likely is it that you would recommend to an academic colleague to engage in UBC in R&D?

European academics active in UBC were questioned about their willingness to recommend their peers to cooperate with businesses in the area of education and training (E&T). Using the Net Promoter Score (NPS) metric, a proxy for customer satisfaction, it can be seen that there is a wide gap in the level of support towards UBC in education among academics.

The calculations show that a high percentage of academics self-define as detractors of UBC in the field of education (43.6), while a significantly lower number of respondents nominate themselves as promoters (29.8) followed by the passives (26.6). These perceptions are reflected in the NPS of -13.8, an indicator that cooperating academics are less likely to recommend their peers to engage in UBC in E&T.

For R&D, the NPS metric reveals a contrasting pattern compared to the results related to cooperation in E&T. Academics are willing to recommend their peers to cooperate with business in the area of R&D to a much larger extent.

The calculations show that a high percentage of academics self-define as promoters' of UBC in R&D (43.7), while a considerably lower number of respondents nominate themselves as passives (29.5) followed by detractors (26.7). These perceptions are reflected in the NPS of 17.0, an indicator that cooperating academics are likely to recommend their peers to engage in UBC in R&D.

19 The Net Promoter Score (NPS) is a measurement mechanism to measure someone's feelings and thinking towards a specific thing. The NPS is expressed in detractors, passives and promoters, ranked on a scale of -100 to +100. Where the single promoter score focusses on a single client, the NPS is calculated by detracting the % of promoters by the % of detractors (Frederick Reichheld, 2003).

Cooperating business perspective

Net Promotor Score for UBC in education

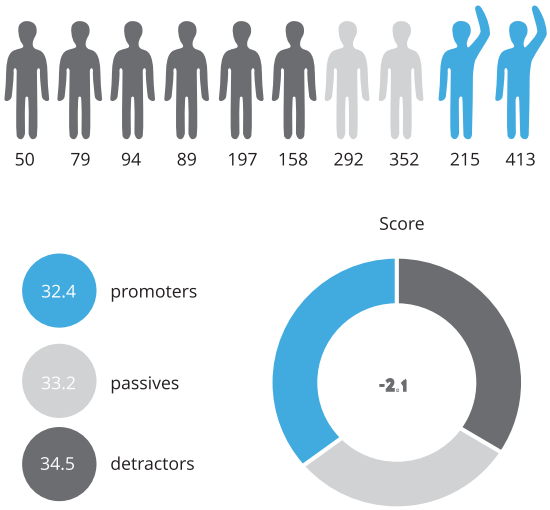


Figure 23: How likely is it that you would recommend to a business colleague to engage in UBC in education?

Net Promotor Score for UBC in R&D

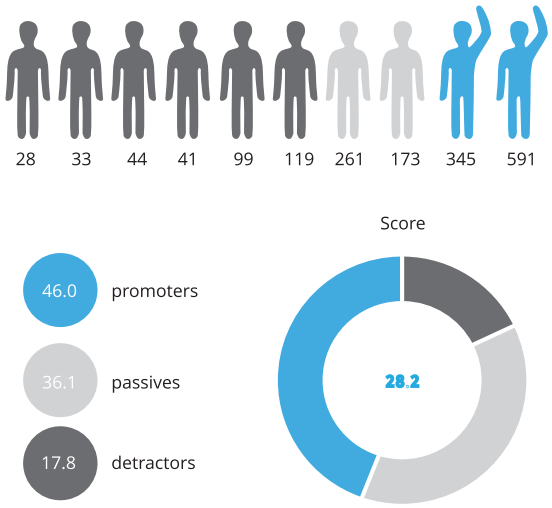


Figure 24: How likely is it that you would recommend to a business colleague to engage in UBC in R&D?

The percentage of managers offering support, passivity and disapproval towards UBC in education and training are almost equally divided. The results show that a similar percentage of business managers are considered detractors (34.5), passives (33.2) and promoters (32.4) of UBC in E&T.

A negative NPS of -2.1 indicate that cooperating businesses show a general passivity towards cooperating in education and training.

Businesses are more likely to recommend to their colleagues to collaborate with HEIs in R&D, compared to those that are willing to recommend UBC in education, which indicates an immediate need for improvement of cooperation in E&T.

Almost half of businesses can be defined as promoters of UBC in R&D (46%), 36.1% as passives and a considerably lower portion of respondents as detractors (17.8).

A positive NPS of 28.2 indicate that cooperating businesses show a strong support to UBC in R&D.

3.6.4 Future intentions regarding UBC

98% of academics and business collaborators intend to maintain if not increase collaboration

Cooperating academics

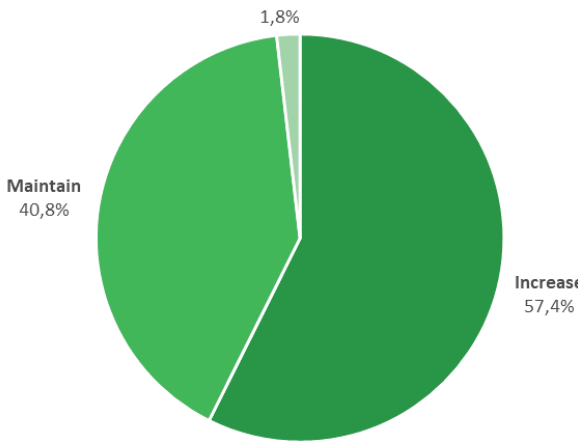


Figure 25: I plan to ... my cooperation with business in the future.

Non-cooperating academics

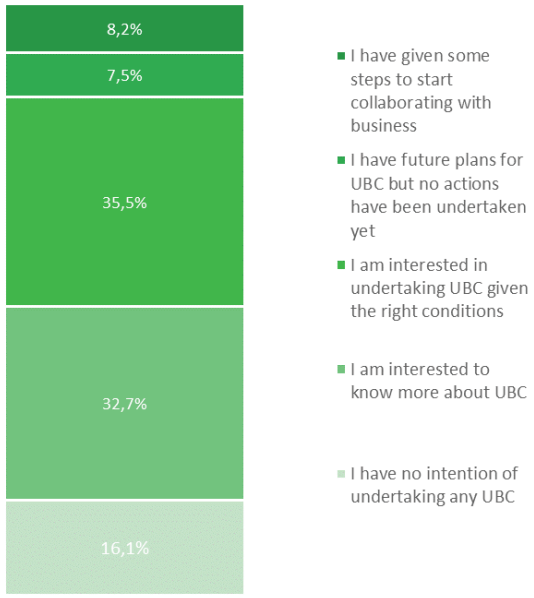


Figure 26: Please select the most appropriate statement

Cooperating academics

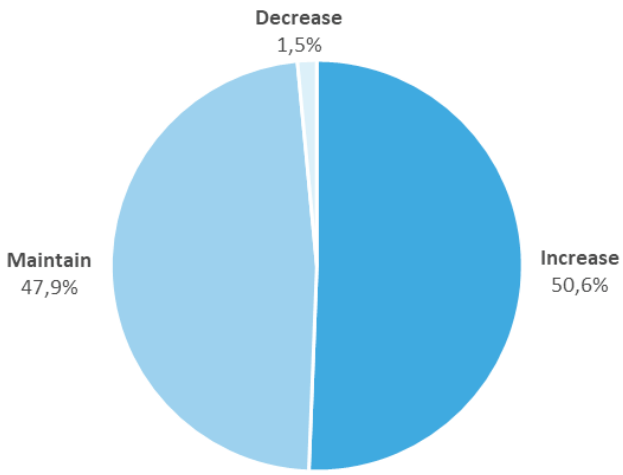


Figure 27: I plan to ... my cooperation with business in the future.

Non-cooperating academics

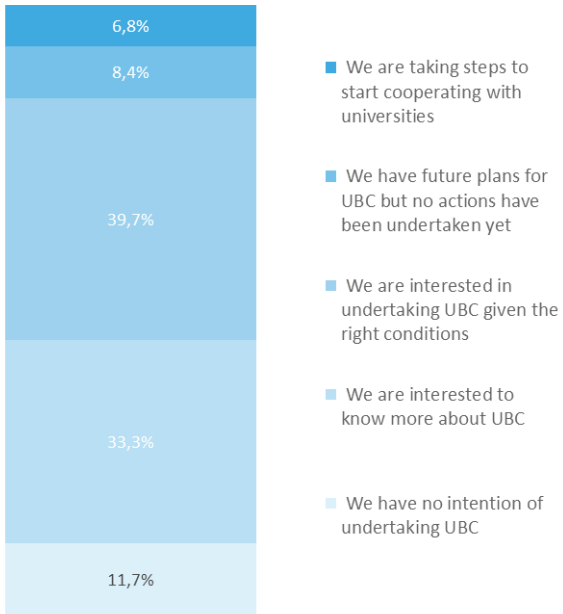
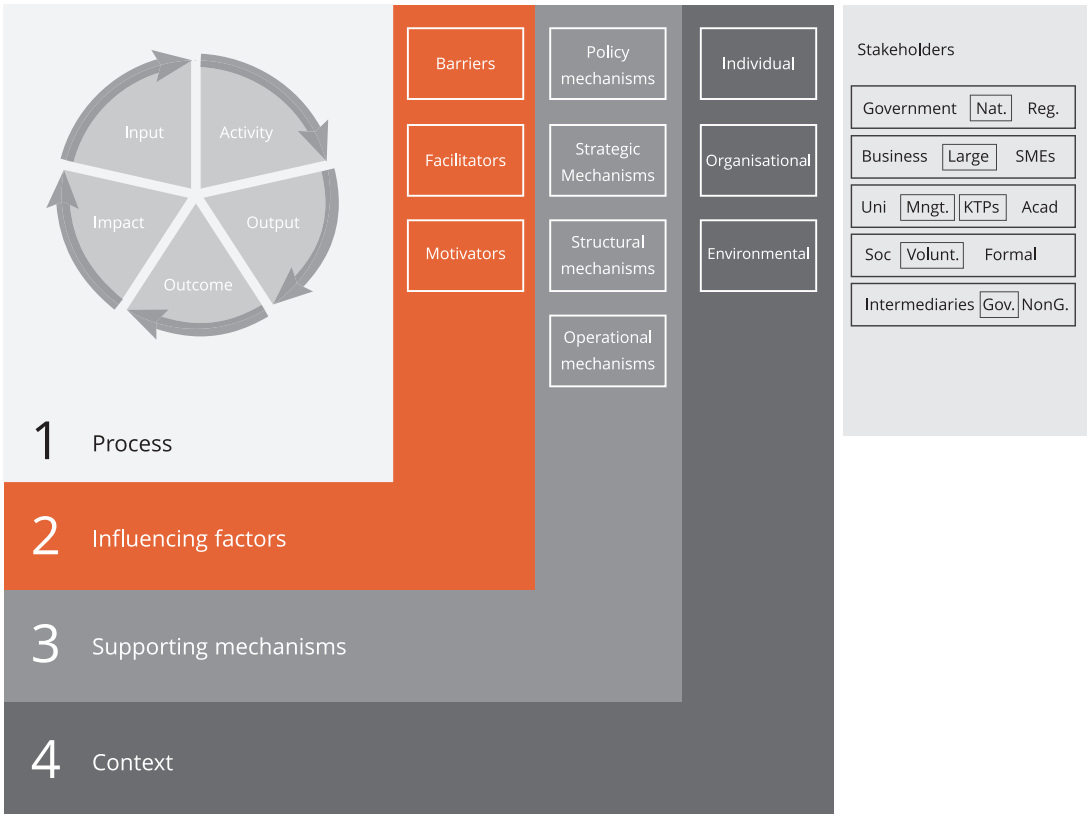


Figure 28: Please select the most appropriate statement

Despite a slightly negative NPS for education, both cooperating academics and businesses show a very strong commitment to UBC, with 98% of both groups stating they will maintain or increase their cooperation. As for their non-cooperating counterparts, the majority indicate their interest to getting involved with, knowing more about or having intentions to start undertaking UBC.

CHAPTER 4

FACTORS THAT INFLUENCE UBC



This section outlines the extent to which various factors affect UBC. This is especially relevant because cooperation with business particularly for academics is generally discretionary behaviour and so, can be easily discouraged.

Generally, a barrier provides a hindrance or obstacle to do something. Drivers are comprised of facilitators, which enable or ease the process, and motivators, which trigger the starting of an activity and are often related to the expected outcome(s).

4.1 RELATIONSHIP BETWEEN BARRIERS AND DRIVERS

A common assumption is that once barriers are overcome, collaboration will occur. However, removing a barrier does not necessarily invite UBC but rather it makes UBC possible. It is generally considered that a barrier provides a hindrance or obstacle to do something, whilst drivers are said to provide the reason propelling to do it. In this context, it is the facilitators, which provide the capability to do something, and the motivators drive to do the UBC activity (drivers). For example, even when a lack of funds is often named as a major barrier to cooperation, the presence of funds may not be enough for cooperation to happen if the facilitators or motivators are not sufficient.

4.2 MOTIVATORS OF UBC

Research outcomes drive academic cooperation

Academics that don't cooperate perceive research motivators much less than those that do

AREAS	UBC MOTIVATORS	COOPERATING ACADEMICS	ACADEMICS NOT COOPERATING
Promotion	obtain funding / financial resources increase my chances of promotion improve my reputation within the university	5.2	5.0
Research	use my research in practice gain new insights for research	7.7	5.8
Education	improve my teaching (i.e. the learning experience and skills of students) improves graduate employability	7.1	6.2
Society	contribute to the mission of the university address societal challenges and issues	6.8	6.4

Table 13: How relevent are the following motivations for your cooperation with business?
Answered by academics. Scale: 1 = not at all, 10 = to a large extent

Perceptions of the European academics cooperating with business and those not cooperating have clear differences when asked about their motivations. Referring to the table above, academics who do not cooperate with business were found to perceive UBC motivators for research and education less strongly than those who cooperate, overall mean scores of 5.8 to 7.7 (research) and 6.2 to 7.1 (education) respectively. Interestingly, the desire to contribute to society is not only a major driver for academics who already cooperate, but the major driver for those academics not cooperating.

Manuel Perez Alonso, a Professor in Genetics who has created nine spin-out companies all related to his research in biomedicine, genetics and genomics, provides an insight into motivations for academics to cooperate with existing, or creating unique new businesses.

Manuel Perez Alonso, Professor in Genetics at the University of Valencia

"Not long ago, a student that is working on his PhD in Barcelona told me, that he is conducting experiments that then end up in publications. This is the path that he thinks will never enable him to see the real results of his own work.
This is very different to what a carpenter experiences after building a chair. After his work, he sees a chair that another person can actually sit on. We have a problem in science that the very long journey of the experimentation... that is undoubtedly necessary... requires a lot of effort in general, however there is no vocation about the results being applied to society.
In Europe we are sadly experiencing, (science) in a tangled mess, a labyrinth. The great majority of experimentation remains in publications and papers. I had already witnessed this when I was almost twenty, I saw that this would be the case all my life (if I stayed in science), being stuck in this tangled mess. I was clear that I had to come out of it and do something that could reach citizens. This is my main force, seeing things in place."

Research motivations for academics to cooperate are increasing

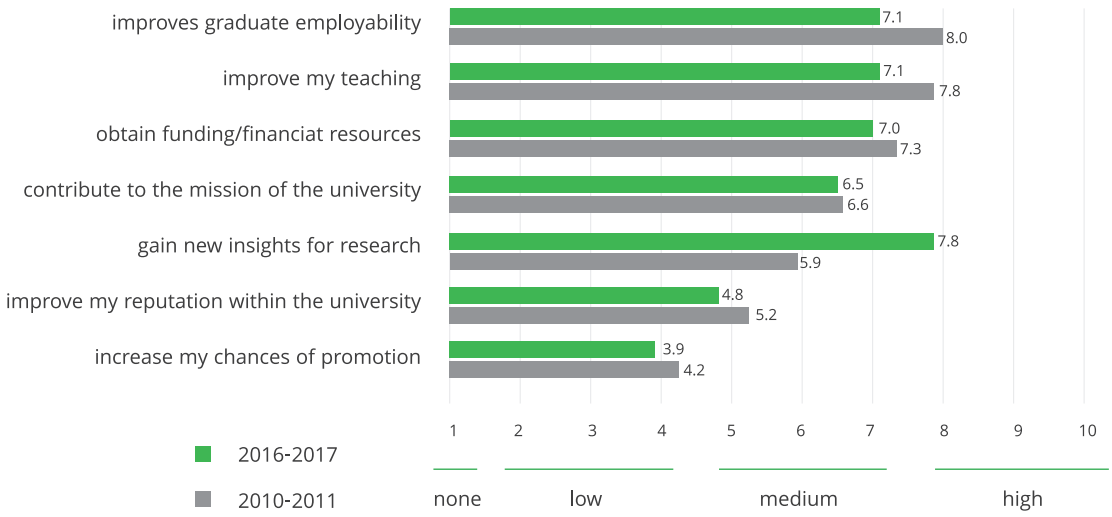


Figure 29: How relevent are the following motivations for your cooperation with business? Comparison of 2010-11 results vs. 2016-17 results

Answered by academics. Scale: 1 = not at all, 10 = to a high extent

In a comparison of the results obtained in academic motivators for UBC between the 2010-11 and 2016-17 studies, it can be seen that nearly all motivators were perceived higher in 2010-11 than in 2016-17, except one item, gaining new insights for research. Crucially, this motivator taps into one of the key motivations of academics, their research, and the cooperating academics are perceiving cooperation with business to be significantly higher.

While the same motivator scored highest among all others in the 2016-2017 study, the ranking order of the other motivating factors has not changed between the two UBC studies, except for that one factor. Improving graduate employability, improving my teaching, and obtaining funding/financial resources are still perceived as the strongest motivators of cooperation by European academics, whilst increasing chances of promotion remains the least motivating factor.

Oliver Bücken, Head of Entrepreneurship and Technical Education at UnternehmerTUM

"One of the issues with entrepreneurship at universities is that each faculty and research group has their own interests. For this reason, we need to create multiple access points to entrepreneurship thinking and acting and these access points need to relate to their interests to get them interested in entrepreneurship."

Access to funding and financial resources are the major motivations for HEI managers to cooperate with business

AREAS	UBC MOTIVATORS	AVE.
Education & Reputation	improve the reputation of the university improve the university´s teaching (i.e. the learning experience and skills of students) improve graduate employability contribute to the mission of the university	7.8
Research	use the university´s research in practice gain new insights for research	7.9
Society	address societal challenges and issues positively impact society	7.7
Funding	obtain funding / financial resources	8.2

Table 14: How relevant are the following motivators for your university to cooperate with business?
Answered by HEI managers. Scale: 1 = not at all, 10 = to a high extent

According to the table, HEIs collaborate with businesses for a wide range of different reasons, however the primary reason is to obtain funding/financial resources (8.2) followed by research drivers (7.9).

Business managers are motivated to engage in UBC for reasons related to longer-term innovation capability

AREAS	UBC MOTIVATORS	AVE.
Education & Reputation	Improve the reputation of our business Provides access to better qualified graduates Improve the skills of our current employees through training	6.5
Research	Obtain a customised solution for our business Improve our innovation capacity Get access to new technologies and knowledge Access new discoveries at an early stage Access university facilities	6.9
Society	Positively impact society	6.6
Funding	obtain funding / financial resources	7.0

Table 15: How relevant are the following motivators for your business to cooperate with universities?
Answered by business. Scale: 1 = not at all, 10 = to a high extent

As illustrated in the table above, funding and research outcomes are the primary factors motivating European business to cooperate with HEIs.

Natascha Eckert, Director University Relations at Siemens

"A barrier is the fact that the differences in time horizons are huge. While universities work with project that lasts several years (usually involving PhD students that require fix contracts during this period), the financial planning for Siemens is annual in the best case and for some units it is even done in a quarterly basis."

Each stakeholder group has its own motivation for UBC: Academics for their research, HEI representatives for disparate reasons and business for innovation outcomes

ACADEMICS COLLABORATING WITH BUSINESS		HEI MANAGERS		BUSINESS COLLABORATING WITH HIGHER EDUCATION	
1 Gain new insights for research	7.8	Obtain funding / financial resources	8.2	Get access to new technologies and knowledge	7.6
2 Use my research in practice	7.7	Improve graduate employability	8.1	Improve our innovation capacity	7.6
3 Existence of funding to undertake the cooperation	7.1	Use the university´s research in practice	8.1	Access new discoveries at an early stage	7.1
4 Address societal challenges and issues	7.1	Improve the reputation of the university	7.9	Obtain funding / financial resources	7.0
5 Improve graduate employability	7.1	Positively impact society	7.9	Provides access to better qualified graduates	6.8
> Increase my chances of promotion	5.5	Address societal challenges and issues	7.7	Access university facilities	5.4

Figure 30: How relevant are the following motivators for your cooperation with business / universities?
Answered by academics, HEI managers and business. Scale: 1 = not at all, 10 = to a high extent || Legend: > = lowest

All three groups are motivated to engage in UBC for different reasons, although generally HEI representatives perceive these factors as stronger motivators than academics and business managers.

Academics' main motivators are related to their research, either to gain new insights or use it in practice. HEI representatives are also highly motivated to use the university research in practice. However, the main motivator for HEI representatives is to obtain funding, which is also the third and fourth most important motivator for academics and businesses respectively.

The main motivators for businesses are driven by organisational resource development, such as the access to new technologies and knowledge, new discoveries and better qualified graduates.

Unlike the first three motivators for academics, the fourth and fifth are not related to their own direct benefit. Academics are motivated to address societal challenges and to improve graduate employability. Those two motivators are also in the top five for HEI representatives, along with the improvement of organisational reputation; whereas European business identified that they are primarily driven by their own benefits.

The following expert interview with Gonzalo Leon highlights the rationale for universities (in this case technical) to collaborate with industry.

Gonzalo León, Vice President for Research at Universidad Politécnica de Madrid

"There are more advantages than disadvantages. From the perspective of the technical universities there are four main reasons to cooperate:

1. UBC offers to the students a fresh understanding of the types of industrial activities and of the behaviour of the companies, which they are going to work with after graduating from the university.
2. Another reason to collaborate is the access to the facilities and machinery offered by companies. The collaboration with industry enables a much cheaper or even free access for academia than in the market.
3. The possibility to work with the businesses in joint research can also be considered as a motivation for academia and business to engage in UBC, because this kind of cooperation enables the quick transfer of the technologies and prototypes into industrial level.
4. UBC through contract-research agreements provides universities with key additional funds to hire students or to buy equipment.

UBC case study related to motivations

STRUCTURAL MECHANISM FOR JOINT R&D CASE STUDY EXCERPT: AMIRA P260

The AMIRA P260 project provides an outstanding example of a long-term collaborative research project can prosper by recognising, and delivering on, the motivations of each of the involved stakeholders. The project involves researchers from the University of South Australia and major sponsors from the minerals and mining industry. In recognising the motivations of the both the academic and business project partners, a unique project structure has been developed that allows it to deliver strategic-basic research outcomes (blue sky research outcomes) as well as immediate, economy-driven results (applied and contract research outcomes) for partners. Now in its eighth iteration and running for over 29 years, the project has involved over 100 sponsor operations. P260 is an exemplar university-business research collaboration that has delivered proven outcomes including 300 refereed research publications, an excellent record of employment for the 50 PhD students and the total benefits delivered from the project exceeding $1AU billion (€670 Million).

For more information go to https://ub-cooperation.eu/pdf/cases/I_Case_Study_Amira_P260.pdf

4.3 FACILITATORS OF UBC

Relationships facilitate academic cooperation

AREAS	UBC FACILITATORS	AVE.
Relational	Short geographical distance between the two organisations Existence of mutual trust Existence of mutual commitment Existence of a shared goal Prior relation with the business partner	7.3
Orientation	Commercial orientation of the university Scientific orientation of the business Existence of funding to undertake the cooperation Interest of business in accessing scientific knowledge Interest of the university in accessing business-sector R&D facilities	6.7

Table 16: How much do the following factors facilitate your cooperation with businesss?
Answered by cooperating academics. Scale: 1 = not at all, 10 = to a high extent

Based on the survey responses received from European academics cooperating with business, the most important facilitators emerged as those related to the relationship component of UBC activities, highlighting the importance of relationships in cooperation.

Greater facilitators exist for academics than in 2011

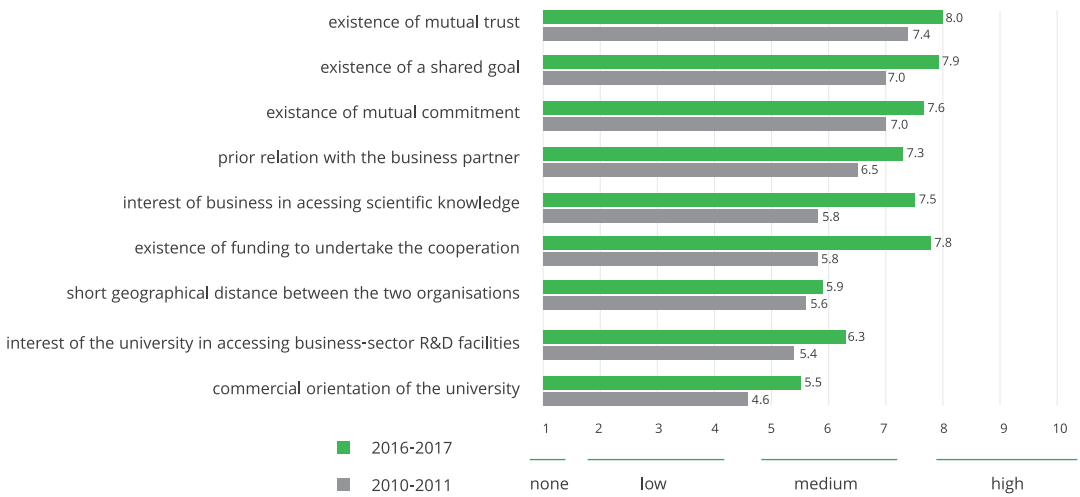


Table 16: How much do the following factors facilitate your cooperation with businesss? Comparison of 2010-11 results vs. 2016-17 results. Answered by academics. Scale: 1 = not at all, 10 = to a high extent

When comparing perceptions between the two studies, the results show all facilitators are ranked higher in 2016-2017 than in 2010-2011. One item existence of funding to undertake the cooperation perceived particularly stronger in the current study (5.8 to 7.8) suggests that greater funding is being made available.

On the other hand, the order of the facilitators has not changed between the two studies regarding their importance. The relationship factors existence of mutual trust, existence of a shared goal, and existence of mutual commitment maintained their position in the top three, whilst commercial orientation of the university is perceived as the least important factor facilitating UBC in both studies.

Good personal relationships and the existence of a shared goal are the main facilitators of UBC together with the existence of funding

AREAS	UBC FACILITATORS	AVE.
Relational	Short geographical distance between the two organisations Existence of mutual trust Existence of mutual commitment Existence of a shared goal Prior relation with the business partner	7.7
Orientation	Commercial orientation of the university Scientific orientation of the business Existence of funding to undertake the cooperation Interest of business in accessing scientific knowledge Interest of the university in accessing business-sector R&D facilities	7.2

Table 17: How much do the following factors facilitate the cooperation of your university with business? Answered by HEI managers. Scale: 1 = not at all, 10 = to a high extent

Like the European academics, the European HEI managers also perceive relationships to be the greatest facilitator of UBC. HEI managers generally perceive both areas higher than academics and businesses.

Personal relationships based on mutual trust, commitment and a common goal are driving business managers to cooperate.

AREAS	UBC FACILITATORS	AVE.
Relational	Flexibility of the university partner Short geographical distance between the two organisations Existence of mutual trust Existence of mutual commitment Existence of a shared goal Prior relation with the university partner	7.2
Orientation	Commercial orientation of the university Interest of the university in accessing our knowledge Scientific orientation of our business Existence of funding to undertake the cooperation Access to university R&D facilities Attractive IP conditions for our business	6.5

Table 18: How much do the following factors facilitate the cooperation of your business with universities? Answered by business. Scale: 1 = not at all, 10 = to a high extent

Similar to the other stakeholder groups, also European businesses perceive relationships as the highest facilitators.

All UBC stakeholders agree that trusted, committed, financed and mutually beneficial relationships drive UBC

	ACADEMICS COLLABORATING WITH BUSINESS		HEI MANAGERS		BUSINESS COLLABORATING WITH HIGHER EDUCATION	
1	Existence of mutual trust	8.0	Existence of mutual trust	8.3	Existence of mutual trust	8.0
2	Existence of a shared goal	7.9	Existence of a shared goal	8.1	Existence of a shared goal	7.8
3	Existence of funding to undertake the cooperation	7.8	Existence of funding to undertake the cooperation	8.0	Existence of mutual commitment	7.7
4	Existence of mutual commitment	7.6	Existence of mutual commitment	8.0	Existence of funding to undertake the cooperation	7.7
5	Interest of business in accessing scientific knowledge	7.5	Prior relation with the business partner	7.7	Prior relation with the university partner	7.0
>	Commercial orientation of the university	5.5	Short geographical distance between the two organisations	6.4	Short geographical distance between the two organisations	5.7

Figure 32: What is facilitating cooperation between HEIs and businesses?
Answered by academics, HEI managers and business. Scale: 1 = not at all, 10 = to a high extent || Legend: > = lowest

The majority of UBC facilitators perceived by academics, HEI managers, and businesses are similar. UBC is enabled and eased mostly by relationship-related and funding facilitators.

The main four facilitators for the three groups are identical. For all of them UBC is mostly facilitated by the existence of mutual trust, mutual commitment, a shared goal and funding to undertake UBC. The fifth largest facilitator for HEI managers and business managers is the prior relation with the partner, another relationship related factor.

The short geographical distance between the two organisations is the least facilitating factor for HEI managers and businesses, whereas academics rank the commercial orientation of the university as the least important.

In the interviews, according to experts there was a need for a shift in thinking overall for UBC development by all involved stakeholders. There was recognition of the perspective change necessary, from seeing UBC as a unidirectional, transactional, market-push activity to one that is built of mutually beneficial relationships involving knowledge exchange and co-creation. For this to take place, a stable environment for UBC is required with good communication channels, which is likely staffed by professionals with a mix of business and academic experience.

The following expert interview excerpt with Peter Rohan highlights the importance of creating mutually beneficial relationships as a foundation for collaboration.

Peter Rohan, Former Partner-National Head of Education at Ernst & Young / Strategic Advisor to Universities

"There remain signs of "naive" selling by universities, as they try to convince industry and others to collaborate (i.e. give money to) particular research projects.
Successful collaboration between universities and industry must be based on a mutually beneficial relationship - not simply a one off deal. All parties to the collaboration need to understand the sought-for benefits of the other parties - that is, the others' self-interest. Without trying to understand the potential benefits of the potential industry partner, it will be difficult to achieve a successful university industry collaboration.
And this notion of "self-interest "equally applies internally to universities, where researchers are typically more driven by a research publication record that a successful industry collaboration. To encourage researchers to seek industry collaboration, where appropriate, universities need to align the academic performance system to reward or encourage this behaviour by individual academics – as they are unlikely to do so just for the betterment of the university overall."

UBC case study related to facilitators

STUDENT MOBILITY CASE STUDY EXCERPT: STUDENT SUPPORT AND CAREER DEVELOPMENT CENTRE AT UNIVERSITY OF ZAGREB

The Student Support and Career Development Centre at the Faculty of Organisation and Informatics of the University of Zagreb is a key intermediary facilitating collaboration between students and employers in and around the cities of Varaždin and Zagreb. Built around a number of mechanisms that shape students competences and presentation for the labour market, the centre also uses an innovative approach to providing comprehensive employer branding services that make companies highly visible and attractive to suitable talented graduates. This centre also acts as a focal point for the modular integration of industry problems and challenges into educational curricula for undergraduates or as topics for master theses.

For more information go to https://ub-cooperation.eu/pdf/cases/S_Case_Study_CPSRK.pdf

4.4 BARRIERS TO UBC

Cooperating and non-cooperating academics perceive a similar existence of barriers inhibiting UBC with both stating funding and resources to be the biggest inhibitors

AREAS	UBC BARRIERS	COOPERATING ACADEMICS	ACADEMICS NOT COOPERATING
Awareness barriers	Business lack awareness of university research activities / offerings Universities lack awareness of opportunities arising from UBC Difficulty in finding the appropriate collaboration partner No appropriate initial contact person within either the university or business	5.6	6.3
Funding & resources barriers	Lack of business funding for UBC Lack of university funding for UBC Lack of government funding for UBC Limited resources of SMEs	6.5	6.4
Internal (university) barriers	Bureaucracy related to UBC Insufficient work time allocated by the university for academics´ UBC activities UBC conflicts with my teaching and research responsibilities Frequent staff turnovers within my university or the business	5.7	5.7
Results barriers	The focus on producing practical results by business Business need for confidentiality Limited absorption capacity of business	5.4	5.7
Cultural barriers	Lack of people with scientific knowledge within business Differing motivation / values between university and business Differing mode of communication and language between university and business Differing time horizons between university and business	5.7	6.2

Table 19: How relevant are the following barriers for your cooperation with business? Answered by academics. Scale: 1 = not at all, 10 = to a high extent

Although there are some differences between the perception of barriers for UBC by academics cooperating and those not cooperating, the majority of barriers perceived by the two groups are of a similar extent, with barriers related to funding and resources being perceived the highest by both groups.

Funding represents the largest barriers for HEIs to cooperate with business

AREAS	UBC BARRIERS	AVE.
Awareness barriers	Business lack awareness of university research activities / offerings Universities lack awareness of opportunities arising from UBC Difficulty in finding the appropriate collaboration partner No appropriate initial contact person within either the university or business	5.7
Funding & resources barriers	Lack of business funding for UBC Lack of university funding for UBC Lack of government funding for UBC Limited resources of SMEs	6.8
Internal (university) barriers	Bureaucracy related to UBC Insufficient work time allocated by the university for academics´ UBC activities UBC conflicts with my teaching and research responsibilities Frequent staff turnovers within my university or the business	5.4
Results barriers	The focus on producing practical results by business Business need for confidentiality Limited absorption capacity of business	5.7
Cultural barriers	Lack of people with scientific knowledge within business Differing motivation / values between university and business Differing mode of communication and language between university and business Differing time horizons between university and business	6.0

Table 20: How relevant are the following barriers for your university when cooperating with business??
Answered by HEI managers. Scale: 1 = not at all, 10 = to a high extent

The main barriers for HEIs to collaborate with businesses are related to the lack of funding and other resources by businesses and the government (6.8), followed by cultural barriers (6.0)

HEI managers perceive lower barriers to HEIs than six years ago

Figure 33: How relevant are the following barriers for your university when cooperating with business?
Comparison of 2010-11 results vs. 2016-17 results.
Answered by HEI managers. Scale: 1 = not at all, 10 = to a high extent

A comparison of results from the 2010-11 study to the 2016-17 study reveals that barriers to UBC were perceived to be higher in 2010-11 for all items, implying that restrictions affecting UBC in Europe have decreased from the perspective of HEI managers.

Funding represents the largest barrier for business to cooperate with HEIs

AREAS	UBC BARRIERS	COOPERATING BUSINESS	BUSINESS NOT COOPERATING
Awareness barriers	Our business lacks awareness of university research activities / offerings Universities lack awareness of opportunities arising from collaborating with our business Difficulty in finding the appropriate collaboration partner No appropriate initial contact person within the university	4.8	6.3
Funding & resources barriers	Lack of our own business funding for UBC Lack of government funding for UBC	5.8	5.9
Internal barriers	Bureaucracy related to UBC in our business Bureaucracy related to UBC in universities Frequent staff turnovers within the university or in our business	4.2	4.7
Results barriers	The focus on producing scientific outcomes (e.g. papers) by universities Limited absorptive capacity within our business	5.3	5.8
Cultural barriers	Lack of people with business knowledge within universities Lack of people with scientific knowledge within our business Differing motivations between universities and our business Differing mode of communication and language between university and our business Differing time horizons between universities and business	6.2	6.0

Table 21: How relevant are the following barriers for your cooperation with universities?
Answered by business. Scale: 1 = not at all, 10 = to a high extent

Cooperating businesses perceive lower barriers across all areas, however specifically when it comes to awareness and cultural barriers. Whereas there is only a minimal difference when it comes to the lack of funding.

For HEI representatives lack of funding and resources is the highest barrier to UBC, whilst academics perceive funding and business cultural barriers to be the most inhibiting

	ACADEMICS COLLABORATING WITH BUSINESS		HEI MANAGERS		BUSINESS COLLABORATING WITH HIGHER EDUCATION	
1	Limited resources of SMEs	6.9	Limited resources of SMEs	7.5	Differing motivations between u niversities and our business	6.0
2	Bureaucracy related to UBC	6.7	Lack of business funding for UBC	6.8	Lack of people with business knowledge within universities	6.0
3	Insufficient work time allocated by the university for academics´ UBC activities	6.7	Lack of government funding for UBC	6.7	Differing time horizons between universities and business	5.9
4	Lack of business funding for UBC	6.5	Lack of university funding for UBC	6.6	Lack of government funding for UBC	5.9
5	Lack of university funding for UBC	6.4	Insufficient work time allocated by the university for academics´ UBC activities	6.4	Bureaucracy related to UBC in universities	5.8
>	Frequent staff turnovers within my university or the business	4.2	Frequent staff turnovers within the university or in our business	4.1	Frequent staff turnovers within the university or in our business	3.3

Figure 34: What are the factors that inhibit UBC?
Answered by academics, HEI managers and business. Scale: 1 = not at all, 10 = to a high extent || Legend: > = lowest

The survey highlighted that, generally, European businesses perceive barriers lower in comparison to academics and HEI representatives, whose perceptions are similar, having four of the five main barriers in common. Both academic and businesses mention the limited resources of SMEs as the main barrier, together with insufficient time allocated by the university for academics' UBC activities and the lack of business and university funding. HEI representatives state that HEIs generally are more inhibited by the lack of funding, with four out of their five main barriers related to lack of funding or resources.

Bureaucracy related to UBC is more inhibiting for academics and business than for HEI representatives. Apart from bureaucracy and lack of government funding, businesses collaborating with HEIs are the only stakeholder group that perceives cultural barriers, such as the different motivations and time horizons and the lack of people with business knowledge at HEIs, to be highly inhibiting. Overall, frequent staff turnovers within the university or in businesses are not recognised as a significant barrier to UBC by any of the groups.

Within the expert interviews, a number of additional barriers were teased out, which have an inhibiting impact on collaboration between HEIs and business. The issue of accreditation processes inhibiting the ability of HEIs to respond to the fast changing needs of employers. Given "the importance of assessing and anticipating rapidly changing skill needs so that they can be addressed through responsive education and training systems" (OECD, 2016), processes that inhibit this process, should be reviewed and modernized.

Accreditation processes can limit the development of employment-focused curricula

The excerpt from the expert interview with Andreas Altmann below highlights the barrier of accreditation processes in creating employer-driven curricula.

> ### Andreas Altmann, Rector at Management Center Innsbruck – The Entrepreneurial School®
>
> "For education-related UBC, one of the biggest barriers may lie in accreditation processes which too often attempt to keep business influence from the curriculum or the school. Accreditation means by definition standardization and complying to standards. This is per se a contradiction to innovation.
> Accreditation processes, therefore, need to be reviewed, because they too often overvalue input factors rather than to the output of a university, a school or a program. Accreditation processes should encourage and promote innovative approaches as well customization to the needs of stakeholders instead of penalizing these issues."

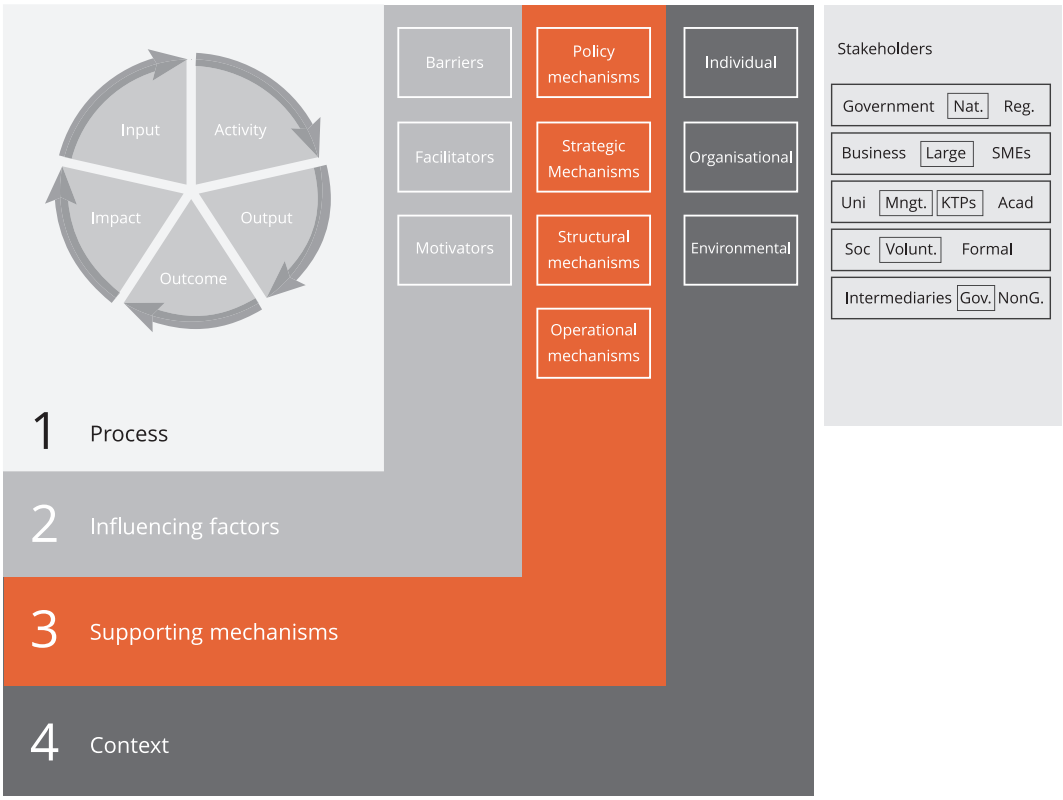
A further set of inhibiting factors were nominated by John Goddard including the limitation of university ranking systems and the need for academics to win research grants as limiting factors.

> ### John Goddard, Professor Regional Development Studies at Newcastle University
>
> "Important barriers are the university ranking systems and the ambition of academics to climb the academic institutional ladder. The need to win research grants leading to publications also hinders collaboration, as academics only want to collaborate with large research-intensive enterprises. Collaboration with smaller companies often does not generate research income or publications."

University ranking systems tend to be beset by not only focus on research publications over educational assessments, but also other issues such as geographical bias (Moed, 2017). This can have the effect of prioritising research outcomes over educational excellence leading to claims even suggesting that it is “denying us a ‘world-class’ global higher education system” (Hazelkorn, 2009). The ability to win research grants and write publishable material can also be limited by working with SMEs, leading to an aversion by academics to such collaborations.

CHAPTER 5

MECHANISMS THAT SUPPORT UBC



UBC supporting mechanisms are understood as different measures put in place by HEI managers, businesses and governments to develop and administer UBC as well as to create favourable conditions in which collaborative activities can prosper and deliver benefit to society.

Given that human nature is generally characterised by resistance to change (Bovey and Hede, 2001; Piderit, 2000), the supporting mechanisms aim to change the culture of HEIs (Kliewe et al., 2013) and bridge the substantial cultural differences between universities and businesses (Jones-Evans, 1998). Thus, the absence of supporting mechanisms causes that UBC remains isolated and a rare activity only reliant on the whims of those individuals willing to engage in collaboration.

While the current academic discussion places an overwhelming focus on TTOs and incubators (Plewa et al., 2006), UBC supporting mechanisms are represented by a wide range of diverse policies, strategies, structures and activities (Davey et al., 2011). The identification and management of these mechanisms is essential for understanding and analysing the current UBC extent as well as its future advancement (Geissler et al., 2006; Korff et al., 2014; Polt et al., 2001). Their effectiveness has been widely recognised (Fini et al., 2011; Herrmann, 2008; Tornatzky et al., 2002) in reducing and removing barriers, but also in facilitating UBC, although there is still a need for their adaptation with respect to specific UBC activities (Henrekson and Rosenberg, 2001).

Additionally, these mechanisms need to be aligned with the mission and culture facilitating UBC through the development of devoted strategies (Siegel and Phan, 2005). Furthermore, they are expected to link all levels of the institutions (Rasmussen et al., 2006). As an example, policies provide the regulatory and economic conditions (e.g. tax concessions for R&D) which in turn provide a space for UBC strategic mechanisms to be created (e.g. UBC strategy with a dedication of resources) often involving the establishment of structural mechanisms (e.g. creation of a knowledge transfer centre or position) that are able to initiate the development of operational mechanisms (e.g. UBC workshops addressing academics).

There are four types of supporting mechanisms:

1. Policy – regulations, funding, organisations or information created by regional, national and international governments to maximise the long term economic performance, welfare or other policy objectives of a region with focus on, or relation to, UBC.
2. Strategic – drafting and implementation of cross-functional high-level plans, methods, or series of maneuvers at a HEI that will enable it to achieve its long-term objectives with respect to UBC.
3. Structural – constructions, personnel and instutional programmes created as a result of top-level strategic decisions within (or related to) a HEI that enable UBC.
4. Operational – actions or events of a practical nature undertaken by a HEI to create and support UBC.

This section outlines the extent to which UBC supporting mechanisms are developed from the HEI and business perspective.

5.1 POLICY MECHANISMS SUPPORTING UBC

UBC policy mechanisms gather all the regulations of the UBC field at organisational level for HEI and business and are the responsibility of government. The primary types of UBC policies can be classified as (Borrás and Edquist, 2013):

- Economic and financial mechanisms, like funding, grants and subsidies, stimulus packages, infrastructure (Harman, 2010; Polt et al., 2001), taxation concessions and public seed capital (OECD, 2002) exist in order to provide specific pecuniary incentives (or disincentives) and support specific social and economic activities.
- Regulatory mechanisms limit and restrain UBC. These mechanisms set the frameworks allowing something or banning it and include UBC laws and regulations (Tartari and Breschi, 2011).
- Other policy mechanisms are those that do not belong to either of the first two categories. These mechanisms provide recommendations, make normative appeals or offer voluntary or contractual agreements, they are non-coercive and include governance, government programmes, education and training programmes (Reynold et al., 2002), public promotion programmes (Polt et al., 2001), and hiring policies (Tartari, Perkmann, and Salter, 2012).

About half of all European countries have a recognizable strategy for UBC

In the 33 countries involved in the study, it is not common that policies address all UBC areas simultaneously, since UBC is a phenomenon whose activities often fall into separate ministries/agencies. About half of the countries have a strategy for UBC. This represents a commitment at a broader level. Nonetheless, in very few countries these strategies are translated into specific instruments or programmes that address the UBC phenomenon in a comprehensive way.

An example is the University Industry Liaison Office Network in Cyprus, which coordinates the development and operation of offices in six Cypriot HEIs by aiming to improve lifelong learning, collaboration in research projects, student mobility and the promotion of innovation in both businesses and HEIs.

Rewarding HEIs for UBC through alterations to funding could offer potential as a policy approach for encouraging UBC

From the interviews, in terms of policy, the need to shift the assessment of universities and academics away from a focus on publications, to a focus on UBC, university engagement generally and societal impact were repeatedly mentioned. The majority identified the importance of the role of government in encouraging UBC and the need for change to increase outcome and impact for society.

The most commonly suggested mechanism to foster this shift was for government to change the funding indicators for HEIs towards a greater recognition of UBC, as a means for changing universities behaviour and priorities. The need for greater coordination and alignment between the different layers of government, to limit the resulting complexity, was also mentioned. A serial academic entrepreneur called for a European 'Bayh Dole Act', involving 'one single patent system with a uniform validity across Europe'.

The role of government is seen as the objective facilitator, who understands and considers the needs of both HEIs and business and creates policies that facilitate win-win situations. One expert remarked 'the government plays the role of catalyst, which helps the stakeholders to avoid and overcome the barriers as well as to create the right conditions for effective collaboration between academia and industry'. Moreover, the government can act as an informant of the main challenges and priorities that they perceive, effectively as a proxy for societal needs.

The following excerpt from the expert interview with Eric Claassen, who is 20% academic and 80% entrepreneur[20], emphasises how funding can be used to focus academics on greater external engagement.

> ### Eric Claassen, CEO at Vironovative BV and Professor of Entrepreneurship in Life Sciences at Vrije Universiteit Athena Institute.
>
> "A cultural shift to celebrate academic entrepreneurs could be made through a change in the funding emphasis towards demonstrated societal impact transfer and give those researchers extra points for demonstrated impact in society. If you give out enough of this 'impact research money', then you create a role model research programme and therefore stimulate others to do this. This really needs top-down attention and stimulation."

The use of funding by government to incentivise the desired behavior by HEIs is also something that was observed during the life of the project. Recent developments in this area have recently been taking place in both Denmark and Sweden. The Teaching Excellence Framework (TEF) in the UK is focused on improving student employability through teaching, whilst the Research Excellence Framework (REF) in the UK is in place as a framework for assigning research funding by identifying potential research outputs, their impact beyond academia, and the environment that supports research. Incentivizing HEIs to cooperate with business focus on measures of engagement or outcomes in education, research, valorisation and management.

Government has a role in supporting UBC

The expert interview with Robert Sorrell highlights the important role that government can play in supporting UBC.

> ### Robert Sorrell, Vice President for Public Partnerships at British Petroleum (BP)
>
> "Government has a really important role to play in UBC. For example, sitting around the table at the Energies Technologies Institute and having the ability for us to talk with government about their objectives, such as the 2050 emission targets, and people from the supply chain around the technologies we need to deploy to meet those goals. It is incredibly important to have government alongside industry and academia sitting around the table and having discussions. You need to have all three groups around the table if you want to get anywhere because each has a role to play. Universities contribute through research and developing capability (education), the government is involved in providing public funding and appropriate policy frameworks to support innovation and industry has a role in terms of articulating the challenges and seeing how we can develop approaches to address them. It is important to have a relationship between all three triple helix actors."

20 Eric also won a Dutch NGI Valorisation Award for 'Excellent deal making with Industry' worth 1 million Euro

5.2 STRATEGIC MECHANISMS SUPPORTING UBC AT HEIS

HEIs are formally committed to UBC but lack strategies that implement it within the HEI, particularly those directly incentivising academics

AREAS	UBC STRATEGIC MECHANISMS	AVE.
Paper strategies	A strategy supporting UBC A documented mission / vision embracing UBC A top-level management committed to UBC A coordinated communication approach for UBC	6.8
Implementation strategies	Business experience considered in the recruitment of academics Recognition of academics for their UBC activities The dedication of resources (incl. funding) to support UBC The inclusion of 'cooperation with business' as part of the assessment of work performance for academics The measurement of UBC performance and outputs The practice of recruiting business professionals into the knowledge transfer area The reduction of teaching time for undertaking collaboration with business	4.9

Table 22: Thinking about your university, how developed are the following strategies?
Answered by HEI managers. Scale: 1 = not at all developed, 10 = highly developed

As illustrated in the survey, the most common mechanisms utilised by HEIs to support UBC are in the form of paper strategies, which officially signal a measure of commitment to business engagement (6.8). However, the strategies designed to implement those paper strategies, implementation strategies, are significantly less developed (4.9).

This highlights that the way in which European HEIs signal a tacit commitment to the development of UBC, however fail to reinforce this with mechanisms that will aid the implementation of UBC. Until the level of commitment to implementation strategies for UBC at HEIs more equally matches the paper strategies for UBC, UBC development will remain unfulfilling of its potential.

This is particularly true for incentives for academics, as the least developed strategies include incentivising academics to collaborate (5.0), including UBC in academic assessment (4.8), recognising academic UBC (4.6) or reducing academic teaching time for undertaking collaboration (4.0).

The following excerpt from Paul Hannon's expert interview reinforces how clear strategies underpin UBC at HEIs.

> **Paul Hannon, Director Institute for Entrepreneurial Leadership at Swansea University**
>
> "Clear university strategies and policies are needed to build a strong engagement with business and industry through strategic partnerships. Some universities have very clear processes for doing this with indicators that can assess progress and added value".

HEI managers perceive that strategies for UBC at HEIs are less developed in 2016-17 than in 2010-11

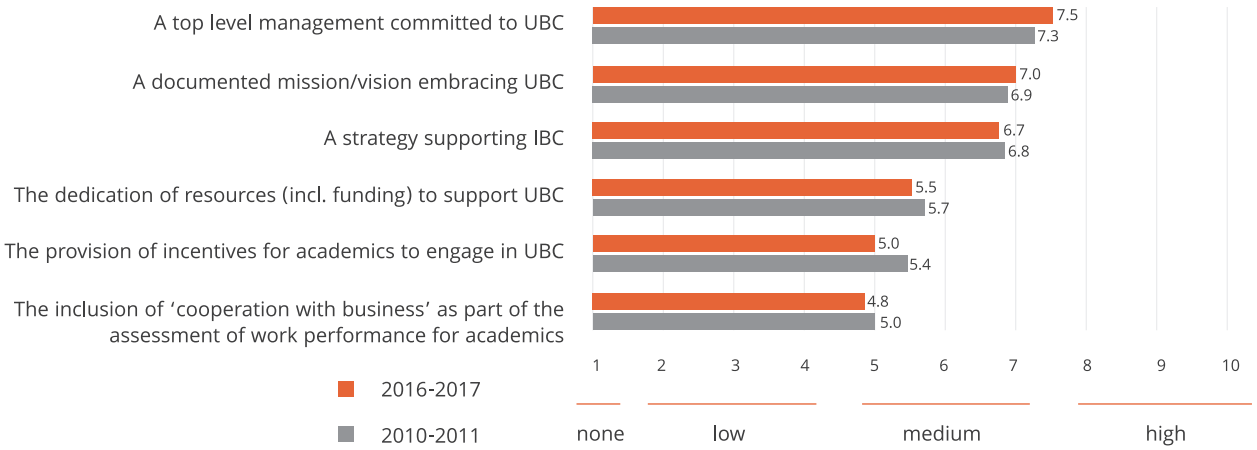


Figure 35: Thinking about your university, how developed are the following strategies? Comparison of 2010-11 results vs. 2016-17 results. Answered by HEI managers. Scale: 1 = not at all, 10 = to a high extent

A comparison of 2010-11 and 2016-17 study results highlight that supporting mechanisms for UBC were considered to be more developed in 2010-11 by HEI managers, in all UBC strategies. This could either reflect a worsening in the development of UBC supporting mechanisms, or an increased expectation of HEI managers for UBC strategies to which HEIs are not living up to as well as in 2010-11.

Panayiotis Ketikidis, in his expert interview highlights the importance of having UBC recognised in the HEI top-level.

> ### Panayiotis Ketikidis, Vice Principal for Research, Innovation and External Relations at the University of Sheffield International Faculty, CITY College
>
> "It is important to include UBC into the mission and vision of the university and to convince the individuals to collaborate and to be proactive, which could be done by applying a top-down approach on an institutional level by putting it on the actual agenda and creating a strategy for collaboration with businesses. However it is a progressive collaboration, which is started by small steps at the beginning."

UBC case study related to strategic mechanisms

STRATEGIC MECHANISM CASE STUDY EXCERPT: SIEMENS RESEARCH COOPERATION WITH UNIVERSITIES

Siemens closely cooperated with numerous universities and research institutes worldwide for decades. They have done so within the scope of the open innovation strategy, which fosters the company´s long term success and strengthens its innovative power. For the last 15 years, the University Relations Department has operated Siemens´ long term strategic approach to UBC known as the Centre of Knowledge Interchange (CKI) Programme. Today Siemens cooperates extensively with nine CKI strategic partner universities in Germany, Austria, Denmark, China and the United States. Here collaboration extends not only to individual departments or research groups, but to the entire university focusing on joint research activities and talent acquisition.

For more information go to https://ub-cooperation.eu/pdf/cases/W_Case_study_Siemens.pdf

5.3 STRUCTURAL MECHANISMS SUPPORTING UBC AT HEIS

Employability and bridging structures are more developed than shared infrastructure and external integration structures in supporting UBC at HEIs

AREAS	STRUCTURAL MECHANISMS	AVE.
Bridging structures	Agencies dedicated to UBC (e.g. technology transfer office, innovation office) Board member or vice rector positions for UBC Industry liaison office	5.6
Employability and career services	Alumni networks Career offices	6.0
Infrastructure	Co-working spaces accessible by business Joint research institutes Incubators Science / Technology Park precincts	5.0
External integration structures	Adjunct positions available within the university for business people Lifelong learning programmes involving business people	4.7

Table 23: Thinking about structures that are accessible (internal or external) to your university, how developed are the following? Answered by HEI managers. Scale: 1 = not at all developed, 10 = highly developed

As can be seen in the survey results above, the most developed structural mechanisms in HEIs to support UBC are employability and career services (6.0) followed by bridging structures (5.6) to link the HEI with business, whist infrastructure (5.0) and external integration strategies (4.7) are less developed.

There are some potential justifications for these results. Employability and career services are well-recognised and developed services available at HEIs with a long-standing apparatus in place for its management.

Whilst bridging structures are more recently developed structures for UBC, the need to manage external relations has also become substantially more recognised. Infrastructure however can be highly expensive and require a longer-term commitment, whilst external integration structures are more recent mechanisms at HEIs. These results further highlight the lack of a wholehearted commitment to UBC across the European higher education system.

From the interviews, in terms of strategic support, interviewees commented on the importance of skilled managers to manage the UBC, with both technical and soft skills and with an understanding of and networks within both academia and business. The involvement of these 'ambidextrous' boundary-spanners is considered essential as they can create support for the development of mutually-beneficial strategic university-business partnerships.

Quotes such as 'culture eats strategy for breakfast', highlight the emphasis that interviewees made on culture and the need to strategically change it, considering the different starting points and the uniqueness of each organisation.

The following excerpt from the expert interview with John Bessant highlights the important role of intermediaries and how structures play a role.

> ### John Bessant, Professor of Innovation and Entrepreneurship at University of Exeter
>
> "It is very beneficial for universities to bring in contract managers or other experienced stakeholders to fulfil the role of intermediaries to ensure an efficient transfer of knowledge from university to business. UBC is far more about bringing two groups of people together, building a network and expanding the relationships. It is rarely just a transactional thing. It is very useful for start-ups and spin-offs to be on a university campus, to be embedded in this knowledge-breathing environment. "

UBC case studies related to structural mechanisms

The following two cases describe structures in the form of offices/centres responsible for the development of UBC activity.

STRUCTURAL MECHANISM CASE STUDY EXCERPT: YISSUM AT HEBREW UNIVERSITY OF JERUSALEM

Yissum, the research development company of the Hebrew University of Jerusalem (HUJI), is one of the top 15 technology transfer companies in the world in terms of revenues. Yissum has partnerships with numerous industry leaders such as Johnson & Johnson, Roche, Merck, Teva, Adobe, Google as well as Lockheed Martin and its technologies are sold annually for over $2b. Yissum's mission is to promote technology transfer of the research of the university, while maximising returns to support research, education, and scientific excellence. Its success is based on its autonomy and legal status as a private entity, its hiring policies, specifically industry experience of the staff as well as the strict HUJI policies that require equity profit sharing.

For more information go to https://ub-cooperation.eu/pdf/cases/I_Case_Study_Yissum.pdf

STRUCTURAL MECHANISM CASE STUDY EXCERPT: DIT HOTHOUSE

In 2007, Dublin Institute of Technology created a technology transfer office named Hothouse. It aims to maximise the commercialisation of its technologies and also supports the launch of knowledge-intensive start-ups, which is done through the New Frontiers programme. Hothouse has consistently outperformed the rest of the technology transfer offices in Irish HEIs due to their unique approach. It includes an effective team with an inspirational leader, a 360-degree view of the ecosystem where they operate, good relationship with all stakeholders, adequate expectation management, transparency and simplicity in their processes, flexibility and speed to respond to external requests and focus on what they are good at.

For more information go to https://ub-cooperation.eu/pdf/cases/N_Case_Study_DIT.pdf

5.4 OPERATIONAL MECHANISMS SUPPORTING UBC AT HEIS

Mechanisms to operationalise UBC are only moderately developed in European HEIs and focused on students rather than academics

AREAS	UBC OPERATIONAL MECHANISMS	AVE.
Networking	Academic networks dedicated to UBC Networking sessions or meetings for academics to interact with business Student networks dedicated to UBC UBC activities facilitating student interaction with business	5.4
External communication	Information sessions and forums about UBC The featuring of UBC prominently on the university´s website	5.1
Entrepreneurship	Entrepreneurship courses offered to academics Entrepreneurship courses offered to students	5.3

Table 24: Thinking about operational mechanisms used within your university, how developed are the following ones? Answered by HEI managers. Scale: 1 = not at all developed, 10 = highly developed

Operational mechanisms are generally the lowest cost and the easiest and quickest to establish (Davey et al., 2011) because they can be established by any stakeholder within the HEI: management and faculty level (top-down) or at the individual programme, academic or student level.

Despite this, mechanisms to operationalise UBC are only moderately developed in European HEIs. Networking activities (5.4), followed by entrepreneurship activities (5.3) are the most developed UBC activities, which are all moderately developed. The activities tend to be focused on students, which is evident in the survey results showing that entrepreneurship courses offered to students (6.5) and UBC activities facilitating student interaction with business (6.3) being the most developed mechanisms.

This seemingly comes to the detriment of academics as entrepreneurship courses offered to academics (4.4) and academic networks dedicated to UBC (4.8) are the lowest developed activities.

According to expert interviews, external intermediaries (i.e. regional development offices) were considered very powerful matchmakers and translators and their objectivity was valued by interviewees representing both parties. A series of other structures are mentioned as being important, such as networks, science parks, incubators or joint research centres, but most interviewees highlight the importance of people over infrastructures.

OPERATIONAL MECHANISM CASE STUDY EXCERPT: AIMDAY

In 2008 the first AIMday was arranged in Uppsala, under the name Materials Day. The focus was to bring together representatives from private and public sector with academic scientists and experts from the university to discuss questions sent in by the representatives. The whole concept of AIMday is very simple. By organising workshops where the motto is "one question, one hour, one group of experts", AIMday creates a forum for discussion where both representatives from industry and academic scientists can transform their knowledge into something useful. AIMday focuses on creating contacts and collaboration between researchers/scientists and the business and public sector communities at large.

For more information go to https://ub-cooperation.eu/pdf/cases/N_Case_Study_Aimday.pdf

5.5 SUMMARY OF SUPPORTING MECHANISMS FOR UBC AT HEIS

'Paper' strategies as well as employability and career services are the most developed UBC supporting mechanisms at HEIs

MECHANISMS	AREAS	AVE.
Strategies	Paper strategies	6.8
	Implementation strategies	4.9
Structures	Bridging structures	5.6
	Employability and career services	6.0
	Infrastructure	5.0
Activities	External integration activities	4.7
	Networking activities	5.4
	External communication activities	5.1
	Entrepreneurship activities	5.3

Table 25: Which supporting mechanisms support your university's cooperation with business?

Answered by HEI managers. Scale: 1 = not at all developed, 10 = highly developed

5.6 PRESENCE OF UBC SUPPORTING MECHANISMS IN BUSINESSES

Strategic, top-level mechanisms are the most developed UBC supporting mechanisms in business

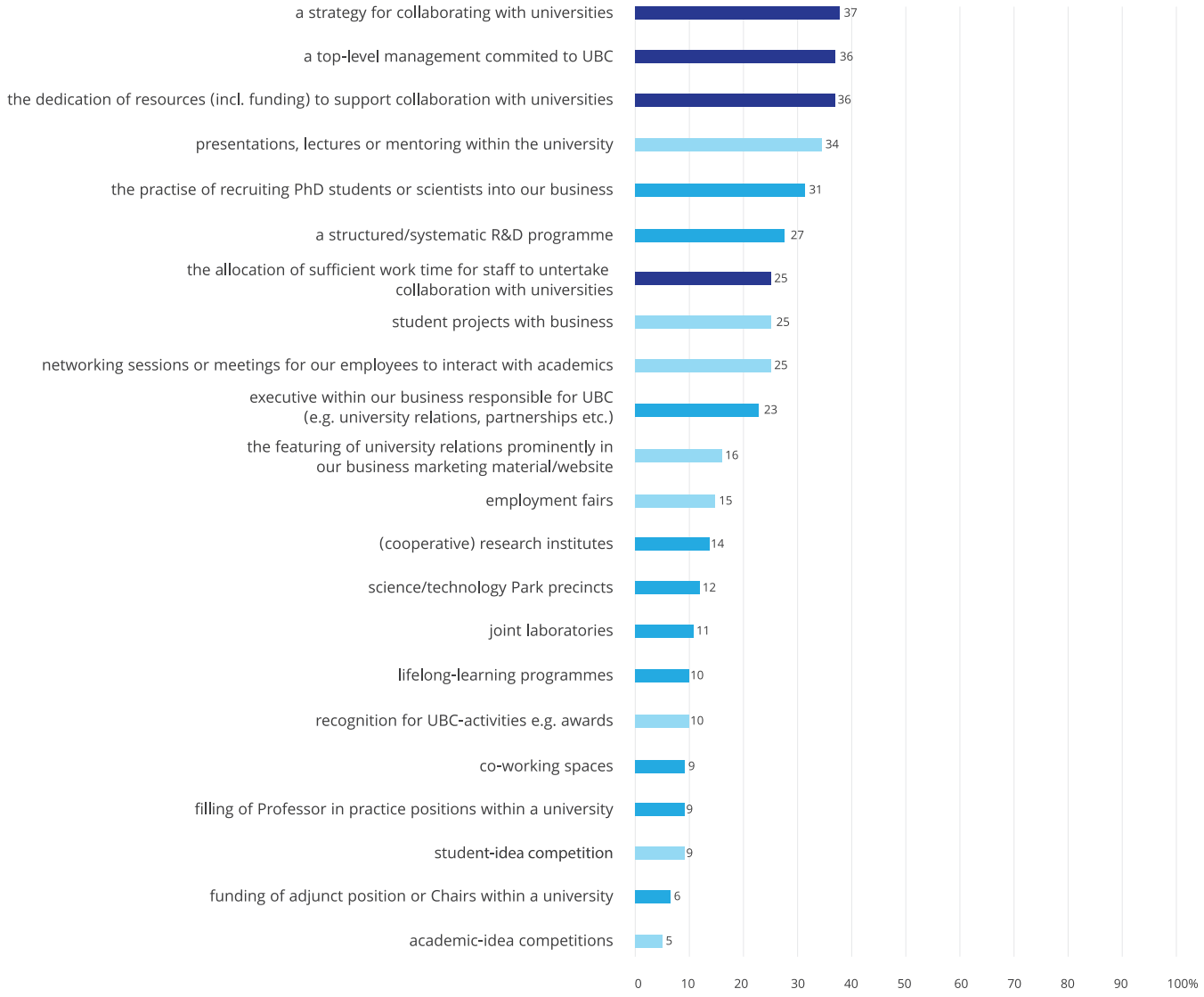


Figure 36: Which of these mechanisms supporting your cooperation with universities exist in your business? Answered by business

Business managers in Europe indicate that strategic supporting mechanisms (indicated in dark blue) to support UBC are more developed than both structures (royal blue) and activities (light blue).

Having a strategy for collaborating with HEIs is the most common mechanism in European businesses, present in 37% of cooperating businesses, closely followed by a top-level management commited to UBC (36%).

Unlike at HEIs, where the tacit commitment to UBC through paper strategies is not backed up by an equivalent commitment of resources, for European businesses cooperating with HEIs, the dedication of resources is equally present (36%) as UBC strategies and top-level commitment. In the practise of recruiting PhD students (31%) and even the allocation of worktime for UBC (25%) as well as a structured/systematic R&D programme, there is a good alignment of strategy and mechanisms for

implementing the strategy.

Regarding their interactions with students, the most common are presentations, lectures or mentoring within HEIs (34%), the practise of recruiting PhD students (31%), students projects (25%) and employment fairs (15%).

Concerning research, 27% of businesses have a structured R&D programme. However, only 14% participate in cooperative research institutes, 12% in science/technology parks and 11% in joint laboratories with HEIs, which shows that businesses have a much lower investment in physical facilities and co-location.

Positions in HEIs are still not that common with 23% having an executive within the business responsible for UBC (not necessarily full-time role), followed by filling a professor in practice role in the HEI (9%) or funding an adjunct position or Chair (6%).

Student (9%) or academic idea competitions (5%) are the least common mechanisms, aligned with their low participation in entrepreneurship.

Experts during the interviews identified a need for senior management responsible for UBC also on the business side. R&D or Innovation Directors often take this role, however occasionally there is a specific contact responsible for managing university relations for research-related UBC. For education-related UBC, a person responsible for education and training is mostly only found in large businesses and in most cases the role is assumed by the HR department

Ambidextrous 'boundary-spanners' who understand both the academic and business world are extremely important in developing UBC

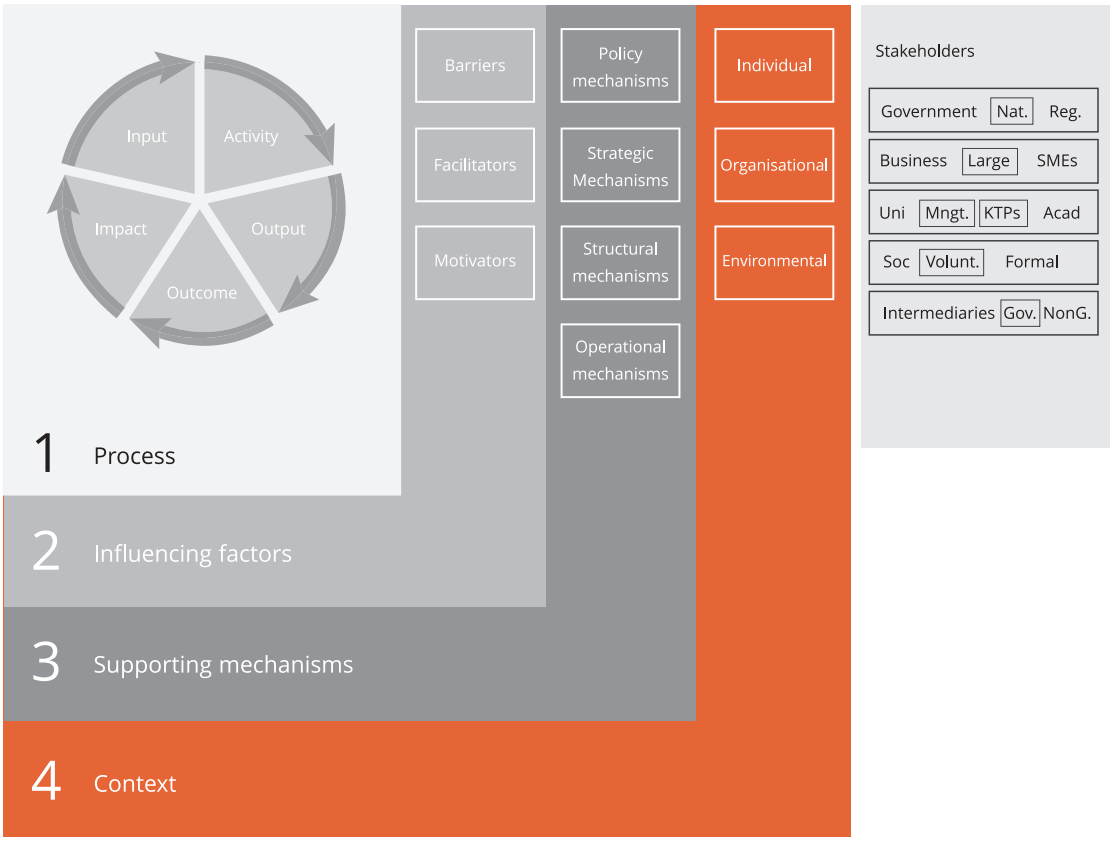
The following excerpt from the expert interview with Robert Sorrell highlights the importance of 'boundary-spanners' who understand both the academic and business environment.

Robert Sorrell, Vice President for Public Partnerships at British Petroleum (BP)

"We employ 'connectors' who have some rather unique attributes in that they have the ability to transplant an interesting piece of science in one field into a practical application inside BP. These people don't necessarily need years of experience in the company, but instead they need to be curious. They generally ask loads and loads of questions because they are curious, and then they can often find the connection with a really interesting piece of science and our business. These people can understand and talk the language of both academia and the business. They can get their head around really complex pieces of science; and see the practical possibilities it offers. They don't to be deep experts though, they just need to be able to make the connection back. They translate the ideas they hear in their interactions with universities and be able to bring it back, to translate it back into BP. These connectors are worth their weight in gold because they help us to sift through all the information and identify the things that can be interesting for BP. We can't do anything without these people. They are what really makes this work but they are not easy to find."

CHAPTER 6

CONTEXT AROUND UBC



The degree to which UBC takes place is influenced by a set of fixed contextual factors including the characteristics of individual actors, institutional factors relating to the HEI and business, as well as by a set of broader socio-environmental factors.

The influence of the UBC context (especially socio-economic conditions) on the UBC process has been identified in literature and in practice.

Sometimes recognised as relating to role models, other times to developing a systemic culture and on other occasions to the ecosystem or environment, the relative strengths and weaknesses play an important role.

Given that UBC is a discretionary activity for academics (D'Este and Perkmann, 2011), it is logical that an individual's perception of the activity and the surrounding environment (supportive or otherwise) along with the culture in which they operate (Plewa et al., 2006) become important.

6.1 THE INDIVIDUAL CAPABILITIES THAT MATTER

The 'age constraint'? - For cooperating academics, younger academics cooperate with business at higher rates that older academics

Figure 37: How do academics of different ages cooperate with business and to what extent? Answered by cooperating academics. Scale: 1 = not at all, 10 = to a large extent.

The results clearly show that the younger academics cooperate with business at higher rates that older academics in all UBC areas, with the youngest academic group (20-29) having an average cooperation of 4.2, whereas those 60-69 have a cooperation average of 3.5. This defies expectations because the knowledge and skills that an academic can offer to business would be expected to improve with age and especially so in respect to cooperation in management. A growing management responsibility within the HEI for older academics could be a factor that helps to explain this.

The 'university influence'? – The greater the number of years that an academic works at an HEI the less they tend to cooperate with business

Figure 38: How do academics with differing amount of years working in a HEI cooperate with business and to what extent? Answered by cooperating academics. Scale: 1 = not at all, 10 = to a large extent.

The more years an academic works at a HEI, the less cooperation they undertake with business. Academics who are at the start of their HE careers, with 1-2 years of experience perform the highest level of UBC activities (cooperation average of 4.5)

compared to the academics with 20+ years of experience having a cooperation average of 3.6.

The 'understanding effect'? – The greater the number of years that an academic works in business the more they tend to cooperate with business

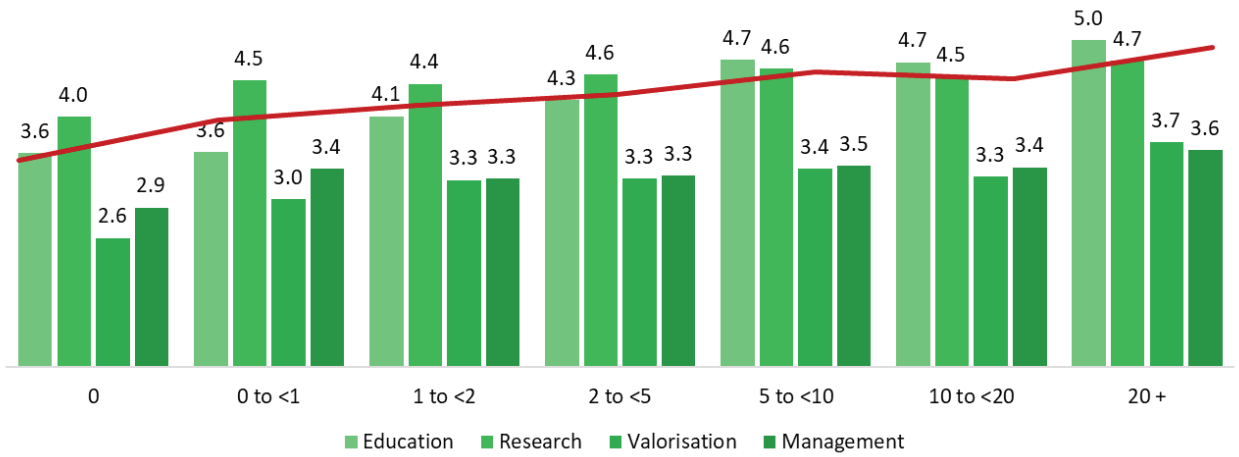


Figure 39: How do academics with differing amount of years working in a business cooperate with business and to what extent? Answered by cooperating academics. Scale: 1 = not at all, 10 = to a large extent.

Academics who spend 20 or more years in industry are found to be involved with the highest level of UBC activity in all areas (a cooperation average of 4.3), compared to those who have less or no experience (a cooperation average of 3.3) working with businesses.

The 'experience multiplier? – The greater the number of years that an academic cooperates with business the more cooperation they undertake

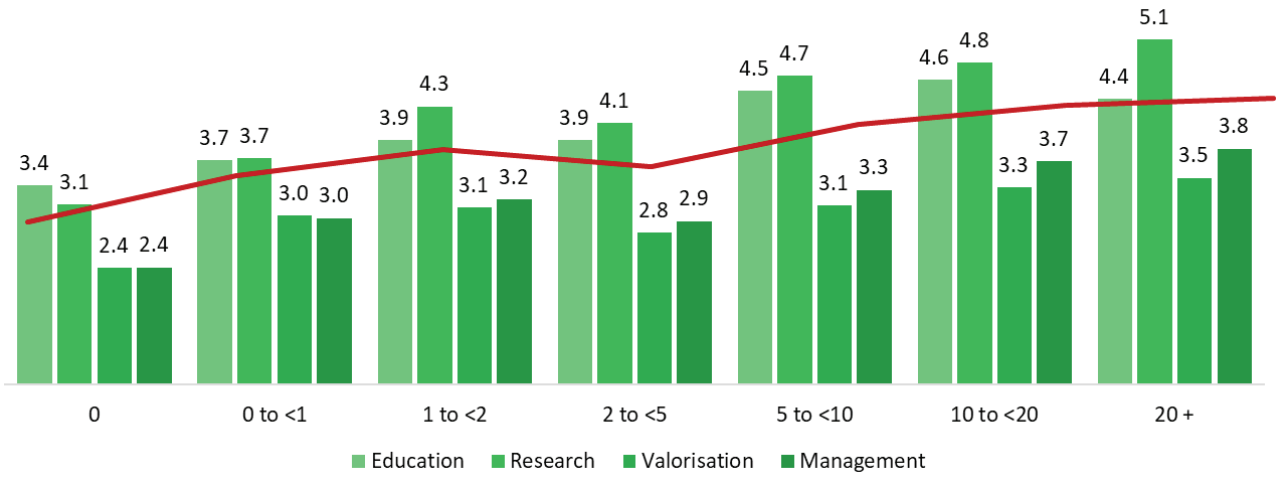


Figure 40: How do academics with differing amount of years working in a business cooperate with business and to what extent? Answered by cooperating academics. Scale: 1 = not at all, 10 = to a large extent.

According to the results, academics who have 5 years and more experience with UBC perform the highest level of cooperation in all UBC areas. Activities in the research category rank the highest among academics with all amounts of UBC experience, followed by education, except for those with no UBC experience who cooperate in education the most. Valorisation activities

remain the least practiced ones in all groups, followed by management.

Comparing this result to previous results, whilst older academics tend to collaborate less than younger academics, experience in business for an academic and also experience in UBC counteract act this negative age result.

The belief of the individual academic or business that they are indeed capable to undertake UBC is likely to affect the extent of cooperation they engage in. Known in scientific studies as self-efficacy, the belief in stakeholders' own capacity and capability has been recognised to relate to their assessment of the strengths of their own profile in education and research, their attitude towards UBC as the role of HEI as well as their perception of their own UBC skills and knowledge, that they have the necessary contacts in business to cooperate and sufficient knowledge of what business need and want.

Non-cooperating academics perceive themselves to have less individual capabilities for UBC

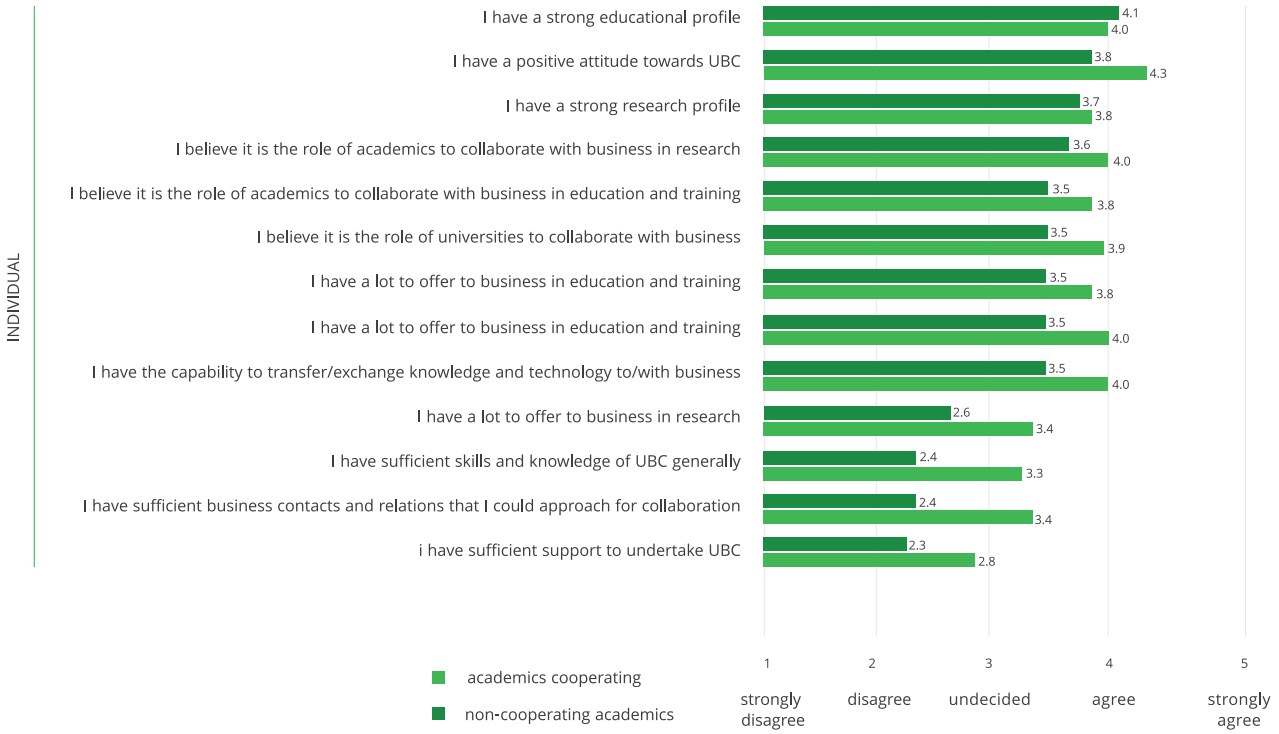


Figure 41: 'How are the personal (individual) capabilities for UBC perceived by academics?'
Answered by academics. Scale: 1 = strongly disagree, 5 = strongly agree.

Academics who cooperate perceive themselves to have significantly higher personal capabilities for cooperating with business (3.7) that those who do not (3.0). Academics cooperating are more positive about UBC than those who do not (4.3 to 3.8) whilst those that do not rate themselves substantially lower than cooperating academics in respect to possessing sufficient skills and knowledge for cooperation, sufficient contacts in industry and support to undertake cooperation.

6.2 THE INSTITUTIONAL CONDITIONS FOSTERING COOPERATION

Jochen Barth, Managing Partner at CER10DIPITY GbR

As Peter Drucker allegedly said "Culture eats strategy for breakfast". Any change in organizational goals will require a change in culture first and foremost. And it will require even more effort in conservative cultures like a university.

Tornatzky et al. (2002) emphasise the need to create the appropriate culture for UBC to flourish, stating that the behaviour of faculty, students and administrators is supported by the values, norms and reward systems of the institution. It is contended that the individual and the surrounding culture, including individual rewards, are vitally important and that most policy efforts to facilitate collaboration are directed at institutions, aiming to formalise such interaction through creating the right institutional culture and environment for it (Ponomariov, 2008; Ponomariov and Boardman, 2008).

Whether it is the HEI or the business, the institution has a key role in either leading the development of a cooperation and engagement culture in a top-down strategy, or nurturing and supporting individual academic or research groups to cooperate, through a bottom-up approach to strategy.

Given growing external engagement obligations, academics have additional responsibilities of interacting with business, which implies that HEI management needs to establish mechanisms that incorporate the change of roles on both levels and to implement structures that acknowledge the interrelationship of the levels.

Non-cooperating academics perceive their university to have less UBC capabilities

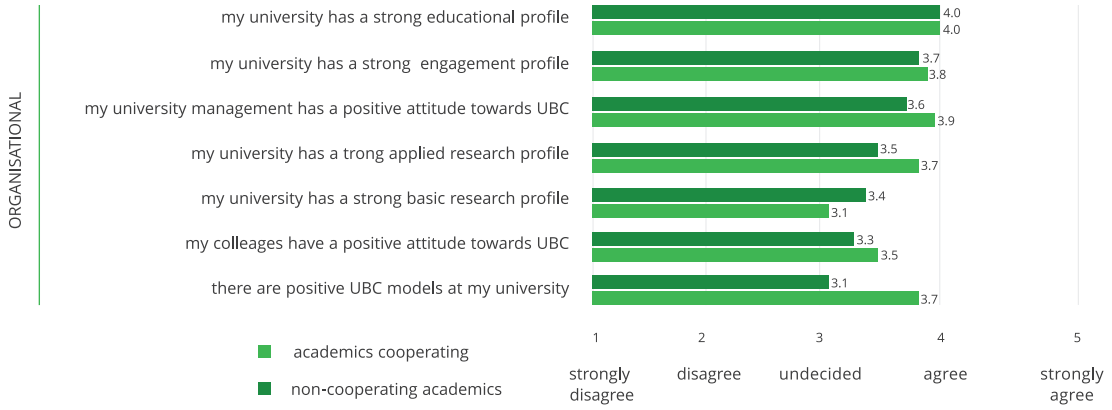


Figure 42: How are the institutional UBC capabilities perceived by academics?
Answered by academics. Scale: 1 = strongly disagree, 5 = strongly agree.

Academics cooperating rate their university more strongly in respect to having an engagement profile, a positive attitude to UBC, a strong applied research profile, colleagues who have a positive attitude of UBC and positive role models for UBC at their HEI. Conversely, those who do not cooperate perceive their institution to have a stronger basic research profile. Overall, academics cooperating rate the UBC capabilities of their institution more positively (3.7 average) than those not cooperating (3.5).

To improve UBC, HEIs could improve their UBC knowledge, their business knowledge and their external contacts

Figure 43: How are the institutional UBC capabilities perceived by HEI managers?
Answered by HEI managers. Scale: 1 = strongly disagree, 5 = strongly agree.

Despite this positivity for UBC, at institutional level HEI managers are not as strong in their beliefs that it is the role of the universities (3.6) or academics to collaborate with business in research (3.6) or education (3.5). Although it appears that there are on average some positive UBC role models at the HEI (3.8), the HEI does not have sufficient business contacts (3.5), sufficient skills and knowledge of UBC procedures and processes (3.4) nor what businesses need and want (3.2). Consequently, there is limited support within the HEI to undertake UBC (3.3).

Larger HEIs generally collaborate with business more than smaller ones in all cooperation areas

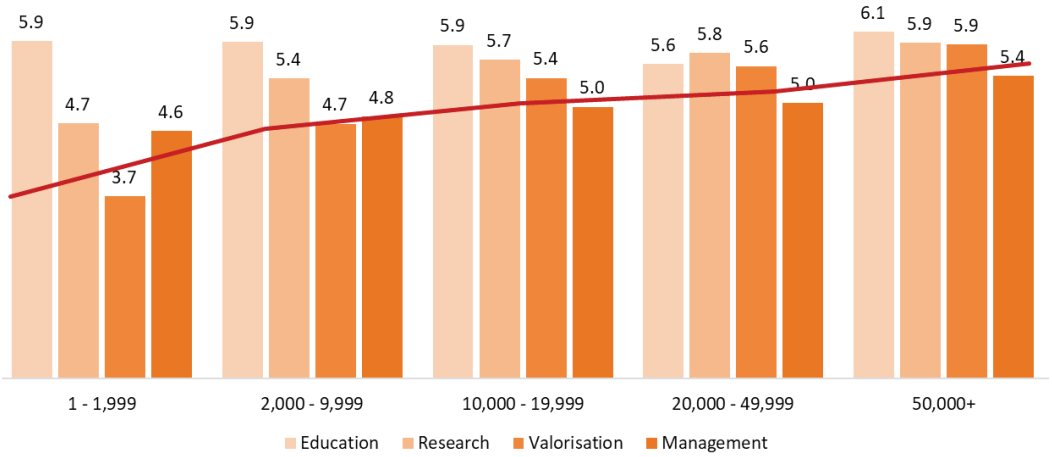


Figure 44: How do HEIs of different sizes cooperate with businesses and to what extent?
Measured in number of students. Answered by HEI managers. Scale: 1 = not at all developed, 10 = highly developed

There is a general relationship between the size of the HEI and the extent of cooperation meaning that larger HEIs generally collaborate more with business in all of the cooperation areas in comparison to smaller HEIs. This positive correlation is exemplified in HEIs with 50,000 and more students, which show the greatest engagement in all four UBC areas compared to those smaller HEIs in absolute terms. This relationship is likely explained by the larger number of academics with which to cooperate and their scale allowing a higher level of resources to put in place to support students and academics with engaging externally.

The larger the business, the more education and management cooperation they undertake

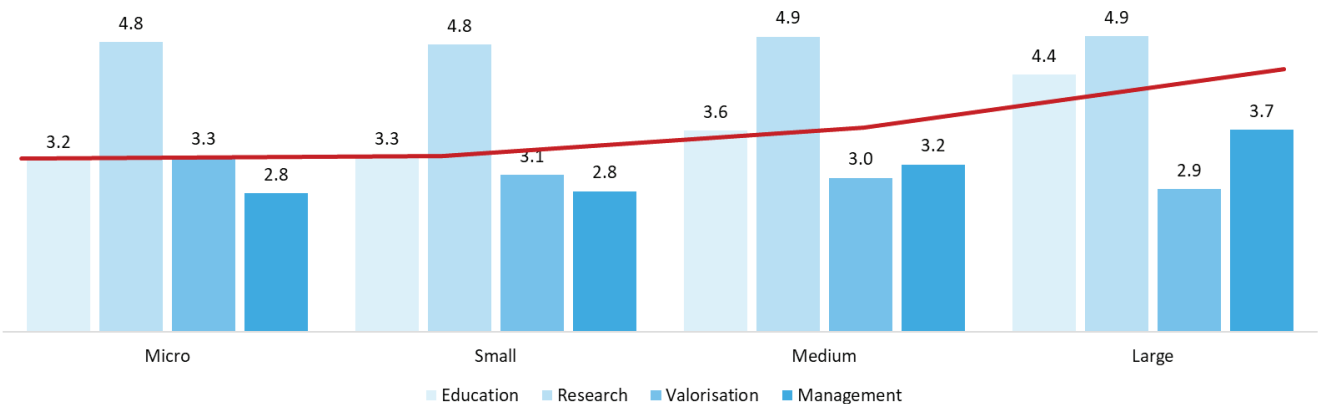


Figure 45: How do businesses of different sizes cooperate with HEIs and to what extent?
Answered by business. Scale: 1 = not at all developed, 10 = highly developed

Generally, large companies have a slightly higher level of cooperation than smaller ones with more developed UBC in education and management, and, a similar level of research and valorisation cooperation. The higher cooperation levels in education by

large businesses could reflect their higher need for talent than smaller business, which is usually managed by a well-developed human resources department that organises cooperation activities with HEIs. The similarly higher cooperation in management by large businesses could be a result of management cooperation generally requiring greater resource commitment.

6.3 THE REGIONAL ENVIRONMENTS IN WHICH UBC TAKES PLACE

Regional environments have multiple players in networks with a range of skills, competencies and experiences, with an intricate set of relationships and roles in the process of knowledge generation, diffusion and valorisation (Van Looy et al., 2004). With inspiration from successful regions such as Silicon Valley and Route 128 in the US, and Cambridge in the UK, HEIs are increasingly being recognised for their central role in building competitiveness of a society (primarily regional), contributing to region industry, growth and employment as well as developing greater social cohesion. Additionally, now the role of the HEI has increasingly included regional prosperity, which suggests a more-holistic set of regional interactions.

The belief in a regional approach to social and economic development, shifts the focus to regional networks and systems (Gunasekara, 2006) and developers of human capital, knowledge and technology fused with users (Boucher et al., 2003; Keane and Allison, 1999), rather than localised individuals and organisations. An effective system therefore is comprised of a synergetic and efficient virtuous cycle of learning, value creation and improvement with contributions from actors, networks, and intermediaries or facilitators (Caniëls and Van den Bosch, 2011).

HEIs in regions with a favourable economic environment are more likely to engage in UBC (Berbegal-Mirabent et al., 2015). Likewise, the characteristics of national innovation systems also affect UBC, such as the accessibility of knowledge and skills and access to infrastructure in the location (Chatterton and Goddard, 2000). For example, the academic curriculum tends to change from basic to applied research when close to a science park (Siegel and Phan, 2005) and technology transfer is higher in regions close to concentration of high-tech firms (Friedman and Silberman, 2003).

The following table summarises the perception of the three groups surveyed about their individual, institutional and regional context and capabilities.

The UBC conditions are different for elite universities and large international companies

Throughout the study, a common message kept reappearing: the rules are different for elite universities and large international companies.

Despite an overemphasise of our media and funding mechanisms that has led to Oxford University receiving 1% of the entire FP7 European funding allocation (Meerman & Davey 2016), elite universities[21] by definition are not that majority or universities. With only 34 of Europe over 3,000 HEIs in the world top 100 (THE ranking 2018) few universities can make that claim. Nevertheless, best-practice case studies and, importantly, policy levers are oriented to these institutions despite the fact that few other Europe HEIs could hope to replicate their success, with reputations in the higher education sector built traditionally over decades, if not centuries. A broader recognition of excellence is therefore required such as in teaching, engagement, regional development, lifelong learning or in centres of excellence within HEIs. The majority of universities in Europe are not 'elite' and require a different approach to UBC than 'elite' universities whom operate under different rules.

Similarly, the scale and scope of the potential for collaboration by large companies is substantially different, even to medium sized companies, let alone small and micro businesses. Resources available to invest in shared facilities like Audi Hungary, the scope of activity that is allowing VW to 'export' their model of dual-study and Siemens to have permanent staff on universities

21 'elite' universities are generally considered to be the top 100 universities in the world

campi are at a different level to a medium-sized company without an R&D department or a start-up with limited capital. The survey results showed clearly that the size of the organisation substantially differentiates the way they cooperate with HEIs, especially in education and management cooperation.

The following excerpt from the expert interview with Markus Perkmann highlights the difference in the UBC environment facing elite and other universities.

> ### Markus Perkmann, Professor of Innovation and Entrepreneurship at Imperial College London
>
> "Academics work with industry at all kinds universities. Academics at research-intensive, elite universities are better resourced and will work with industry mostly if its conducive to driving their research. At less resource-focused universities, there may be room for some academics to be more commercially focused, thinking, 'this is my expertise, someone is asking me to provide that, why not?' This is also legitimate model, however university management need to manage it in order to ensure that it still adds to the core missions of the university."

The rules are different for elite universities and large international companies with the majority of HEIs and businesses needing different approaches to encourage UBC.

Summary of responses to individual, institutional and regional context and capabilities

ACADEMICS	HEI MANAGERS	BUSINESS
Non-cooperating academics perceive themselves to have less individual capabilities for UBC Non-cooperating academics perceive their university to have less UBC capabilities Non-cooperating academics perceive their region to have less UBC capabilities	Individual managers have favourable attitudes towards UBC but are not so sure about their colleagues Universities could improve their UBC knowledge, their business knowledge and their external contacts, which is likely to affect support for UBC Generally speaking, there is a moderately positive attitude towards UBC in the region	Non-cooperating business perceive themselves to have significantly lower organisational capabilities for UBC Cooperating and non-cooperating businesses perceive relatively similar regional capabilities related to UBC

Table 26: How are the individual, institutional and regional context and capabilities perceived by UBC stakeholders? Answered by academics, HEI managers and business.

Academics cooperate with large and medium sized organisations

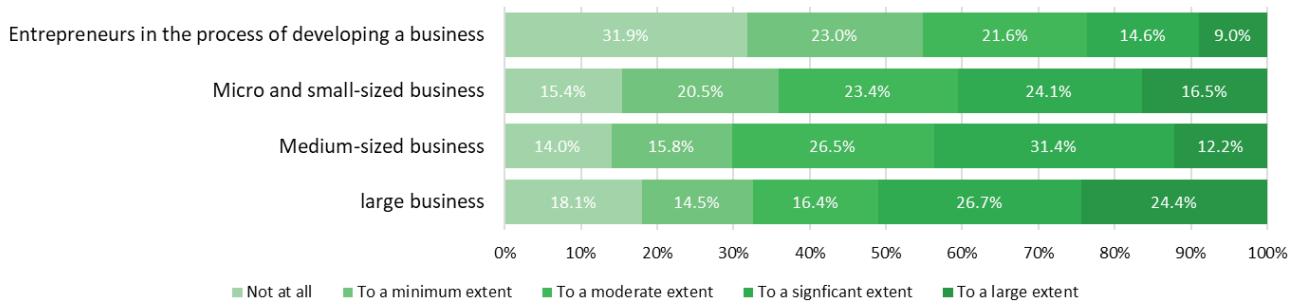


Figure 46: With what size of organisation do you collaborate? Answered by academics. Scale: 1 = not at all, 10 = to a large extent.

Academics collaborate with businesses of varying size. Medium-sized businesses have the highest share, with 70.1% of academics in the given sample report cooperating with such businesses at a 'moderate' to a 'large' extent. Large businesses (67.5%) and micro and small-sized businesses (64%) follow this group, however considering the small number of large organisations in existence[22] (and the large amount of micro & small businesses[23]), they are considerably over-represented (and small business underrepresented).

Cooperating partners are mostly located within their region or in the country which shows that geographical factor still matters in cooperation

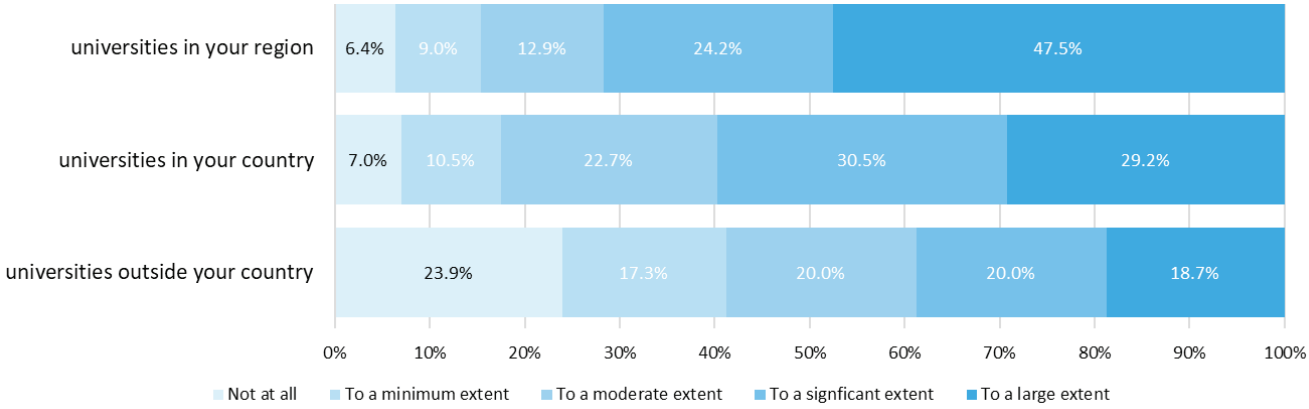


Figure 47: Where are your cooperation partners?
Answered by business. Scale: 1 = not at all, 10 = to a large extent.

Most European businesses cooperate with the HEIs in their region (71.7%) and in their countries (59.7%) at a significant to large extent. Cooperation with HEIs outside their country remains limited; with 23.9% of businesses are not cooperating at all and only 18.7% of them indicating a large extent of international cooperation. This highlights that whilst technology is enabling a more globalised world, local relationships are still the highest form of collaboration.

The following excerpt from the expert interview with Paul Hannon describes the importance of national and sectoral-specific context in UBC.

Paul Hannon, Director Institute for Entrepreneurial Leadership at Swansea University

"Context plays an essential role in UBC, from the national culture to the sector culture or the different areas of knowledge within the university (life sciences vs social sciences vs arts). HEIs do not work in isolation. They are part of a wider society and their role is to contribute to the development of society, i.e. social transformation whether through research, teaching, stakeholder engagement, business development and internationalisation. Developing their students to equip them to do this will often include collaborating with the private sector businesses and organisations of different types."

22 Large businesses represent 0.20% of all EU businesses
23 Micro and small businesses represent 98.80% of all EU businesses

6.3.1 Context-related UBC case studies

REGIONAL CASE STUDY EXCERPT: MIT REAP

MIT and its entrepreneurial spirit are the powerhouse of the New England economy. This experience and expertise led to the launch of the Regional Entrepreneurial Acceleration Programme (REAP), a comprehensive solution that has been applied to 28 regions to date in order to make similar structured changes at all regional levels. For this, REAP brings together key representatives from government, corporate, academia, risk capital, and entrepreneurial community in order to (1) accelerate innovation-driven entrepreneurship, (2) understand the key drivers of innovation-driven entrepreneurial ecosystems, (3) evaluate the strengths and weaknesses of the regions, (4) design an acceleration strategy and (5) find resources and engage stakeholders to move the acceleration strategy into implementation.

For more information go to https://ub-cooperation.eu/pdf/cases/I_Case_Study_MIT.pdf

REGIONAL CASE STUDY EXCERPT: AMSTERDAM INSTITUTE FOR ADVANCED METROPOLITAN SOLUTIONS

AMS Institute is a unique collaboration between knowledge institutions, business and public stakeholders to deliver metropolitan solutions to urban challenges. The City of Amsterdam and the greater metropolitan region function as a testbed for AMS Institute's pro-jects. Created following a unique call for tender by the City of Amsterdam, some of the world's leading universities, multinationals and several societal stakeholders committed themselves to establishing a leading institute in urban innovation. The initial funding provides this unique concept with a 10-year runway to use technology and design to resolve, steer and navigate city flows.

For more information go to https://ub-cooperation.eu/pdf/cases/W_Case_Study_Amsterdam.pdf

REGIONAL CASE STUDY EXCERPT: UNIVERSITY OF TWENTE

The University of Twente (UT) and Kennispark Twente are key drivers of regional innovation and growth and the renaissance of the Twente region. Founded in 1961, during difficult local economic conditions, UT has grown into a world-class entrepreneurial university through its top-down innovative and entrepreneurial institutional culture, its human resource strategy and its strong regional network. UBC is embedded in the long and short -term strategies of the university, and has been implemented through offices dedicated to UBC, (extra)-curricular training and mentoring programmes focused on UBC and its networking events. The key mechanism in this case is the Foundation Kennispark Twente, the joint initiative of local stakeholders that acts as the engine and architect of the ecosystem. The limited proportion of jobs in the region that require higher levels of education is also a driver for stimulating spin-offs and start-ups coming out of the university. The strong relationships in combination with effective management of these relationships are key to UT's success, which has focused its efforts on its region. Over 100 new start-ups per year on average, over 1,000 spin-offs still operational to date, and in excess of 20,000 jobs are being created. The UT spin-offs also account for 10% of the fastest growing high-tech firms in the Benelux.

For more information go to https://ub-cooperation.eu/pdf/cases/W_Case_Study_Twente.pdf

6.4 HYPOTHESES FROM LITERATURE FOR SITUATIONAL FACTORS TESTED AGAINST THE SURVEY

Situational factors for European academic, HEIs and businesses affect their levels of cooperation

ACADEMIC'S AGE

Literature: UBC increases with age (Haeussler and Colyvas, 2010), decreases (Giuliani et al., 2010) or there is no relationship (Boardman and Ponomariov, 2009).

Survey result: UBC slightly decrease with age

AGE OF THE HEI

Literature: No literature found to test this

Survey result: There are no specific pattern for HEI engagement in terms of its age

AGE OF THE BUSINESS

Literature: No literature found to test this

Survey result: No clear pattern in general, but in respect to each of the engagement in each of the areas, valorisation is more developed in the newest businesses and education in the oldest one.

ACADEMIC'S AREAS OF KNOWLEDGE

Literature: : Higher engagement in more applied areas, such as technology and natural sciences (Arvanitis et al., 2008; Mueller, 2006)

Survey result: : UBC in the areas of 'technology and engineering' and 'social sciences' are equally developed and more than 'biomedical sciences' and 'humanities'.

BUSINESS SECTOR

Literature: Differences exist at sector-level (Dalmarco et al., 2015), such as higher engagement levels in research cooperation for companies working in the fields of physics, computer science and mathematics (Cohen, Nelson, and Walsh, 2002) and in emergent industries (Freitas et al., 2013).

Survey result: Not large difference among sectors in general, slightly more engagement in industrial sectors.

SIZE OF THE HEI

Literature: No literature found to test this

Survey result: Larger HEIs are slightly more engaged in UBC than smaller ones.

BUSINESS SIZE

Literature: The larger the business the higher the engagement in valorisation (Van Geenhuizen, 2010)

Survey result: Larger businesses are more engaged in UBC, particularly in education and valorisation.

TYPE OF HEI

Literature: Universities of Applied and Polytechnics are more engaged than other types of HEIs (Perkmann et al. 2012; Renault, 2006).

Survey result: : Overall, traditional universities, universities of applied sciences and polytechnics are similarly engaged. While traditional universities are more engaged in valorisation, universities of applied sciences are more engaged in education and polytechnics in research.

TYPE OF BUSINESS

Literature: No literature found that test this

Survey result: Apart from the intermediaries, for whom engagement in their core business, there are no major differences in general. By area, UBC in management and research is more developed in stock exchange listed companies, education in multinational companies and valorisation for sole traders.

ACADEMIC'S GENDER

Literature: Higher engagement for males than females (Clarysse et al., 2011; Goktepe-Hulten, 2010; Murray and Graham, 2007),

Survey result: Higher engagement for males

ACADEMIC'S EXPERIENCE IN THE HEI

Literature: The longer the experience in the HEI the higher the engagement (Dutrénit et al., 2010; Lee and Bozeman, 2005; Ponomariov and Boardman, 2008)

Survey result: The higher the experience in the HEI the slightly lower the engagement

ACADEMIC'S EXPERIENCE IN BUSINESS

Literature: The higher the experience in business the higher the engagement (Lubango and Pouris, 2007; Nilsson et al., 2010; Clarysse et al., 2011; Perkmann et al., 2012; van Rijnsoever et al., 2008; van Rijnsoever and Hessels, 2011)

Survey result: The higher the experience in business the higher the engagement

Table 27: Summary of hypotheses and survey findings on situational factors affecting UBC

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 INSIGHTS FROM THE STUDY

The following insights summarise the findings of the State of University-Business Cooperation in Europe study that were gleaned from the quantitative survey, the case studies, expert interviews, policy and indicators review completed as part of the study.

7.2 HOW DO UNIVERSITY AND BUSINESS COOPERATE?

7.2.1 Universities and businesses cooperate in multiple and varied activities. However only a minority of academics and businesses collaborate.

The first two missions of the university, education and research, are the primary areas in which university and business cooperate. Cooperation in research (i.e. joint R&D, consulting to business, mobility of staff) is the most prevalent University-Business Cooperation (UBC) area across Europe, closely followed by education (curriculum co-design, curriculum co-delivery, mobility of students, dual education programmes, lifelong learning). However, Higher Education Institutions (HEIs) and businesses in Europe also cooperate in the areas of valorisation (commercialisation of R&D results, academic entrepreneurship, student entrepreneurship) and management (governance, shared resources, university support), although to a far lesser degree. Despite significant efforts by national governments and the European Commission to broaden the impact of the HEI sector through greater cooperation with business, the study showed that there remains a lack of awareness of all the forms in which HEIs and businesses cooperate and how they interrelate. This is particularly true for 'lesser practised' education cooperation activities (curriculum co-design and co-delivery, lifelong learning and dual study programmes) as well as, and especially, valorisation (all types) and management cooperation (all types). Also, whilst most academics still do not cooperate with business, no business cooperation does not mean no cooperation at all as nearly 75% of the academics not cooperating with business cooperate with government or societal actors.

Key study findings include:

- There are 14 recognised UBC activities.
- Cooperation in the first two missions of education and research are most developed.
- Most cooperating academics and businesses undertake research cooperation.
- A large portion of cooperating academics and businesses do not engage in cooperative valorisation despite the finding that European policy measures focus heavily on valorisation activities at HEIs.
- No business cooperation does not mean academics don't cooperate with external stakeholders.
- All management UBC activities are at low levels of development.

Recommendations

What **Ensure there are mechanisms in place that support UBC development.**

Why

- There is a connection and relationship between the types of UBC. This means that awareness needs to be built about all types of cooperation because any development of one activity, will benefit others.
- Nearly 75% of academics who do not cooperate with business, cooperate with other external stakeholders.

How

- Continue funding cooperative research projects and look for ways to bring in business into basic research projects.
- Provide funding opportunities for HEIs to undertake research and education cooperation with external actors, not only with business, but also government and other societal actors.
- Identify the extent of cooperation taking place between HEIs and businesses in the country / region / institution through surveys, forums, case studies or other measures.

What **Promote the short and long term benefits of university-business relationships and of university engagement generally.**

How

- Organise forums and workshops and distribute information (e.g. webpages, flyers, brochures, white papers, blog articles) for business people on how working with HEIs gives the business a competitive edge in respect to getting qualified employees, new discoveries and building reputation
- Organise forums and workshops and distribute information (e.g. webpages, flyers, brochures, white papers, blog articles) for HEI managers on how working with business improves student employability, strengthen and make more relevant the university's research agenda, strengthen the university's impact in society and improve the university's reputation.
- Facilitate the collection and distribution of good practice UBC case studies, which illustrate examples of how HEIs and businesses cooperate. These can be publicised through the local press, institutional newsletters, websites or other publications and promote good news and impact UBC stories.
- Create guides, videos, roadmaps, e-courses and workshops for 'starting cooperation' and 'scaling up' cooperation for academics, business and HEIs.

7.2.2 Cooperation with business is being recognised as more than just licenses and spinouts

Whilst commercialisation of R&D remains an important and valuable way of transferring knowledge, HEIs are increasingly being seen as a long-term anchor tenant underpinning a region's development. The access to skilled and knowledgeable graduates, new discoveries as well as research facilities are some of the greatest motivators for business to cooperate with university. With this broad ability to influence their community, the HEIs cooperation with business – a major employer of talent and driver of our economies – has become a major focus of governmental policy makers. Examples include (1) UnternehmerTUM in Germany, a full-service centre driving the entrepreneurship and innovation capacity in the region of Munich in Germany, or (2) Tecnocampus in Spain, serving as a hub of knowledge, entrepreneurship and business and (3) the AMS Institute in Amsterdam that delivers metropolitan solutions to urban challenges through collaboration in education, research and valorisation.

Key study findings include:

- Employability and bridging supporting mechanisms are more developed than shared infrastructure and external integration structures in supporting UBC at HEIs.
- Most valorisation UBC indicators are for commercialisation of R&D results.
- Policy focuses heavily on valorisation activities at HEIs.

Recommendations

What **Policy needs to embrace a broader understanding of what is UBC as well as engagement more generally.**

Why
- Research cooperation is often the starting point for most UBC. Once a quality UBC relationship is created, it is much easier to expand the activities into other forms of cooperation.

How
- Broaden the remit of funding collaborative university-business projects to include a broader range of activities. The result could be to fund project consortiums that extend their cooperation activities beyond research into education, valorisation and management cooperation.

7.2.3 Getting first access to talent is an increasingly important reason for business to undertake UBC

European businesses are increasingly recognising the benefits of cooperation with HEIs in education as a means to improve and access better qualified future employees. Nevertheless, cooperation in education still remains low particularly in respect to cooperation in curriculum design and delivery. There are many ways in which HEIs can engage with employers to provide education that is more relevant to employment markets. In building these employment pathways into the HEIs, business have various initiatives of their own to get better access to their future employees. For example, Henkel, a traditional German business has developed a number of paths into the HEI to secure talented students including engaging students in research/consulting projects with different universities, offering internships as part of the curriculum delivery, their employees being involved in curriculum delivery as well as being involved in a network of international organisations of both business and universities and the Global Alliance in Management Education collaborating in a master programme. In addition to dual study programmes, European businesses also participate in the co-design and delivery of new curricula to provide more industry-ready graduates. Lifelong learning, job-related or not, is an emerging UBC activity across Europe and is well supported by pan-European and national policies.

Key study findings include:

- Mobility of students is the most prevalent form of cooperation in education.
- European businesses cooperate most in student mobility (followed closely by joint R&D) while other activities are less developed.
- Despite cooperation in education being developed relatively well, there are only a few UBC indicators measuring it.

Recommendations

What **Create more opportunities for cooperation with employers in education including more practical programmes, both within and cross-faculty.**

Why

- Aside from student mobility, most cooperation types in education are developed to a low extent. Student employability in Europe can be improved through greater connection to employers, with focus on business.

How

- Promote to business the importance of UBC in education particularly the benefits that can come from including the voice of the employer into curricula design such as better equipped graduates.
- Look to include business in the curriculum through presentations from industry, case studies, student projects for business and site-visits as well as applying problem-based learning, work-based learning and other pedagogical techniques that enable employment-connected learning.
- Make the various forms of cooperation in education more transparent. These forms of cooperation include supervising bachelor and master theses, mentoring and teaching opportunities at HEIs, internships, student projects as well as 'industrial' PhDs. These could be promoted to business as means for recruiting as well as building expertise whilst building better employment pathways for students.
- Provide more flexible, customisable and prestigious opportunities for business people to teach at the HEI including offering a title such as Professor of Practice or Practice Expert.

What **Provide support for the creation of new curricula, to redesign existing curricula or undertake ongoing modernisation of curricula at HEIs.**

How

- Provide information and/or training programmes informing about how to establish processes that include the voice of the employer in the (re)design of curricula. This could include information about how to execute employer forums / surveys / interviews / partnerships and how to structure external advisory boards.
- Provide funding and support to HEIs and business for the creation of new curricula, to redesign existing curricula or undertake ongoing modernisation of curricula at HEIs.
- Taking an MBA or DBA as an example, which tend to be focussed on more practical subject matter or applied research, create opportunities for 'industrial master' programmes across the HEI driven by input and cooperation of business.
- Develop more cross-disciplinary employer-connected graduate and post-graduate programmes that focus on the jobs of tomorrow for example programmes in artificial intelligence, climate change, internet of things and smart cities.

7.2.4 Strengthening employment and recruitment pathways to the benefit of students and employers

Since the 2010-11 study, both HEIs and business have a growing interest in engaging to create stronger employment pathways in order to increase the employability of students and access talent respectively. There is a tangible growth in lifelong learning and dual-study programmes as important ways in which HEIs and business cooperate to provide continuing and experiential education. Specific purpose universities such as Danube University Krems, executive education and continuous learning at Reykjavik University and dual-study programmes which continue to grow in prominence outside their Germanic origins through businesses such as VW. This cooperation in education is spawning partnerships between HEIs and employers in the delivery

of education. Examples can be taken from Linköping University and their collaborative partnership with SAAB, Management Centre Innsbruck's collaborative approach to their bachelor intake, Audi Hungary's Audi Faculty where engineering students have access to state-of-the art technical and technological knowledge and curricula designed in cooperation with industry at the Institute of Work Based Learning at Middlesex University.

Key study findings include:

- Lifelong learning is highly recognised in policy.

Recommendations

What **Develop improved employment and recruitment pathways from higher education to employers.**

Why
- Interaction with future employers at an early stage enhances the employability of future graduates.

How
- Promote to business that UBC can be a great way to identify and recruit future talent as a means for encouraging their involvement in curriculum design and delivery.
- Provide tax deductions and other short term benefits for business that cooperate with HEIs in designing lifelong learning, dual study programmes and other bachelor, master and doctoral programmes. This helps to counterbalance the long time to payoff from collaboration in education as well as to cover expenses.
- Create opportunities for internships within and external to the curricula.

What **Provide improved support to employers in educating and upskilling their employees during their working lives.**

Why
- Interaction with future employers at an early stage enhances the employability of future graduates.

How
- Engage employer groups and industry partners to investigate possibilities for dual study programmes, whereby workers combine either (i) university education and work or (ii) university study, vocational education and work in an integrated programme.
- Seek opportunities to provide employees with professional courses to respond to the particular skill and training needs of industry including both formal and informal courses, seminars, conferences or private lessons as well as continuing education and lifelong learning programmes.
- Provide funding for the creation of lifelong learning or dual study programmes that connect employers with students and the future needs of employers with the higher education sector.

7.2.5 Entrepreneurship is being fostered by European universities

There is a noticeable change in the acceptance that developing entrepreneurship is part of the university's role, which includes supporting entrepreneurial mind-set development and entrepreneurship activities with academics and students and evidenced by the significant increase in programmes and initiatives within universities supporting entrepreneurship. This also applies to the increasing view of the HEI as a hub for entrepreneurial activity. Exemplar programmes include Tiimiakatemia (Team Academy) in Finland, which offers a truly unique entrepreneurship programme without exams, UnternehmerTUM in Germany, which brings business onto the campus to team up with students to develop new products, services and other concepts or iAccelerate at the University of Wollongong in Australia, which engages actively with alumni and regional stakeholder to develop

new business. Moreover, businesses are increasingly working with HEIs and observing the entrepreneurial talent and start-ups coming from the university environment as a feeder for their innovation – new product and service development – pipeline. Considering the ratio of students to academics – approximately 20 to 1 – at a HEI, the scalability of research cooperation, problem-solving or entrepreneurship activities is greatly enhanced by making students part of the equation.

Key study findings include:

- There is a lack of UBC indicators measuring the outcomes and impact of student and academic entrepreneurship.
- The presence of supporting mechanisms for entrepreneurship have increased since 2010.

Recommendations

What **Embrace the HEIs role in providing entrepreneurship education.**

Why
- HEIs provide a breeding ground for developing entrepreneurial talent and ventures because of its access to education, mentors, infrastructure and networks that support incubation.

How
- Allow for easier integration of entrepreneurs into the HEI by providing them with a transparent contact point, defined ways of being involved (e.g. defined programmes) and limiting internal regulations hindering practitioners to work within HEIs.
- Offer entrepreneurship courses and opportunities across faculties as both a means for coping with a flexible labour market and a path to employment. Embrace and educate entrepreneurial thinking and acting as a comparable skill-set, and as equally necessary, as business management.
- Building on the 'Industrial' PhD structure, create and fund the 'Entrepreneurial PhD', which has a combined focus on research excellence as well as commercialising research results.

What **Embrace HEIs as a potential source of not just entrepreneurial teaching, but as a potential source of entrepreneurial ventures and as a facilitator or hub of a regional entrepreneurship ecosystem.**

Why
- HEIs are a source of high tech research, more radical forms of innovation and entrepreneurial talent.

How
- Businesses could look to open their innovation chain to entrepreneurial ventures from students or academics as a source of growth, new areas of business and entrepreneurial talent acquisition. Sponsoring entrepreneurship programmes, staff participation in entrepreneurship workshops and engaging with start-ups as mentors are simple ways to commence this association.
- Make available entrepreneurship programmes and facilities at HEIs to business as a means of the HEI better connecting with external partners and to develop more entrepreneurial thinking in the business.

7.2.6 There are mixed messages in the development of UBC in Europe

The reluctance of parts of the academic world to engage with business in research, and at times in education, was also evident through the expert interviews. The desire for academic freedom and research free from the influence of industry was mentioned a number of times as a reason that academics do not cooperate. Similarly, for business, experts on both sides often referred to the long-held notion of the academic separation (ivory tower) as well as the cultural differences as sources of business reluctance. The still low rates of academic and business cooperating were evident even considering the likely self-(de)selection bias of those non-cooperating academics or businesses[24], not undertaking the survey. With the increasing

speed of the industrial cycle and societal change, academics will be challenged to stay relevant and business challenged to stay at the cutting edge in the face of global competition. Nevertheless, there is a lot of good news emerging from the study in respect to UBC. The case studies described 52 good practise examples, which highlight the potential for UBC to benefit all stakeholders and to positively impact regions or society generally. From the Siemens example in research, the positive education cooperation example of Audi Hungary, the DIT Hothouse valorisation example and the Telecom Italia Joint Open Labs as a place where industry research and universities come together, there were extensive positive individual and collective stories described in the cases as well as the interviews by experts. Moreover, the survey results clearly highlighted that, despite both academics and businesses stating that they get some of the least benefits from UBC, nearly all co-operators are willing to recommend and continue to undertake cooperation.

Key study findings include:

- Most European academics do not cooperate with business
- Even for cooperating academics, there is still room for increased cooperation
- Both academics and businesses in Europe would recommend UBC in research, less so in education
- 98% of academics and business collaborators intend to maintain if not increase collaboration

Recommendations

What	**Create more detailed insights into the State of UBC**
Why	▪ More detailed insights allow for policymakers to make more targeted investments into UBC and create evidence-based policy
How	▪ To develop evidence-based policy for UBC, undertake regular data gathering at a regional, national and European level which review the State of UBC

7.3 WHAT IS DRIVING OR INHIBITING UBC?

7.3.1 UBC is a people's game and relationships matter

A commonly-exhibited key success factor evident in both the survey and most cases was the importance of relationships for successful UBC. Aside from one-off commercialisation deals, cooperation activities are built on personal and organisational relationships, whereby mutual interest is established alongside recognition of their individual interests. Mutual trust, commitment, having a shared goal and prior relations with partners are the key facilitators on which successful UBC is built. Many of the good practise cases highlighted that relationships commenced through small projects with low commitment and minimal risk, and then built a relationship from this base. The case of Perspective Exchange in Potsdam Germany, recognises this by inviting business people and academics to work with the other for a day to get to know each other and their worlds and subsequently creating a starting point for further collaboration. The case of Harper Adams University and the company Dairy Crest in the UK is another example of a successful long-term partnership built on relationships of both the organisational leadership as well as the academics and industry researchers and their daily positive interactions in the shared facilities of both organisations.

24 'Non-cooperating academics' is a term used for those academics not cooperating with business (only) and does not mean that they do not cooperate externally or with external stakeholders. This terminology is true also for #non-cooperating business'.

Key study findings include:

- Relationships facilitate academic cooperation.
- Good relationships and the existence of a shared goal are the main facilitators of UBC together with the existence of funding.
- Relationships based on mutual trust, commitment and a common goal are driving business managers to cooperate.
- All UBC stakeholders agree that trusted, committed, financed and mutually beneficial relationships drive UBC.

Recommendations

What **Create greater opportunities for academics and business people to develop trust and UBC experience.**

Why

- Trusted and mutually-beneficial relationships underpin successful cooperation.
- Finding a collaboration partner is a major barrier to cooperation for those not yet collaborating. Moreover, successful previous partnerships are an indicator of future productive partnerships.

How

- Provide small funding opportunities to allow new UBC relationships to commence. The funding should be a first step in potentially developing a relationship, rather than just a one-off paid research consultancy and should be oriented towards building trust and delivering small outputs.
- Spend time at the start of collaborative projects to build relations and emphasise relationship-building. Furthermore, create processes which align aims and expectations prior to commencement, and define deliverables for both business and academia.
- Drawing upon already existing relationships as a source for connecting academics with business and employers. Encourage and support academics to reconnect with alumni, past master and PhD students who are now in industry, as a source of external cooperation.

What **Develop opportunities for greater professional mobility. Professional mobility includes the exchange of professional staff from business and post-graduate, PhD, post-doctoral, research staff and academics from HEI.**

Why

- Professional mobility between HEIs and business is currently a lesser known and less developed activity despite the potential it offers for relationship development and for exposing the professional to the culture of the other stakeholder.
- During the case study review, there were no institutional examples found of formal professional mobility programmes, only informal arrangements.

How

- Create more flexible positions in academia by offering the potential for a % split in working time between academia and business with recognition for their time in business. This can also be replicated in European businesses through more flexible positions in companies, and offering the potential for a similar % split in working time. The 'Google' rule of one day a week (20%) made available could be a good working format. Insights for research and the ability to see what is coming in R&D could be the major benefits for each party.
- Create 'packaged' professional mobility, which allow shorter and longer term movement from HEIs to business and business to HEIs. This could include 3-6 month professional sabbaticals, master / PhD theses residencies as well as research or commercialisation 'sprints', whereby research is converted to outcomes in a short time period.

- Promote short-term academic mobility funding opportunities (e.g. Erasmus scholarships) that include sabbaticals in business. Make available mobility funding for business people to take a 'sabbatical' within the HEI, whist companies can provide 'sabbatical' leave opportunities to work within a HEI.
- Create a mandatory PhD component that requires the PhD candidate to interact with business, government or societal stakeholders related to their PhD topic through e.g. site-visits, week in practice or presenting their research to externals.
- Offer easier regulations for professional mobility that recognises employment length and work record as well as a continuation of superannuation and health cover.

What **Develop new mechanisms to develop contacts and relationships.**

How

- Seek to develop innovative new ways and structures for communicating scientific discoveries.
- Better utilise existing online and social media tools such as ResearchGate, Academia.edu, LinkedIn, Twitter and Yammer to build profiles of academics, to offer their research to business and to build relations. These social media platforms could also be connected into an online search platform for business and HEIs to find the appropriate collaboration partner.
- Better utilise student internships and alumni programmes as sources of UBC relationships.
- Develop mechanisms for building upon and 'scaling-up' existing academic-business relationships to include more faculty and business colleagues, or elevate to the faculty or university level and across different departments of the business. This institutional anchoring of UBC' escalates the relationship above the individual to the institutional level.

7.3.2 Research outcomes drive UBC for both academics and business whilst for HEIs it relates to funding

Each stakeholder group has its own motivation for UBC: Academics for their research, HEI representatives for disparate reasons (funding, graduate employability, research used in practice) and business for innovation outcomes. European businesses cooperate with HEIs mostly as a source of future perspectives and enduring competitive advantage. Siemens research cooperation with HEIs is a case in point. They operate a multi-billion-euro R&D budget of which a small fraction is dedicated to HEIs. However, with most of the budget dedicated to development, their research cooperation with HEIs is focussed on contributing discoveries and technologies for the business of tomorrow (and the business of the day after tomorrow). Investing in research cooperation with universities is best suited to being a strategic long-term investment that highlights where UBC has an ideal 'sweet spot'. This long-term perspective and dedication of resources that large corporations have is also why it can be difficult for small and medium sized businesses to undertake UBC. Their lack of capacity, including having a dedicated contact person for UBC, makes it difficult to establish a strategic relationship with universities.

Key study findings include:

- Research outcomes drive academic cooperation.
- Academics that don't cooperate perceive research motivations much less than those that do.
- Research motivations for academics to cooperate are increasing.
- Access to funding and financial resources are the major motivations for HEI managers to cooperate with business.

- Business managers are motivated to engage in UBC for reasons related to their longer-term innovation capability

Recommendations

What **Develop mechanisms and processes for more effective conversion of cooperative projects into research outcomes.**

Why
- To ensure that research finds its way into practice and maximise the impact of publicly funded research.

How
- Promote to academics the potential research benefits that can result from UBC, which include increased quantity and quality of research.
- In addition to a research plan, at the start of their funded research projects academics could create a plan for the potential utilisation of their research including listing organisations who could be interested in their work.
- Involve knowledge transfer professionals in the research process to coordinate the potential use of the research findings and to ensure the conversion of outputs from research projects into value for all stakeholders, for example, publications for academics and products and services for business.
- Get business involved at an earlier stage in the research process even if it is just to secure an expression of interest in the final research results.

What **Facilitate funding opportunities which combine funding or in-kind support, from government, business and the HEI.**

Why
- HEI managers perceive that the greatest motivation for undertaking UBC is to access an additional source of income whilst they also nominate the absence of finance as the greatest barrier to UBC.

How
- Create project structures for collaboration that allow it to deliver (i) basic research outcomes (blue sky research outcomes) as well as shorter term (ii) applied research results, and (iii) immediate problem solving consultancies that provide direct assistance to problems faced by business (but would be paid by that business).
- To reward HEIs for undertaking UBC, tie part of the funding of HEIs to UBC outcomes as a policy approach for encouraging UBC.

7.3.3 UBC can be further stimulated through incentives

Currently, in Europe academics are primarily rewarded in their career progression for their research outcomes. With that background, it is noteworthy that both academics and business, despite perceiving that they get less benefits from UBC than other stakeholders, continue to cooperate. This suggests a clear way forward for those knowledge-transfer professionals (KTPs) trying to develop UBC. If KTPs concentrate on making sure that the outputs of cooperation are converted into outcomes and benefits for those involved – for example that academics receive publications, and business receive more tailored, usable and further-developed research outcomes that better contribute to their innovation efforts – then greater levels of UBC, and satisfaction with UBC, will occur.

Key study findings include:

- Incentives for academics are the least developed of the UBC strategies at the HEI.
- Academics and businesses perceive that they get less benefits from UBC than other stakeholders.

Recommendations

What **Seek ways to ensure that both academics and business get greater benefits from their cooperation that contribute to both their short-term and long-term objectives.**

Why

- Currently, both academics and businesses in Europe perceive that they get some of the lowest benefis from UBC.
- Incentives for academics to undertake UBC are presently some of the lowest developed strategy mechanisms supporting UBC.
- A leading barrier for UBC relates to differing perception of time as well as other barriers related to cultural differences.

How

- Support collaborative R&D projects with a responsible project manager, whose job would be to ensure that all project outcomes are met and that project outputs are converted into tangible outcomes for all involved stakeholders.
- Provide incentives for academics to cooperate with business / employers including these 'third mission' activities in their performance assessment and career progression. This could include specific incentives for academics to update their curriculum together with employers. The actual incentives could include reduced teaching time, salary bonuses, budgets for expenditure on equipment and travel, awards and prizes for excellence in UBC as well as funding and support for facilitating the process.
- At the start of new collaborations, establish clear and transparent 'collaboration agreements' which clarify expectations and outcomes for each of the respective stakeholders.
- Seek to align working with HEIs with the corporate social responsibility needs of business to increase the potential benefits to their reputation from collaborating with HEIs.

7.3.4 Lack of resources and differing cultures are inhibiting UBC in Europe

The study found that funding and a lack of resources to undertake UBC was a particular barrier to cooperate for all stakeholders involved with UBC, but particularly for academics, HEI managers and cooperating business. For academics who have been traditionally focussed on education and research, a 'third mission' of engagement has been added to their workload without necessarily providing them with the time to do it – Insufficient work time allocated was one of the top three barriers for academics – without any specific training and without proper incentives. Given that HEI managers rate funding as a key driver for UBC, it would seem reasonable that tying a portion of HEI funding from the state to UBC activities could provide significant enough incentive for HEIs to increase cooperation. Cooperating and non-cooperating academics rate the barriers to UBC quite similarly, with non-cooperating academics rating awareness and cultural barriers higher, but not significantly. Barriers for business differed between those cooperating and those that are not. Whilst cooperating businesses rated funding and resources as the biggest barrier to cooperation, businesses not cooperating rate awareness and cultural barriers as the highest, and score the barriers overall higher. For cooperating businesses, the awareness of what the HEI does and the difficulty of finding the appropriate collaboration partner as well as cultural differences have been reduced to more manageable levels. This indicates that, just as relationships are a key facilitator of UBC, and the lack of understanding that comes with those relationships, is also a key barrier. Compare this with the situation of an already existing relationship between academics and

business. At this stage, there is more of a need for (further) funding to 'scale-up' their already existing activities.

Key study findings include:

- Funding represents the largest barriers for HEIs to cooperate with business.
- HEI representatives perceive the highest barriers to UBC to be a lack of funding.
- Cooperating and non-cooperating academics perceive a similar existence of barriers inhibiting UBC with both stating a lack of funding and resources are the biggest inhibitors.
- Rewarding HEIs for UBC through alterations to funding could be an important policy approach for encouraging UBC.
- Funding represents the largest barrier for businesses already cooperating whilst awareness and cultural barriers most inhibit business not cooperating.

Recommendations

What **Seek opportunities to remove barriers for UBC.**

Why
- Academics specifically have named bureaucracy and a lack of additional time as major barriers to UBC.

How
- Provide academics with ready-made contracts and other legal and internal documents. This can reduce the time spent by academics on the administrative part of the collaboration.
- Audit the UBC environment to identify regulations hindering UBC and seek ways to streamline and reduce bureaucracy for UBC at an institutional and regional level.

What **Seek ways to develop improved cross-cultural understanding between the academic and business environment.**

How
- Encourage academic-mentoring for businesses as well as 'academics in residence' opportunities to provide business with academic-world experience. This can improve cultural understanding and provide connections back into academia.
- Expose academics to real-world and entrepreneurial influencers through programmes such as 'entrepreneurs / business leaders in residence' and business-mentoring for academics. These business people work alongside academics to provide academics with business-world experience and provide connections back into business.
- Create initiatives that establish academics as external advisors on company boards as well as industry professionals and / or other employers involved in university and faculty boards.
- For businesses starting out in cooperation, assist them to find the most appropriate collaboration partner and partner them with an academic experienced in working with business.

7.4 WHAT ARE THE PRIMARY MECHANISMS SUPPORTING UBC?

7.4.1 A long-term strategic commitment, underpinned by a stable supply of resources, provides a foundation on which UBC relationships can develop

The previous section highlighted that people and relationships drive UBC, suggesting that a longer-term approach to cooperation is necessary to allow the development of trust and mutual interest for these relationships to prosper. Furthermore, most of the case studies displayed that benefits from UBC are often experienced in a medium to longer term timeframe and that stable commitment of resources was crucial to their development. Moreover, the commitment of long-term resources enables the kind of meaningful interactions and long-term planning that underpins successful UBC cases. The commitment of financial resources for facilities, human resources and larger projects help overcome barriers to cooperation, including the differing cultures, and to provide a stable environment for cooperation to commence and develop. High level commitment helps UBC to stretch beyond isolated cases and institutionalise cooperation within the culture of the organisation. This thinking guided some of the universities in our best practice series to become leading institutions in regional engagement and entrepreneurship, such as the case of Simon Fraser University. However, for most universities across Europe, the support for UBC has remained on 'paper' and not supported through the commitment of resources or 'implementation strategies'. With respect to mechanisms supporting UBC, business is leading the way, with a similar development of 'paper' and 'implementation' strategies, showing that they are putting their 'money (resources and time) where their mouths are'.

Key study findings include:

- About half of all European countries have a recognizable strategy for UBC.
- 'Paper' strategies as well as employability and career services are the most developed UBC supporting mechanisms at HEIs.
- Rewarding HEIs for UBC through alterations to HEI funding could be an important policy approach for encouraging UBC.
- Government has a role in supporting UBC.
- HEI managers perceive that strategies for UBC at HEIs are less developed in 2016-17 than in 2010-11 although the interest in UBC has grown. This could relate to increasing expectations in respect to supporting mechanisms from HEI managers since the previous study.
- Employability and bridging structures are more developed than shared infrastructure and external integration structures in supporting UBC at HEIs.
- Mechanisms to operationalise UBC are only moderately developed in European HEIs and focused on students more than academics.
- Strategic, top-level mechanisms are the most developed UBC supporting mechanisms in business.

Recommendations

What **Put appropriate mechanisms in place to support the development of UBC.**

Why

- For academics, UBC is a discretionary activity and for both HEIs and business, cooperation is not necessarily a natural activity. In these circumstances, appropriate mechanisms can be put in place to encourage and support cooperation between the two.
- Whilst including UBC in the strategic mission and vision of the university is highly adopted in European HEIs, reinforcing that strategic commitment with resources is significantly less developed. Additionally, only 37% of cooperating businesses have a strategy for UBC.

How

- Provide a clear UBC strategy and development policy, which is aligned and included in the university or business mission as well as the long term strategic planning of the HEI or business.
- Ensure that there is a person responsible for the executing of the strategic development of UBC at the HEI or business.
- Establish common terminology and visions for UBC amongst key stakeholders. This could encompass terminology such as university-business cooperation, entrepreneurship, engagement as well as defining the role the individuals, organisations or regions should play in these different contexts.
- Establish internal awareness raising activities including recognising UBC on the website and within newsletters, create internal events and forums as well as inviting external guest speakers.
- Before implementing mechanisms to support UBC, audit the environment to have clarity about which supporting mechanisms are already in place and what is needed.

What **Create 'corporate relations' offices / adjust the role of existing technology transfer offices.**

How

- Establish an office that supports UBC by (i) clearing the path of obstacles for cooperators (e.g. reducing bureaucracy), (ii) supporting the development of external relationships (e.g. helping to access funding opportunities, organise research contracts) as well as (iii) project managing collaborative projects to ensure that benefits are delivered for all stakeholders.

7.4.2 To develop UBC, more funding is not necessarily the answer... start small!

Despite the previous points advocating for UBC funding to remove barriers for UBC, whilst money can be important, and at times even essential for undertaking UBC, there are many opportunities for developing activities without it. Tested scientifically using the data from the study, barriers can prevent an academic or business from cooperation, however the absence of barriers does not necessarily mean that either will cooperate. Only UBC drivers had the ability to explain or influence UBC. Said differently, the provision of funding helps to overcome any resource-related obstacles, however this does not necessary stimulate UBC. Focusing on developing relationships and taking the motivators of the individual stakeholders into consideration does. Incentivising academics for their cooperation with industry with a recognition of UBC in their criteria for promotion is a further method for aligning UBC with the interest of academics. As emphasised by Gonzalo León (VP for Research at Universidad Politécnica de Madrid) and Peter Rohan (Former Partner / Project Director at EY), there needs to be a mutually respectful model and these should involve conversations about mutual interests. It is about understanding the different self-interests of the actors involved, and this can be facilitated in several ways without necessarily requiring financial investment.

Particularly in the area of education, while most cooperation activities require a low financial investment (e.g. student mobility), some of them need nothing at all, like joint curriculum design, which only requires people from the HEI and business to sit together, this also applies to joint curriculum delivery, as some businesspeople do not give a lecture or speech to students for money but rather for the experience and access to students. The Sunshine Project from South Africa demonstates that

entrepreneurship education does not need to have a higher cost than any other university course, in fact it can generate funds that can benefit the community. These activities help develop relationships and open the door towards more and a greater variety of UBC activities.

In the research area, where more financial resources are often required, there are still a number of cooperation initiatives that can be used to overcome a potential lack of funding and make it over the first threshold. Initiatives such as the Young Investigator Network, a network of young researchers mentored by business managers from leading Danish companies, or AIMday, a forum for discussion where both industry and academic representatives can create contacts, exchange knowledge and collaborate, prove that sometimes simplicity is key. These types of events also allow the business stakeholders with less resources, such as SMEs, to develop relationships with HEIs without necessarily having to provide financing from the start.

Key study findings include:

- HEIs are formally committed to UBC but lack strategies that implement it within the HEI, particularly those directly incentivising academics.
- Once academics and businesses cooperate, they tend to cooperate with each other in a number of UBC activities.

Recommendations

What **Seek meaningful ways in which academics and business people can be brought together.**

Why
- To find common ground/interest between academics and business people as a basis for forming a relationship.

How
- Seek opportunities to create and develop relationships such as through a 'societal grand challenge' collaborative project, regional innovation boot-camp weekends, executive education master thesis collaboration.
- Create small 'packaged' opportunities to collaborate e.g. master-thesis supervision, student 'consulting' project with business / external stakeholders a blog article, small UBC projects around a common area of expertise.
- Create and promote events that encourage networking of academics and students with business people to help the development of relationships e.g. academic pitching competitions, topic-related breakfasts etc.

7.4.3 Simple (and flexible) UBC structures support UBC

A common characteristic of the good practice cases was that certain structures were established to provide greater tangibility to the activity. This tangibility made the concept easier to understand and align internal regulations to support rather than hinder UBC. For example, the AMS Institute is a tangible and clear concept co-created by a large number of stakeholders, whose collaborative work has been successfully 'labelled'. Whether it is from the perspective of business or HEIs, founding, naming and framing the UBC activity allowed common clear communication of the concept and reduced uncertainty. This is for example the case of Vytautas Magnus University in Latvia whose Centre for Enterprise Practices (CEP) offer three structured and interrelated entrepreneurship programmes.

A structure also provides a framework into which stakeholders could invest time and finances, however structures by nature tend to be complex and rigid. Conversely, simple structures allow both academics and companies (particularly SMEs) to engage more successfully, since one of the main barriers of both actors is their lack of time. The WMG (formerly Warwick Manufacturing

Group) at Warwick University is a positive example of a successful approach to this. Their staff are acutely aware of the limited time and resources of SMEs, and for this reason, they facilitate the collaboration and support the work of the SMES partner, as much as possible. Similar thinking has gone into the 'Demonstrator' concept run by Empa. These demonstrators provide very straightforward demonstrations of research in practise and provides for easy-access to its facilities to test research in practice.

Key study findings include:

- Limited resources, lack of time and bureaucracy are some of the highest barriers to UBC

Recommendations

What	**Develop simple (and flexible) UBC structures support UBC**
Why	▪ UBC structures which are easy to access provide better opportunities for commencing or developing UBC.
How	▪ Offer clear and transparent public-private funding structures for the creation of joint labs, institutes and collaborative research centres. ▪ Provide funding to develop relationships between HEIs and business at different stages of development by differentiating between shorter-term funding for 'starting up' new collaborations and longer-term funding for 'scaling up' proven collaborations.

7.4.4 Measuring the (right) outcomes of UBC is important to managing it

The adage that one cannot manage what one cannot measure is true also for UBC. Historically, measuring UBC has been limited to easy-to-measure tangible or explicit metrics such as patents and licences. However, the revenues generated by licensing patents, and managing technology transfer generally, doesn't always outweigh the costs to HEIs to manage them and are not necessarily the most beneficial outcomes from UBC for universities, business or society. As many of the benefits from UBC take full effect in the long-term, and in less quantifiable or less attributable ways, much of the impact of cooperation can be difficult to capture. For government and universities to manage, facilitate and promote a broader set of UBC activities, the appropriate measurement and incentive systems need to be in place. Encouragingly however, the good practice cases have provided some good examples of how some of more tacit or intangible outcomes of UBC can be measured. Some of the measures created including student skills improvement, relationship satisfaction or amount of job offers in the region for graduates. Further examples could be observed to measure the longer-term impact measures that could be linked to the UBC activity such as new jobs created and improvements to the regional industrial profile. In response to a declining local industry and a brain-drain to other more prosperous cities, Australia's iAccelerate created specific metrics around jobs created in the region, inward investment secured, female entrepreneurship rates as well as rates of alumni who stayed in the region to create their start-up. Despite these positive examples, indicators to measure the mostly intangible benefits of UBC remains of upmost importance and remain a challenge. UBC's measurement needs to thoughtfully capture the right metrics to ensure that the 'right' type of cooperation is encouraged, with recognition of the many intangible results and often long term to payoff of a broad set of UBC activities.

Key study findings include:

- Despite cooperation in education being developed relatively well, there are only a few UBC indicators measuring it
- UBC indicators are focused on valorisation at the expense of education and research cooperation indicators
- Most valorisation UBC indicators are for commercialisation of R&D results
- The high extent of cooperation in R&D contributes to it having the most developed UBC indicators

Recommendations

What **Develop indicators and measurements of UBC which capture both explicit and tacit outcomes as well as longer term impact across the full spectrum of UBC activities**

Why

- Current HEI funding frameworks, measurements and indicators as well as international university rankings recognise a limited range of UBC activities and are relatively homogeneous. The result is a HEI sector with a similar lack of diversity.

How

- Establish national / regional surveys of employers measuring the satisfaction with university curricula and their graduates together with other employability metrics. Require HEIs to monitor student employability metrics for their graduates.
- Provide a systemic evaluation of employer's needs as a basis for creating new curricula and adapting existing curricula within existing programmes as well as on creating lifelong learning concepts and business training opportunities for employers.
- Establish measures and indicators for HEIs, which capture the broader long-term impact of UBC, not only limited to their valorisation, but also an engaged first (education) and second (research) mission.

7.5 IN WHICH CONTENT DOES UBC OCCUR?

7.5.1 UBC needs people with the right skills and mind-set to engage successfully

To foster UBC, academics also need a set of skills that allow them to interact with business, commercialise their research and start new ventures more successfully. The study found that there are a number of factors which explain the likelihood of an academic engaging in cooperation with business including the amount of time they have spent in a business and the amount of experience they have already accumulated in UBC, both factors relate to having an understanding of how business works. Working against these two experience factors are the 'university influence', from the time within the HEI, as well as their age, as results indicate that they would undertake less cooperation.

Although supporting mechanisms are needed in both HEIs and businesses, they are only structures whose usefulness depends on the people operating them. Having people with the right skills and experience is a crucial factor in initiating and succeeding in UBC. Many of the case studies described similar experiences, with also the professionals enabling and supporting UBC needing to have specific skills, different from that of other staff within the HEI or business. While traditionally these roles have been awarded to those with a deep understanding of academia (in HEIs) or the company (in businesses), most good-practice cases show how these UBC professionals (so-called 'boundary-spanners') are required to have a thorough knowledge of both the university environment – teaching and research – and the industrial sectors that are part of the collaboration. As an example, staff of Yissum in Israel, one the world's leading research commercialisation offices have extensive personal experience in industry and commercialisation, whilst British Petroleum (BP) UK's Public Partnerships area employ 'connectors', generally with a PhD in the subject area, who have the ability to transplant an interesting piece of science in one field into a practical application inside BP.

Key study findings include:

- The 'university influence'? – The greater the number of years that an academic works at an HEI the less they tend to cooperate with business.
- The 'understanding effect? – The greater the number of years that an academic works in business the more they tend to cooperate with business.

- The 'experience multiplier? – The greater the number of years that an each cooperates with the other, the more cooperation they undertake.
- For cooperating academics, younger academics cooperate with business at higher rates that older academics.
- Ambidextrous 'boundary-spanners' who understand both the academic and business world are extremely important in developing UBC.
- Universities could improve their knowledge of UBC, their business knowledge and their external contacts as a means to improve their UBC.

Recommendations

What **Increase the UBC experience of both academics and business**

How

- Adjust employment criteria of academics to put more emphasis on experiences outside of academia as viable criteria for employment.
- Include having an entrepreneurial mindset as part of the hiring criteria for future academic employees, especially for positions expected to work more intensively on external engagement.
- Employ 'boundary spanners', knowledge transfer professionals who have a deep understanding of business and academia, to support the knowledge transfer / exchange process and development of relationships especially early in relationship development process.

7.5.2 Non-cooperating academics and businesses observe their own lack of UBC capabilities

Non-cooperating academics see themselves, their institution and their environment less positively for UBC than academic collaborators. In terms of having sufficient skills and knowledge, knowledge of what business want, ample business contacts and relations as well as adequate support are factors that non-cooperating academics rate significantly lower than cooperating academics. In respect to their institution, the HEI, they generally, believe the HEI to have lower capabilities for UBC to academic collaborators, particularly with respect to colleagues having a positive attitude towards UBC as well as having positive UBC role models at their HEI.

Businesses that do not cooperate with HEIs, rate their organisational capabilities significantly lower in all UBC-related factors than those businesses already cooperating. Similar to academics, they rate themselves lower in possessing the necessary UBC skills and knowledge, understanding of what HEIs want or having sufficient contacts or relations in HEIs, however this mostly relates to research capabilities. Their responses were more similar to cooperating business when it came to capabilities for cooperation with HEIs in education. Both results suggest that, for those non-cooperating businesses potentially interested in UBC, proactively supporting their understanding of the other through workshops, having forums to interact, together with promoting positive examples of successful UBC, would foster greater UBC activity.

Key study findings include:

- Non-cooperating academics perceive themselves to have less individual capabilities for UBC
- Non-cooperating academics perceive their university to have less UBC capabilities
- The 'experience multiplier? – The greater the number of years that an academic cooperates with business the more cooperation they undertake
- Non-cooperating business perceive themselves to have significantly lower organisational capabilities for UBC

- Cooperating and non-cooperating businesses perceive relatively similar regional capabilities related to UBC
- Most businesses cooperating with HEIs in R&D also cooperate with other business and /or have their own R&D capability

Recommendations

What **Codify and professionalise the skills and competencies for UBC and develop UBC capabilities in both academia and business**

Why
- Non-cooperating academics and businesses perceive their UBC skills and knowledge lower than those that do cooperate.

How
- Provide programmes (e.g. e-courses, workshops, guides) that develop specific UBC knowledge and skills for both academics and SMEs.
- Create professional development programmes for the professional development of knowledge transfer professionals.
- Create a UBC-buddy programme for experienced UBC academics to partner with academics not-cooperating with business.
- Create a UBC-buddy programme for experienced UBC businesses to partner with businesses not-cooperating with HEI.

7.5.3 Situational factors of both HEIs and business affect their ability to cooperate

Although they are factors that cannot necessarily be changed, consideration of a range of situational factors affecting the HEI/ business to cooperate are important to understand.

As a starting point, larger-sized HEIs or big business generally have more resources available to cooperate with each other. For HEIs, this affects their general ability to cooperate across all the UBC areas of education, research, valorisation and management. Furthermore, the knowledge area of the faculty also affects the UBC they undertake. The widely-held notion that the scientific fields of Technology & Engineering and Medical Sciences cooperate with business mostly in research and Social Sciences and Humanities mostly in education is confirmed by the study. Additionally, 'elite' universities in particular, who are ranked in the top 100 in the world, operate with a different set of rules to the remainder of European HEIs. Within the case study research there was an observable difference in the willingness of business to proactively approach elite universities, which is not replicated in the majority of HEIs. Given the ample resources and natural potential to acquire both research and UBC funding, together with the unique nature of the previously-described situation, the research suggest that policy-makers should not seek to create specific policy to address these 'elite' institutions and should them as a proxy for other HEIs.

The ability and willingness of large-sized business to cooperate in activities which provide a less immediate pay-off, such as cooperation in the areas of education and management, were greater than medium, small and micro sized organisations. Large businesses were also more often involved in 'grand social challenges' and ('moon-shot') research projects, whereby there was a longer timeframe to outcome expected, or a higher risk of failure. This is also the space in which a much higher proportion of entrepreneurs, start-ups and spin-outs also engaged with HEIs.

A further observation from the case studies was that even within good practice HEIs and business, the commitment to UBC was not necessarily shared across the institution. This resistance to UBC occurred through 'pockets of resistance' not wanting to cooperate in the organisation, or because there was a specific UBC 'hub' such as a centre, institute, department, faculty or external arm of the organisation. With respect to HEIs, there were no examples of the entire organisation being completely committed to being 'entrepreneurial' or 'engaged' institutions, with the responsibility for cooperation apportioned equally across the entire organisation.

Key study findings include:

- Situational factors for HEIs and businesses affect their levels of cooperation
- Larger HEIs generally collaborate with business more than smaller ones in all cooperation areas
- Technology & Engineering and Medical Sciences cooperate with business mostly in research and Social Sciences and Humanities more so in education
- The larger the business, the more education and management cooperation they undertake
- The rules are different for elite universities and large international companies with the majority of HEIs and businesses needing different approaches to encourage UBC.

Recommendations

What **Promote a more differentiated HEI sector with different models of external engagement**

Why
- Those academics with any business experience are already significantly more likely to cooperate with business once they are inside the HEI.

How
- Consider employing academics who have already worked within business or who have engaged in entrepreneurial ventures as a pre-requisite for employment.
- Recognise, promote, fund and regulate different definitions of 'elite' universities including excellence in business-partnership, entrepreneurship, employability, regional development, lifelong learning or dual study programmes.
- HEI managers to utilise the European Commission's HEInnovate as a tool for discussion and self-assessment of innovation within the HEI. The tool can also be useful for Regional development agencies working with HEIs.

7.5.4 Regional businesses are the main collaboration partner for HEIs

Although there is increasing international competition for students and researchers as well as large investment in international research cooperation, most collaboration takes place on a regional or national level. Academics seek out and initiate their own cooperation with business, which are generally medium to large in size and localised, whilst businesses tend to also initiate their own cooperation with academics or HEIs, also within their region or nation. This is despite the increasing influence of technology in both HEIs and businesses, which make distance significantly less of an issue. The ongoing importance of proximity has seen a greater recognition of the university's role as a long-term anchor tenant for a regional innovation system and resulting in universities being at the centre of a regional innovation ecosystem. Examples such as iAccelerate at the University of Wollongong in Australia and Simon Fraser University in Canada highlight how universities have taken up this role to engage the local business community, act as a hub for start-ups and SME engagement on a regional level. The same applies to the University City Science Centre in Philadelphia, Tecnocampus in Spain and the AREA Science Park in Italy, who all have recognized the importance of a strong regional network and the important role of SMEs in the innovation ecosystem.

Key study findings include:

- Academics and businesses initiate their own cooperation
- Academics cooperate with large and medium sized organisations

- Cooperating partners are mostly located within their region or in the country which shows that geographical factor still matters in cooperation

Recommendations

What **Seek to find ways specifically for SMEs to engage more with HEIs**

Why

- SMEs get their innovation ideas mostly from suppliers and other businesses and often don't have the capability to absorb knowledge from HEIs.
- Broader collaborations spread the risk and investment required for more radical forms of innovation.

How

- Fund collaborative regional and/or supply chain consortiums, which include both large companies and SMEs. This will better allow SMEs to exchange knowledge, skills and technology with both large companies who can support knowledge translation and HEIs.
- When creating funding programmes, consider structures that have larger partners (designated as 'anchor' partners) committed to the life of the project and combine this with other smaller players that have more feedback to more flexibly come and go from the initiative.
- Integrate UBC activities, and especially the education related types, into the European Regional Development Fund to finance UBC on a regional level.
- Small and micro companies to have a lower and more straightforward regulation and flexible access to cooperation with HEIs.
- Offer SMEs and academic institutions incentives for initiating collaboration through devices such as research vouchers and support in their expectation management on both sides.

7.5.5 Building a supportive UBC ecosystem helps to sustain UBC in the long term

Despite the potential for universities to play a leading role in their regional development, there is an increasing recognition of the complexity and fragility of UBC and that sustainable UBC relies on the development of a supportive UBC ecosystem. In making the cases described a success, leaders were regularly called upon to engage other stakeholders from the triple helix in order to establish or develop an initiative or activity. The cases reinforced the adage that 'if you want to go fast, go alone, if you want to go far, go together' is true for UBC as well. This need for multiple UBC actors to come together to deliver real value to a city or region was a common theme throughout the cases. Although some of the case studies showed that bottom-up approaches for individuals or organisations to develop a specific UBC activity can work (e.g. Learning 2 Be), the impact is often experienced at the institutional level and its sustainability is dependent on the individuals involved. The cases that take a more holistic and long-term approach to collaboration, between relevant regional and international stakeholders, demonstrate how more sustainable and far reaching effects can be achieved. An ecosystem recently emerged from very adverse conditions is the one established in Medellin (Colombia), as explained in the Ruta N case. At a more developed level, Twente University and the innovation campus Novel-T have been working together since the 1960s to create a world-class entrepreneurial regional ecosystem.

Key study findings include:

- Those academic and businesses that are engaged in UBC mostly undertake more than one UBC activity
- The majority of academic and business collaborators have more than one collaboration partner

Recommendations

What **Develop a UBC culture**

Why

- Longer term financing allows the stability for relationships to further develop and expertise to develop.
- Despite new communication technologies, physical location still plays a role in developing long-term relationships.

How

- Develop and deepen relationships through longer term (five years plus) funding for research cooperation between proven project consortiums of private and public stakeholders.
- Using the university campus as a platform, develop modern collaborative precincts as well as co-location possibilities, which bring together excellence in HEIs and business. Ensure that there is an onsite relationship management function that can play a major role in supporting the development of UBC.
- Identify the strengths and weaknesses of the organisation (HEI or business) as well as the region as a source of potential opportunities for UBC, for cluster development and smart specialisation.
- Identify UBC champions or ambassadors within the HEI or business and empower them to promote and drive the topic.

What **Raise the profile of UBC in academia and business environments and develop ways for academic and business professionals to gain and share UBC experiences**

How

- Create a community or network of external like-minded collaboration-driven academics and /or innovation-driven businesses. These networks can facilitate regular internal stakeholder meetings around external engagement at the HEI and meetings, networking events and matchmaking with external partners.
- Create national / regional forums on UBC or related topics such as university engagement, regional innovation or entrepreneurship, to promote how collaboration can strengthen regions, create innovation, improve employability and develop the economy.
- Create national / regional / organisational awards and prizes for excellence in UBC.
- Create a programme at the HEI that invites the world of work into the HEI through invited presentations and for business to be able to request a presentation from an academic.

7.6 THE COLLABORATOR ARCHITYPES

7.6.1 The 'Academic Collaborator'

Collaboration profile

The 'academic collaborator' typically initiated their own cooperation with business and they tend to cooperate with more than two businesses, which are based in their region or nation and either medium or large in size. They tend to cooperate with these partners most likely in research or education, however cooperate in more than one way indicating that it tends to be a relationship with a business partner rather than a one-off transaction.

Personal profile

The academic collaborator has worked in business for a period of time (The 'understanding affect') and will increase their cooperation with each year of experience they have with it (The 'experience affect'). Working against this, the academic collaborator is likely to reduce their cooperation as they get older and/ or as they spend more time in the HEI (The 'university affect').

Motivators and inhibitors

Their biggest motivations for cooperation with business are for research outcomes more so than promotion and reputation in the university (although this could be improved through adjustments of internal measurement systems). Overwhelmingly, their cooperation is best facilitated through trust and mutually beneficial relationships with business and they perceive greater facilitators for cooperation than in 2010-11. Nevertheless, the focus by business on practical results and lack of funding generally inhibit their cooperation.

The profile of the HEIs in which they work

They work at larger HEIs, which are most likely applied sciences universities or technical universities although older HEIs tend to have a research focus and younger HEIs, a focus on cooperation in education. These HEIs also tend to have more localized partnerships with business although lack of funding inhibits the development of these relationships and support UBC primarily through 'paper' strategies (such as vision, mission, planning and communication) and to a lesser degree, resources.

Profile of 'non-collaborating academics'

Contrastingly, those academics who do not cooperate perceive research motivations from UBC much lower than those academics who cooperate, although they identify a similar extent of barriers. They also most likely possess no experience working in business, have been working in HEIs for many years, perceive themselves to have less capabilities for UBC, and they are generally less positive about the capabilities and attitudes of their universities and regions towards UBC.

Future cooperation

Despite perceiving that a greater amount of benefits from UBC go to business and the HEI than themselves, cooperating academics are also highly likely to recommend research cooperation to their academic colleagues but not in education, and are firmly committed to either maintaining or increasing their cooperation (98%).

7.6.2 The 'Business Collaborator'

Collaboration profile

The 'business collaborator' typically cooperates with less than five HEIs, mostly in their region or country and are most typically traditional universities or polytechnics. They tend to cooperate primarily in research, however cooperate with their academic partners in more than one way indicating that it tends to be a relationship with the academic partner rather than a one-off transaction.

Organisational profile

The business collaborator is most likely to be a larger, publicly-owned business, who see themselves as the initiator of the collaboration and operate in a country where research collaboration is the most developed UBC activity. As the business gets older, they are more likely to cooperate with industry at higher levels especially in education and as they get larger, more likely to increase cooperation in more long-term cooperation areas such as education and management. The more years of experience they have with UBC (The 'experience affect') the more cooperation they undertake, which they support by top-level commitment and the commitment of resources.

Motivators and inhibitors

Their biggest motivations for cooperation is to support their innovation efforts, particularly with a longer-term perspective, which is supported by external funding. The business collaborator perceives cultural differences to be the largest barriers to UBC, particularly differing motivations and lack of business experience in HEIs as well as differing time horizons.

Profile of 'non-collaborating businesses'

Non-cooperating business are generally interested to undertake UBC given the right conditions however, perceive higher barriers to UBC than cooperating businesses, particularly those related to awareness, first contact and communication

Future cooperation

Cooperating business are highly likely to recommend to their business colleagues to engage with HEIs in R&D more so than in education and training, however, 99% of cooperating businesses say that they want to continue if not increase their UBC in the future.

ANNEXES

ANNEX 1: EXPERTS INTERVIEWED

UBC expert panel interview candidates were chosen from a UBC expert pool compiled by the project consortium. In total, 23 interviews were executed in this initiation part of this study. The full list of experts interviewed can be found in the table below.

NO.	NAME	TITLE	ORGANISATION	COUNTRY
1	Allen Alexander	Director of Centre for Innovation & Service Research	University of Exeter	United Kingdom
2	Andreas Altmann	Rector	Management Centre Innsbruck	Austria
3	Jochen Barth	Managing Partner	CER10DIPITY GbR	Germany
4	John Bessant	Professor of Innovation and Entrepreneurship	University of Exeter	United Kingdom
5	Oliver Bücken	Head of Entrepreneurship and Technical Education	UnternehmerTUM	Germany
6	Lena Christiaans	Head of Corporate Employer Branding & Recruitment	Henkel AG & Co. KGaA	Germany
7	Eric Claassen	CEO & statutory director	Vironovative BV	Netherlands
8	Natasha Eckert	Director University Relations	Siemens	Germany
9	Paul Coyle	Innovation Consultant	Own consultancy	France / United Kingdom
10	John Goddard	Professor Regional Development Studies	Newcastle University	United Kingdom
11	Paul Hannon	Director Institute for Entrepreneurial Leadership	Swansea University	United Kingdom
12	Keith Herrmann	Director of Employability and Careers	University of Surrey	UK
13	Panayiotis H. Ketikidis	Vice Principal for Research, Innovation and External Relations & Chairman of the South East European Research Center (SEERC)	The University of Sheffield International Faculty, CITY College	Greece
14	Gonzalo León	Vice President for Research	Universidad Politécnica de Madrid	Spain
15	Markus Perkmann	Associate Professor of Technology and Innovation Management	Imperial College	United Kingdom
16	Carolin Plewa	Deputy Head of School	The University of Adelaide	Australia
17	Jonathan Potter	Senior Economist	OECD	-
18	Erik Puura	Vice-Rector for Development	University of Tartu	Estonia
19	Peter Rohan	Former Partner / Project Director	Ernst & Young / RMIT	Australia
20	Robert Sorrell	Vice President for Public Partnerships	British Petroleum (BP)	United Kingdom
21	Lukasz Sulkowski	Vice-President	Polish Accreditation Committee	Poland
22	Prónay Szabolcs	Assistant Professor	University of Szeged	Hungary
23	Miron Zapciu	CESAER-UPB responsible	University Politehnica of Bucharest	Romania

Table 1: List of experts interviewed as part of the qualitative expert interviews

ANNEX 2: CASE STUDIES

As part of the study, 52 good practice case studies on UBC were collected. The selection of cases followed a call and search for cases by the consortium partners, country partners and other contacts. This initial list was reduced to a selection of 200 potential candidates, and after another round of selection, the final 51 cases were selected for research. The cases were selected, amongst others, based on their UBC activities, type of mechanisms, geographical location, maturity and transferability.

CASE NO.	EU REGION	COUNTRY	CASE STUDY NAME	ORGANISATION(S) NAME
1	North	Finland	Team Academy	Jyväskylä University of Applied Sciences
2	North	Ireland	DIT Hothouse	Dublin Technical University
3	North	Iceland	Open University	Reykjavik University
4	North	United Kingdom	Dairy Crest Innovation Centre at Harper Adams University	Dairy Crest and Harper Adams University
5	North	United Kingdom	Institute for work-based learning	Middlesex University
6	North	United Kingdom	Warwick Manufacturing Group	Warwick University
7	North	Sweden	Vinnova's development of a new funding model for increased UBC	Vinnova
8	North	Sweden	AIMday	Uppsala University
9	North	Sweden	Young Investigator Network	University of Copenhagen
10	North	Denmark	DTU Skylab	Technical University of Denmark (DTU)
11	North	Norway	NTNU The Global Manufacturing Management Programme	Norwegian University of Science and Technology (NTNU)
12	South	Spain	Tecnocampus	Tecnocampus Foundation
13	South	Spain	Best practices UC3M-Airbus Group	University Carlos III Madrid, Airbus Group
14	South	Croatia	Student Support and Career Development Centre (CPSRK)	Faculty of Organisation and Informatics (FOI), University of Zagreb
15	South	Malta	Malta Business Bureau – University of Malta	Malta Business Bureau and University of Malta
16	South	Greece	Athens Centre for Entrepreneurship and Innovation (ACEin)	Athens University of Economics and Business
17	South	Italy	AREA Science Park	AREA Science Park, Innovation Factory
18	South	Italy	ASTER	ASTER
19	South	Italy	TIM Joint Open Labs	Telecom Italia, JOL WAVE University of Catania

20	South	Portugal	Fibrenamics	University of Minho, TecMinho, Sciencentris
21	South	Portugal	Learning to Be(L2B)	Department of Economics, Management, Industrial Engineering and Tourism, University of Aveiro
22	East	Hungary	Audi Hungaria Motor Kft and Széchenyi István University	Audi Hungaria Motor Kft and Széchenyi István University
23	East	Slovenia	The Gorenje Group	The Gorenje Group
24	East	Slovenia	Kolektor Group	Kolektor Group, University of Ljubljana and University of Maribor
25	East	Poland	Strategic development of UBC at the Gdansk University of Technology	Gdansk University of Technology
26	East	Poland	Klaster Life Science Kraków	Klaster LifeScience Kraków
27	East	Czech Republic	Entrepreneurial Programmes for Supporting Regional Innovation Strategy: The South Moravian Innovation Centre (JIC)	South Moravian Innovation Centre (JIC)
28	East	Estonia	University of Tartu	University of Tartu
29	East	Latvia	Facilitating Strategic R&D Cooperation in the medium-sized company	GroGlass, Solid State Physics Institute and University of Latvia
30	East	Slovakia	Elective courses at The University of Economics Bratislava	The University of Economics Bratislava
31	East	Lithuania	Facilitating Entrepreneurial Experience at the Vytautas Magnus University Centre for Enterprise Practice	Vytautas Magnus University - Centre for Enterprise Practice
32	West	Belgium	Ghent Entrepreneurship Ecosystem	Durf Ondernemen (Dare to Venture) at Ghent University, Centrum voor Ondernemen at Hogeschool Gent, Idea Factory at Artevelde Hogeschool, imec (previously iMinds), City of Ghent
33	West	Germany	Dual Study programmes – the hybrid higher educational programme	VW Group, Baden-Württemberg Cooperative State University (DHBW)
34	West	Germany	Siemens research cooperation with universities	Siemens AG
35	West	France	Roscoff Marine Station (SBR)	Roscoff Marine Station
36	West	Netherlands	University of Twente	University of Twente and Kennispark Twente
37	West	Netherlands	Amsterdam Institute for Advanced Metropolitan Solutions (AMS Institute)	Delft University of Technology, Wageningen University and Massachusetts Institute of Technology, in close cooperation with societal and business partners:
38	West	Germany	UnternehmerTUM	UnternehmerTUM GmbH, UnternehmerTUM Projekt GmbH, Unternehmertum Venture Capital Partners GmbH, UnternehmerTUM MakerSpace GmbH, Technical University of Munich
39	West	Germany	Perspective Change	Chamber of Commerce and Industry (Industrie- und Handelskammer) Potsdam, Cottbus and East Brandenburg
40	West	France	FoodLab	Vaucluse Chamber of Commerce (France) – Project coordinator
41	Western Europe	Austria	Management Center Innsbruck (MCI) – The Entrepreneurial School	Management Center Innsbruck (MCI)
42	Western Europe	Austria	Lifelong Learning Strategy at Danube University Krems – University for Continuing Education	Danube University Krems
43	Global	Australia	University of Wollongong's iAccelerate	University of Wollongong, NSW Government
44	Global	Canada	The Engaged University: Engaging students, research, and communities	Simon Fraser University
45	Global	Israel	Yissum - The research development company of the Hebrew University of Jerusalem (HUJI)	The Hebrew University of Jerusalem and Yissum

46	Global	USA	CU-ICAR	Clemson University International Center for Automotive Research
47	Global	USA	MIT REAP (Regional Entrepreneurship Acceleration Programme)	Massachusetts Institute of Technology
48	Global	Australia	AMIRA P260	University of South Australia, AMIRA International
49	Global	Switzerland	EMPA	EMPA
50	Global	South Africa	The Sunshine Project	Nelson Mandela Metropolitan University
51	Global	Colombia	Ruta N Medellín	Ruta N
52	Global	USA	University City Science Center	Science Center

Table 2: List of case studies written as part of the good practice case study report

ANNEX 3: INDICATORS

This monitoring tool includes three different modules of UBC indicators, a basic module (Module 1) an intermediate module (Module 2) and a complex module (Module 3). The indicators have been included in each of the three modules depending on the availability of the information and the level of complexity in the collection of information. The basic module (Module 1) contains those indicators that are relatively easy to collect, both because they are already collected and made available by an organisation or because the underlying data can be directly collected from accessible sources. Indictors in module 2 and 3 increase in complexity so the organisation that creates the monitoring tool can decide which modules to use depending on the final aim and the resources available.

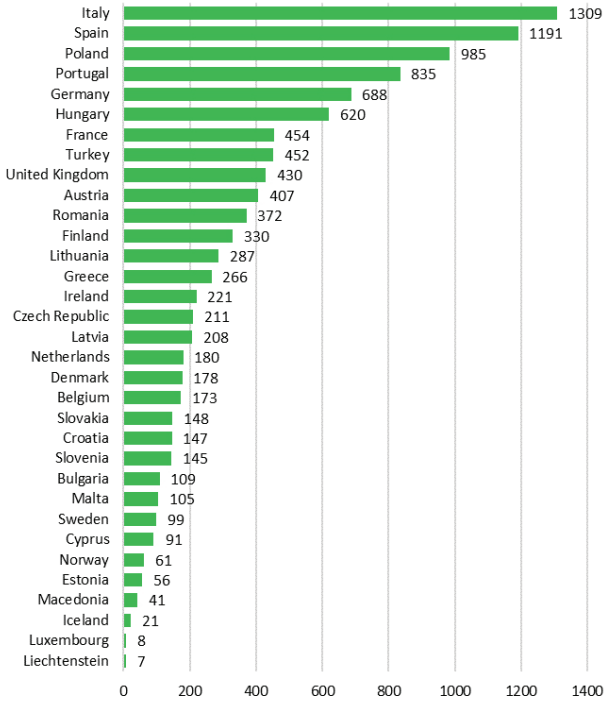
AREA	ACTIV.	INDICATOR	MOD. 1	MOD. 2	MOD. 3
Education	Joint curriculum	Number of programmes/curricula developed in cooperation with industry			✓
		Number of courses with guest lectures from industry			✓
		Number of dual education programmes		✓	
	LLL	Number of industry professional trained			✓
		Number of training programmes for industry			✓
	Student mobility	Undergraduate internships in businesses		✓	
		Joint supervision and number of master and/or doctoral theses		✓	
		Total number of months of the stays			✓

Research	Professional mobility	Number of teaching staff or researchers moving temporary from HEIs to businesses			✓
		Number of researchers moving temporary from businesses to HEI			✓
		Number of weeks that academics move from HEI to business			✓
		Number of weeks that industry researchers move from businesses to HEI			✓
	Joint R&D	Number of contract research deals		✓	
		Number of joint R&D project		✓	
		Number of joint R&D projects		✓	
		Value of contract research deals			✓
		Value of R&D consulting			✓
		Value of joint R&D projects			✓
		Number of joint scientific publications	✓		
		Number of co-patents (applied)	✓		
		Number of co-patents (granted)	✓		
		Number of positions funded by joint R&D projects or contracts		✓	
Valorisation	R&D commercialisation	Number of disclosures of inventions			✓
		Number of patents applied		✓	
		Number of patent granted		✓	
		Number of patent licensed			✓
		License income			✓
	Entrepreneurship	Number of academic spin-offs		✓	
		Number of employees of academic spin-offs			✓
		Annual turnover of academic spin-offs			✓
		Number of graduate spin-offs		✓	
		Number of employees of graduate spin-offs			✓
		Annual turnover if academic spin-offs			✓
		Number of start-ups by academic		✓	
		Number of start-ups by students		✓	
		Percentage of spin-off that exists after 5 years			✓
		Percentage of start-ups that exists after 5 years			✓
Governance	Governance	Existence of a TTO or other supporting unit at the university		✓	
		Staff (FTE) of the TTO		✓	
		Participation of business people in HEI/faculty boards			✓
		Participation of academics in business boards			✓
		External organisation providing support to UBC			✓

ANNEX 4: QUESTIONNAIRE RESPONDENTS

1.1.1 ACADEMIC RESPONDENTS

HEI location



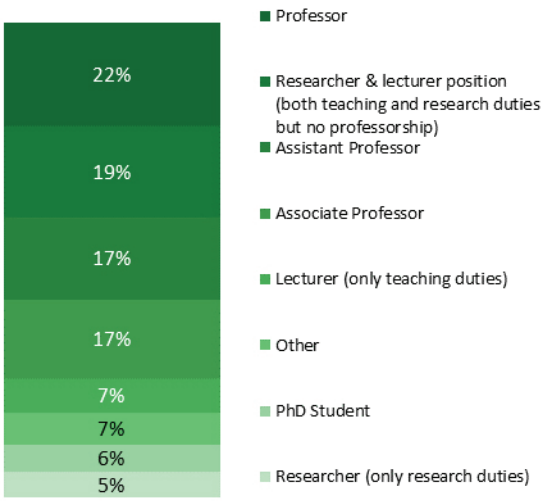
The 10.836 academic respondents came from 33 EU and EEA countries, with the most respondents originating from Italy (1.309), Spain (1.191) and Poland (985).

The number of respondents per country reflects the size of the higher education system in the respective countries with a few exceptions.

The academics in Slovenia, Portugal, Lithuania, Hungary and Latvia were overrepresented in the total sample. Whereas the United Kingdom, Germany, Sweden, Norway, Turkey and France were underrepresented given the size of their higher education system.

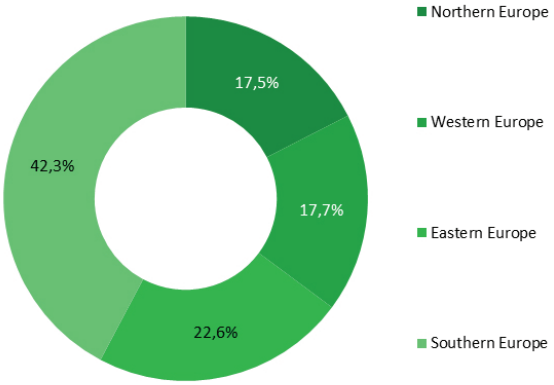
The responses in this report have been weighted to account for any over or under representation.

Position of respondent



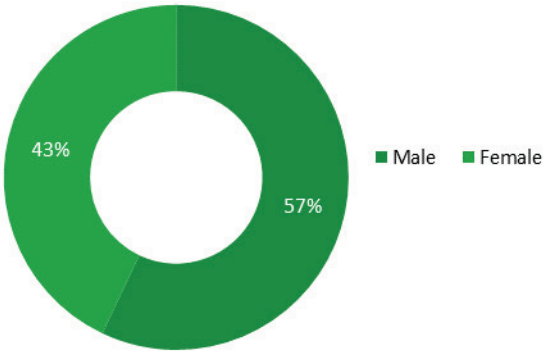
Examining the position of academic respondents, 'Professors' comprised the largest group (22%), followed by 'Researcher and lecturer (in teaching and research duties but no professorship)' (19%). The remaining respondents identified themselves as 'Assistant Professor' (17%), 'Associate Professor' (17%), 'Lecturer (only teaching duties)' (7%), 'PhD student' (6%) and 'Researcher' (only research duties)' (5%).

HEI location



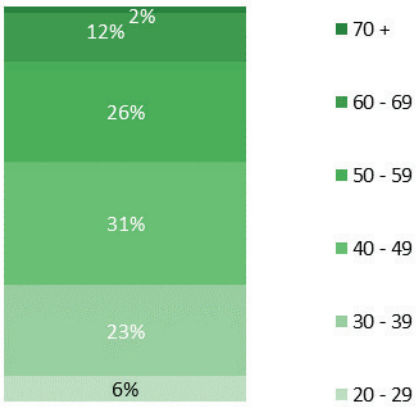
The survey captured responses from across all Europe. However, the largest number of responses came from Southern Europe (42,3%), followed by Eastern Europe (22,6%). The European regions of Western and Northern Europe showed slightly less respondents with 17,7% for Western Europe and 17,5% for Northern Europe.

Gender of respondents



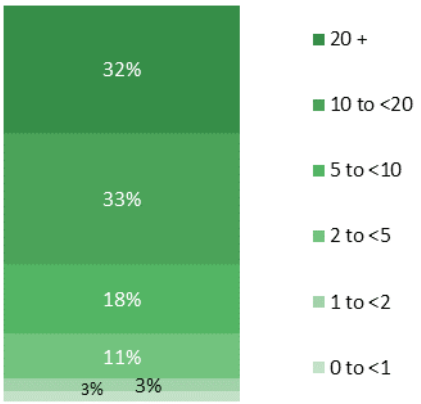
The proportion of male respondents is slightly larger (57%) than the proportion of female respondents (43%). This distribution is somewhat representative of the gender distribution of European academics according to Eurostat data.

Age of respondents



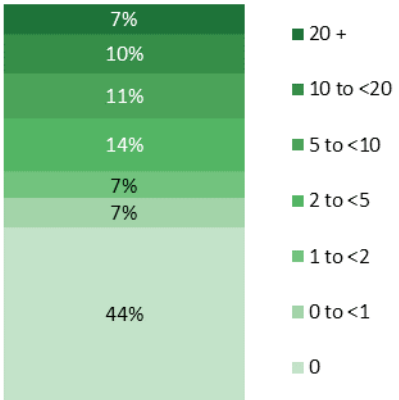
Respondents below the of 40 represent 29% of the sample, 31% are aged between 40 and 49 years and those aged between 50 and 59 years are 26%. Only 14% of the respondents are older than 60 years.

Years working at a university



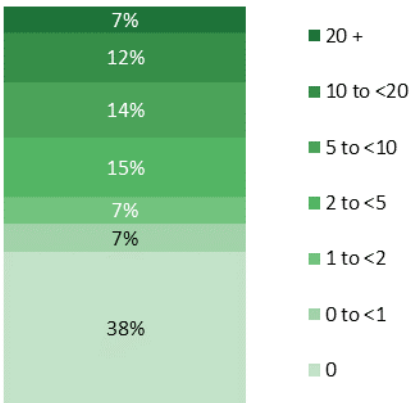
Almost two thirds of the respondents have worked in academia for over 10 years: 33% between 10 and 20 years and 32% over 20 years. A lower percentage of respondents have worked in academia for 5 to 10 years (18%), 2 to 5 years (11%), 1 to 2 years (3%) and less than 1 year (3%).

Years working in business



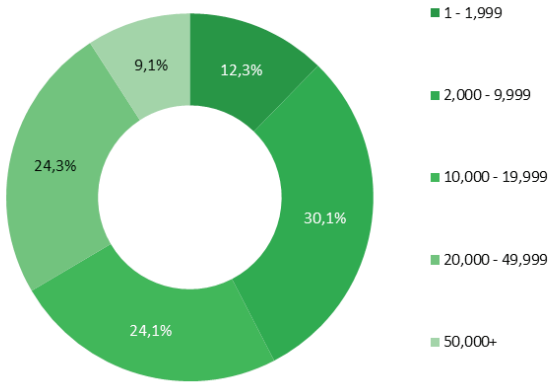
Over half of the academic respondents have worked in business (56%), from which 28% have done it for less than 5 years, 11% for 5 to 10 years, 10% for 10 to 20 years and only 7% for over 20 years. Yet, 44% of the respondents have no experience working in business.

Years involved in UBC whilst working at a university or business



38% of respondents have never engaged in UBC at all. From the 62% that have some experience in UBC, 14% is under 2 years, 15% between 2 and 5 years, 14% between 5 and 10 years, 12% between 10 and 20 years and only 7% over 20 years.

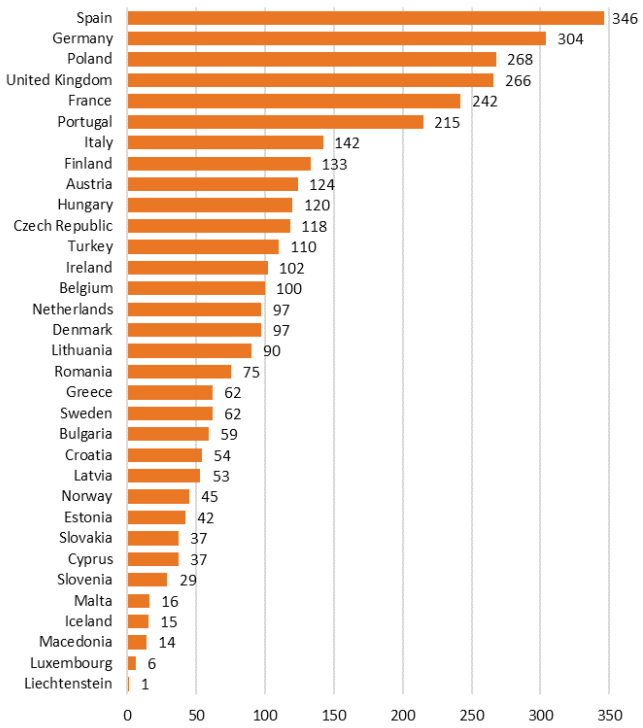
Number of students of the HEI



While 42.4% of the respondents come from HEIs with less than 10.000 students, 28.4% come from HEIs with 10.000 and 50.000 students. HEIs with over 50.000 students represent 9.1% of the sample.

7.6.4 HEI management and Knowledge Transfer Professionals (KTPs) respondents

HEI location



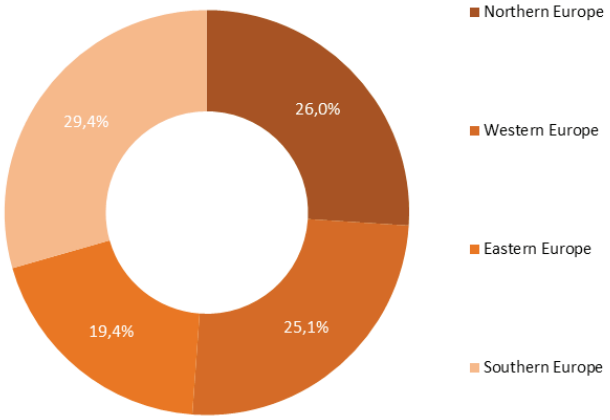
The 3.482 HEI managers that participated in the survey consist out of 2.285 managers and 1.197 knowledge transfer professionals. These responses originated from 33 EU and EEA countries, with the most respondents being from Spain (346), Germany (304) and Poland (268). Least represented countries are Macedonia with 14 respondents, Luxembourg with 6 and Liechtenstein with 1.

The number of respondents per country reflects the size of the higher education system in the respective countries with a few exceptions.

The HEI institutions in Finland, Cyprus, Croatia, Portugal and Ireland, were overrepresented in the total sample. Whereas the France, Romania, Latvia, Turkey and Norway were underrepresented given the size of their higher education system.

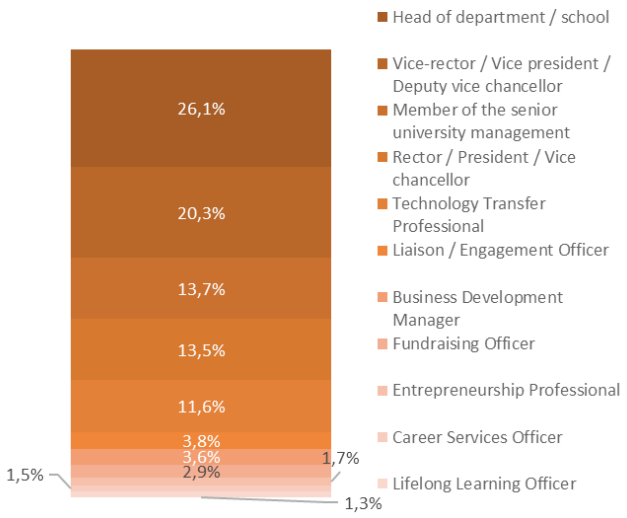
The responses in this report have been weighted to account for any over or under representation.

HEI location



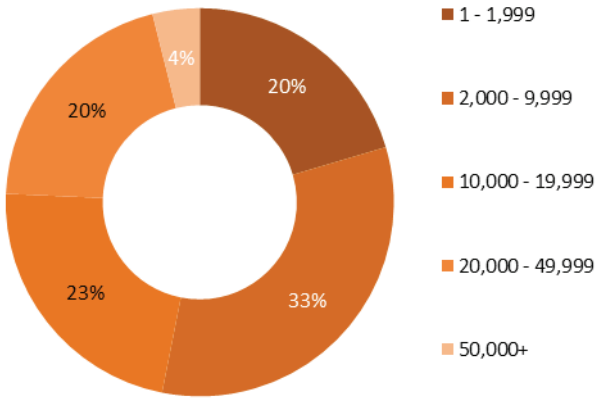
The results show that 29,4% of the HEI management respondents are based in Southern Europe, followed by Northern Europe (26%). Western Europe represents 25,1% of the sample, with a lower participation from Eastern Europe (19,4%).

Position of respondent



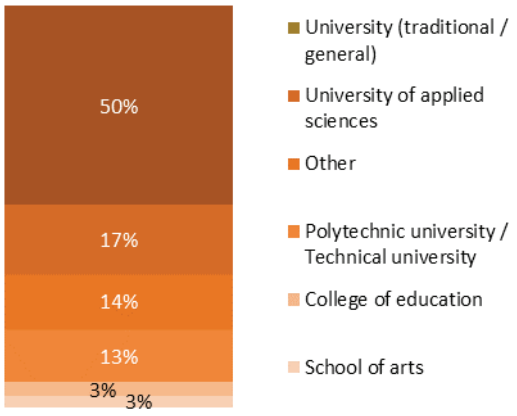
While 73% of the total number of respondents are HEI managers, 27% are KTPs. The main role represented in the sample is 'head of department / school' (26.1%), followed by 'vice-rector / vice-president' (20.3%), 'member of the senior university management' (13.7%) and 'rector / president / vice chancellor' (13.5%). In the group of KTPs, the majority is represented by 'technology transfer professionals' (11.6%) or 'liaison / engagement officers' (4%).

Number of students of the HEI



When compared to the responses by academics, HEI managers responding to the survey reflect a similar distribution when it comes to the size of the institutions they represent. Overall, 76% work for large HEIs (between 20,000 and 49,999 students). Additional 20% is based in institutions with less than 1,999 students, and only 4% of HEI respondents work at university with over 50,000 students.

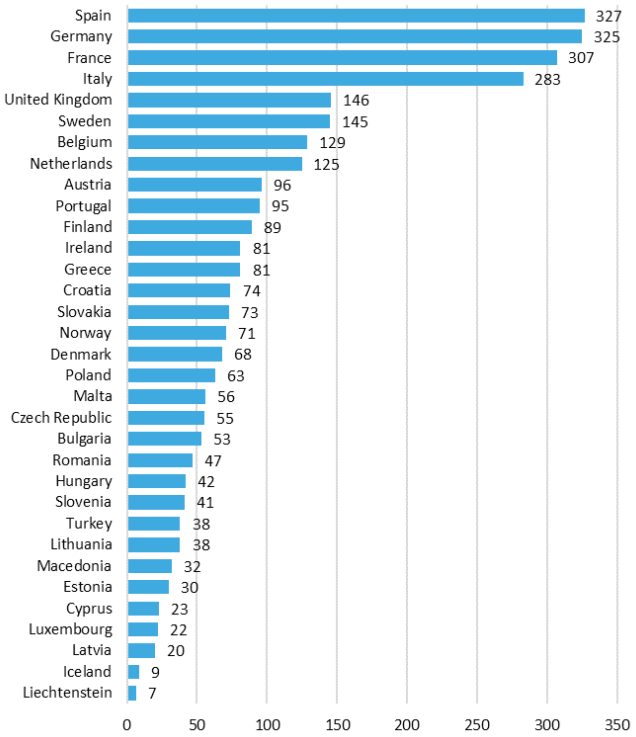
Type of HEI



A wide variety of HEIs are represented in the sample, with 'University (traditional/general)' forming the largest type (50%), followed by 'University of applied sciences' (17%). 'Other' types and 'Polytechnic university/Technical university' HEIs accounted for 13% each. HEI types with less than 10% representation included 'College of education' and 'School of arts' (3% each).

1.1.3 Business respondents

Business location

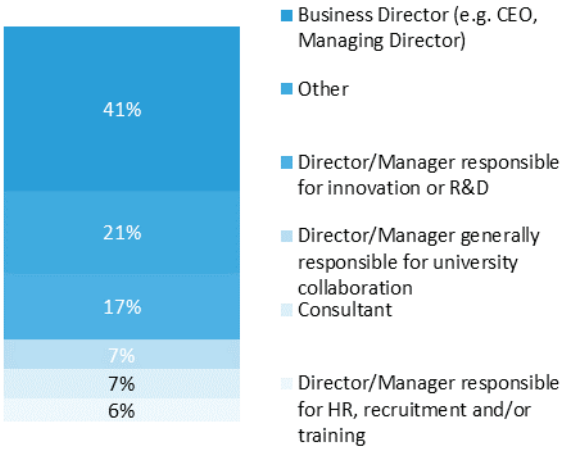


The 3.113 respondents representing business originated from 33 EU and EEA countries, with the most respondents being from Spain (327), Germany (325) and France (307). In strong contrast with the academic and HEI managers respondents where Poland was one of the countries with the most respondents, there were only 63 respondents from Polish business representatives.

The businesses in Malta, Macedonia, Ireland, Estonia, Croatia, Finland, Belgium, Slovenia and Sweden, were given the number of respondents and the size of the businesses they represented overrepresented in the total sample. Whereas Turkey, United Kingdom, Poland, Romania and the Czech Republic were underrepresented given the size of their business sector.

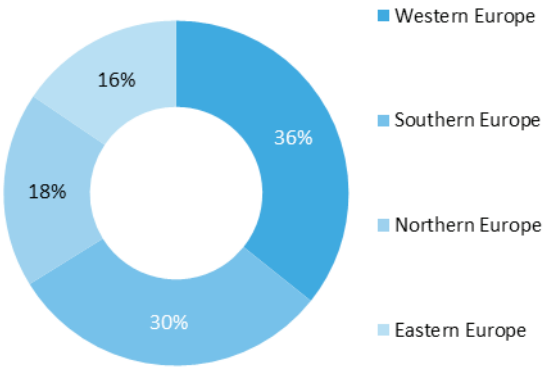
The responses from business in this report have been weighted to account for any over or under representation.

Position of respondent



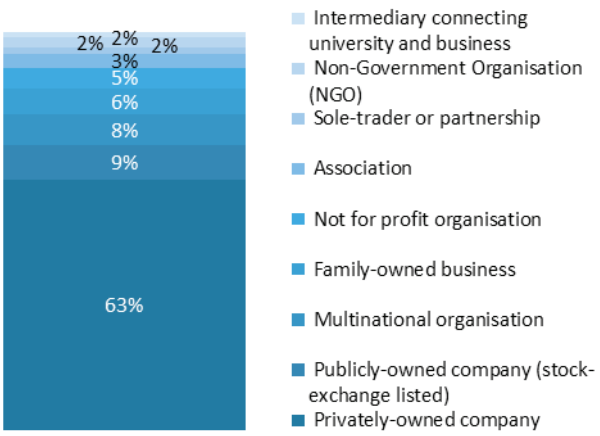
Business directors reflect the largest group of respondents (41%), followed by 'Director/Manager responsible for innovation or R&D' (17%). The remaining respondents identified themselves as 'Director/Manager generally responsible for university collaboration' (7%), 'Consultants' (7%), and 'Director/Manager responsible for HR, recruitment and/or training' (6%).

Business location



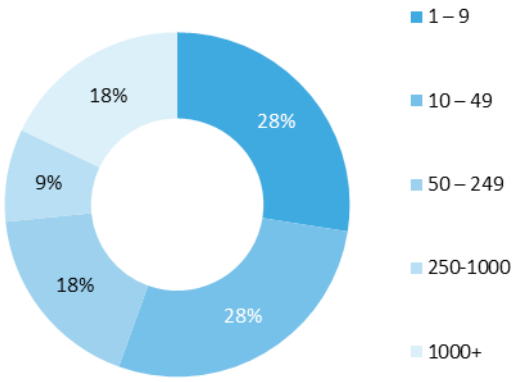
Western Europe emerged as the predominant location of the business respondents (36%), closely followed by Southern Europe (30%). With Northern Europe (18%) and Eastern Europe (16%) showing significantly lower representation.

Type of business



Almost a third (63%) of the respondents work for 'privately-owned companies'. The other types of organisations represented in the sample include: 'publicly-owned companies (stock-exchange listed)' (9%), 'multinational organisations' (8%), 'family-owned businesses' (6%), 'not for profit organisations' (5%), 'associations' (3%), 'sole-traders or partnerships' (2%), 'NGOs' (2%) and 'intermediaries connecting university and business' (2%).

Business size



Businesses are clustered into five groups according to the number of staff they employ. The sample comprises a high percentage of small firms, with 28% of respondents indicating that they worked for two groups of firms: those with 1 to 9 employees and 10 to 49 employees. Respondents indicating that they work for medium-sized firms with 50 to 249 and 250 to 1000 employees accounted for 18% each. Large businesses made up 9% of the total number of respondents.

ANNEX 5: INSIGHTS AND RECOMMENDATIONS MATRIX

a) Area: University-business cooperation

INSIGHT 1 UNIVERSITIES AND BUSINESSES COOPERATE IN MULTIPLE AND VARIED ACTIVITIES, HOWEVER ONLY A MINORITY OF ACADEMICS AND BUSINESS COLLABORATE

		Policy				Responsibility				
		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
What	Ensure there are mechanisms in place that support UBC development									
Why	There is connection and relationship between the types of UBC. This means that awareness needs to be built about all types of cooperation because any development of one activity, will benefit others.									
How	Continue funding cooperative research projects and look for ways to bring in business into basic research projects.	■				■	■			
	Provide funding opportunities for HEIs to undertake research and education cooperation with external actors, not only with business, but also government and other social actors.	■				■	■	■	■	
	Identify the extent of cooperation taking place between HEIs and businesses in the country / region / institution through surveys, forums, case studies or other measures.			■	■	■	■	■	■	

What	Promote the short and long term benefits of university-business relationships and of university engagement generally									
Why	Nearly 75% of academics who do not cooperate with business, cooperate with other external stakeholders									
How	Organise forums and workshops and distribute information (e.g. webpages, flyers, brochures, white papers, blog articles) for business people on how working with HEIs gives the business a competitive edge in respect to getting qualified employees, new discoveries and building reputation.				■		■	■		
	Organise forums and workshops and distribute information (e.g. webpages, flyers, brochures, white papers, blog articles) for HEI managers on how working with business improves student employability, strengthen and make more relevant the university's research agenda, strengthen the university's impact in society and improve the university's reputation.				■		■	■		
	Facilitate the collection and distribution of good practice UBC case studies, which illustrate examples of how universities and businesses cooperate. These can be publicised through the local press, institutional newsletters, websites or other publications and promote good news and impact UBC stories.				■		■	■	■	
	Create guides, videos, roadmaps, e-courses and workshops for 'starting cooperation' and 'scaling up' cooperation for academics, business and HEIs.				■		■	■	■	

INSIGHT 2 COOPERATION WITH BUSINESS IS BEING RECOGNISED AS MORE THAN JUST LICENSES AND SPINOUTS

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Policy needs to embrace a broader understanding of what is UBC as well as engagement more generally									
Why	Research cooperation is often the starting point for most UBC. Once a quality UBC relationship is created, it is much easier to expand the activities into other forms of cooperation									
How	Broaden the remit of funding collaborative university-business projects to include a broader range of activities. The result could be to fund project consortiums that extend their cooperation activities beyond research into education, valorisation and management cooperation.	■	■			■	■			
What	Search for other ways in which business people can be brought onto the HEI through UBC in management e.g. facility or equipment sharing									
Why	A coordinated approach to this activity can lead to an offsetting of costs for expensive equipment and facilities whilst also exposing business to the HEI environment									
How	Audit the HEI to determine facilities and equipment that can be offered for business use and use it as a gateway to collaboration as well as a means of sharing equipment costs. Seek to develop greater opportunities for co-funded and shared facilities and infrastructure.			■				■		

INSIGHT 3 DELIVERING CURRICULA THAT PROVIDE STUDENTS WITH SKILLS THAT BETTER MEET THE NEEDS OF THE LABOUR MARKET

		Policy				Responsibility				
		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
What	Create more opportunities for cooperation with employers in education including more practical programmes, both within and cross-faculty									
Why	Aside from student mobility, most cooperation types in education are developed to a low extent. Student employability in Europe can be improved through greater connection to employers, with focus on business									
How	Promote to business the importance of UBC in education particularly the benefits that can come from including the voice of the employer into curricula design such as better equipped graduates									
	Look to include business in the curriculum through presentations from industry, case studies, student projects for business and site-visits as well as applying problem-based learning, work-based learning and other pedagogical techniques that enable employment-connected learning									
	Make the various forms of cooperation in education more transparent. These forms of cooperation include supervising bachelor and master theses, mentoring and teaching opportunities at HEIs, internships, student projects as well as 'industrial' PhDs. These could be promoted to business as means for recruiting as well as building expertise whilst building better employment pathways for students									
	Provide more flexible, customisable and prestigious opportunities for business people to teach at the HEI including offering a title such as Professor of Practice or Practice Expert									

What	Provide support for the creation of new curricula, to redesign existing curricula or undertake ongoing modernisation of curricula at HEIs									
Why										
How	Provide information and/or training programmes informing about how to establish processes that include the voice of the employer in the (re)design of curricula. This could include information about how to execute employer forums / surveys / interviews /partnerships and how to structure external advisory boards.									
	Provide funding and support to HEIs and business for the creation of new curricula, to redesign existing curricula or undertake ongoing modernisation of curricula at HEIs.									
	Taking an MBA or DBA as an example, which tend to be focussed on more practical subject matter or applied research, create opportunities for 'industrial master' programmes across the HEI driven by input and cooperation of business.									
	Develop more cross-disciplinary employer-connected graduate and post-graduate programmes that focus on the jobs of tomorrow for example programmes in artificial intelligence, climate change, internet of things and smart cities.									

INSIGHT 4 STRENGTHENING EMPLOYMENT AND RECRUITMENT PATHWAYS TO THE BENEFIT OF STUDENTS AND EMPLOYERS

		Policy				Responsibility				
		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
What	Develop improved employment and recruitment pathways from higher education to employers									
Why	Interaction with future employers at an early stage enhances the employability of future graduates									
How	Promote to business that UBC can be a great way to identify and recruit future talent as a means for encouraging their involvement in curriculum design and delivery.									
	Provide tax deductions and other short term benefits for business that cooperate with HEIs in designing lifelong learning, dual study programmes and other bachelor, master and doctoral programmes. This helps to counterbalance the long time to payoff from collaboration in education as well as to cover expenses.									
	Create opportunities for internships within and external to the curricula.									

What	Provide improved support to employers in educating and upskilling their employees during their working lives									
Why										
How	Engage employer groups and industry partners to investigate possibilities for dual study programmes, whereby workers combine either (i) university education and work or (ii) university study, vocational education and work in an integrated programme.									
	Seek opportunities to provide employees with professional courses to respond to the particular skill and training needs of industry including both formal and informal courses, seminars, conferences or private lessons as well as continuing education and lifelong learning programmes.									
	Provide funding for the creation of lifelong learning or dual study programmes that connect employers with students and the future needs of employers with the higher education sector.									

INSIGHT 5 ENTREPRENEURSHIP IS BEING FOSTERED BY EUROPEAN UNIVERSITIES

		Policy				Responsibility				
		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
What	Embrace the HEIs role in providing entrepreneurship education									
Why	HEIs provide a breeding ground for developing entrepreneurial talent and ventures because of its access to education, mentors, infrastructure and networks that support incubation									
How	Allow for easier integration of entrepreneurs into the HEI by providing them with a transparent contact point, defined ways of being involved (e.g. defined programmes) and limiting internal regulations hindering practitioners to work within HEIs.		■	■			■	■		■
	Offer entrepreneurship courses and opportunities across faculties as both a means for coping with a flexible labour market and a path to employment. Embrace and educate entrepreneurial thinking and acting as a comparable skill-set, and as equally necessary, as business management.			■				■	■	
	Building on the 'Industrial' PhD structure, create and fund the 'Entrepreneurial PhD', which has a combined focus on research excellence as well as commercialising research results.	■				■	■	■	■	

What	Embrace HEIs as a potential source of not just entrepreneurial teaching, but as a potential source of entrepreneurial ventures and as a facilitator or hub of a regional entrepreneurship ecosystem									
Why	HEIs are a source of high tech research, more radical forms of innovation and entrepreneurial talent									
How	Businesses could look to open their innovation chain to entrepreneurial ventures from students or academics as a source of growth, new areas of business and entrepreneurial talent acquisition. Sponsoring entrepreneurship programmes, staff participation in entrepreneurship workshops and engaging with start-ups as mentors are simple ways to commence this association.	■		■					■	
	Make available entrepreneurship programmes and facilities at HEIs to business as a means of the HEI better connecting with external partners and to develop more entrepreneurial thinking in the business			■		■	■			

INSIGHT 6 THERE ARE MIXED MESSAGES IN THE DEVELOPMENT OF UBC IN EUROPE

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Create more detailed insights into the State of UBC									
Why	More detailed insights allow for policymakers to make more targeted investments into UBC and create evidence-based policy									
How	To develop evidence-based policy for UBC, undertake regular data gathering at a regional, national and European level which review the State of UBC.			■		■	■			

b) Area: Drivers/Barriers

INSIGHT 7 UBC IS A PEOPLE'S GAME AND RELATIONSHIPS MATTER

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Create greater opportunities for academics and business people to develop trust and UBC experience (1)									
Why	Trusted and mutually-beneficial relationships underpin successful cooperation									
How	Provide small funding opportunities to allow new UBC relationships to commence. The funding should be a first step in potentially developing a relationship, rather than just a one-off paid research consultancy and should be oriented towards building trust and delivering small outputs.	■				■	■			
	Spend time at the start of collaborative projects to build relations and emphasise relationship-building. Furthermore, create processes, which align aims and expectations prior to commencement, and define deliverables for both business and academia.			■				■	■	■

What	Create greater opportunities for academics and business people to develop trust and UBC experience (2)									
Why	Finding a collaboration partner is a major barrier to cooperation for those not yet collaborating. Moreover, successful cessful previous partnerships are an indicator of future productive partnerships									
How	Drawing upon already existing relationships as a source for connecting academics with business and employers. Encourage and support academics to reconnect with alumni, past master and PhD students who are now in industry, as a source of external cooperation.			■				■		■

What	Develop opportunities for greater professional mobility. Professional mobility includes the exchange of professional staff from business and post-graduate, PhD, post-doctoral, research staff and academics from HEI (1)
Why	Professional mobility between HEIs and business is currently a lesser known and less developed activity despite the potential it offers for relationship development and for exposing the professional to the culture of the other stakeholder
How	Create more flexible positions in academia by offering the potential for a % split in working time between academic and business with recognition for their time in business. This can also be replicated in European businesses through more flexible positions in companies, and offering the potential for a % split in working time between academic and business. The 'google' rule of one day a week (20%) made available could be a good working format. Insights for research and the ability to see what is coming in R&D could be the major benefits for each party.

What	Develop opportunities for greater professional mobility. Professional mobility includes the exchange of professional staff from business and post-graduate, PhD, post-doctoral, research staff and academics from HEI (2)
Why	During the case study review, there were no institutional examples found of formal professional mobility programmes, only informal arrangements.
How	Create 'packaged' professional mobility, which allow shorter and longer term movement from universities to business and business to universities. This could include 3-6 month professional sabbaticals, master / PhD theses residencies as well as research or commercialisation 'sprints', whereby research is converted to outcomes in a short time period.
	Promote short-term academic mobility funding opportunities (e.g. Erasmus scholarships) that include sabbaticals in business. Make available mobility funding for business people to take a 'sabbatical' within the HEI, whist companies can provide 'sabbatical' leave opportunities to work within a HEI.
	Create a mandatory PhD component that requires the PhD candidate to interact with business, government or societal stakeholders related to their PhD topic through e.g. site-visits, week in practice or presenting their research to externals.
	Offer easier regulations for professional mobility that recognises employment length and work record as well as a continuation of superannuation and health cover.

What	Develop new mechanisms to develop contacts and relationships
Why	
How	Seek to develop innovative new ways and structures for communicating scientific discoveries.
	Better utilise existing online and social media tools such as ResearchGate, Academia.edu, LinkedIn, Twitter and Yammer to build profiles of academics, to offer their research to business and to build relations. These social media platforms could also be connected into an online search platform for business and HEIs to find the appropriate collaboration partner.
	Better utilise student internships and alumni programmes as sources of UBC relationships.

INSIGHT 8 RESEARCH OUTCOMES DRIVE UBC FOR BOTH ACADEMICS AND BUSINESS WHILST FOR HEIS IT RELATES TO FUNDING

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Develop mechanisms and processes for more effective conversion of cooperative projects into research outcomes									
Why	To ensure that research finds its way into practice and maximise the impact of publicly funded research.									
How	Promote to academics the potential research benefits that can result from UBC, which include increased quantity and quality of research.									
	In addition to a research plan, at the start of their funded research projects academics could create a plan for the potential utilisation of their research including listing organisations who could be interested in their work.									
	Involve knowledge transfer professionals in the research process to coordinate the potential use of the research findings and to ensure the conversion of outputs from research projects into value for all stakeholders, for example, publications for academics and products and services for business.									
	Get business involved at an earlier stage in the research process even if it is just to secure an expression of interest in the final research results.									

What	Facilitate funding opportunities which combine funding or in-kind support, from government, business and the HEI (1)									
Why										
How	Create project structures for collaboration that allow it to deliver (i) basic research outcomes (blue sky research outcomes) as well as shorter term (ii) applied research results, and (iii) immediate problem solving consultancies that provide direct assistance to problems faced by business (but would be paid by that business).									

What	Facilitate funding opportunities which combine funding or in-kind support, from government, business and the HEI (2)									
Why	HEI managers perceive that the greatest motivation for undertaking UBC is to access an additional source of income whilst they also nominate the absence of finance as the greatest barrier to UBC									
How	To reward HEIs for undertaking UBC, tie part of the funding of HEIs to UBC outcomes as a policy approach for encouraging UBC									

INSIGHT 9 UBC CAN BE FURTHER STIMULATED THROUGH INCENTIVES

		Policy				Responsibility				
		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
What	Seek ways to ensure that both academics and business get greater benefits from their cooperation that contribute to both their short-term and long-term objectives (1)									
Why	Currently, both academics and businesses in Europe perceive that they get some of the lowest benefits from UBC									
How	Support collaborative R&D projects with a responsible project manager, whose job would be to ensure that all project outcomes are met and that project outputs are converted into tangible outcomes for all involved stakeholders.			■				■	■	

What	Seek ways to ensure that both academics and business get greater benefits from their cooperation that contribute to both their short-term and long-term objectives (2)									
Why	Incentives for academics to undertake UBC are presently some of the lowest developed strategy mechanisms supporting UBC									
How	Provide incentives for academics to cooperate with business / employers including these 'third mission' activities in their performance assessment and career progression. This could include specific incentives for academics to update their curriculum together with employers. The actual incentives could include reduced teaching time, salary bonuses, budgets for expenditure on equipment and travel, awards and prizes for excellence in UBC as well as funding and support for facilitating the process.		■	■			■	■		

What	Seek ways to ensure that both academics and business get greater benefits from their cooperation that contribute to both their short-term and long-term objectives (3)									
Why	A leading barrier for UBC relates to differing peception of time as well as other barriers related to cultural differences									
How	At the start of new collaborations, establish clear and transparent 'collaboration agreements' which clarify expectations and outcomes for each of the respective stakeholders.		■	■				■	■	■
	Seek to align working with HEIs with the corporate social responsibility needs of business to increase the potential benefits to their reputation from collaborating with HEIs.		■	■				■	■	■

INSIGHT 10 LACK OF RESOURCES AND DIFFERING CULTURES ARE INHIBITING UBC IN EUROPE

		Policy				Responsibility				
		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
What	Seek opportunities to remove barriers for UBC									
Why	Academics specifically have named bureaucracy and a lack of additional time as major barriers to UBC									
How	Provide academics with ready-made contracts and other legal and internal documents. This can reduce the time spent by academics on the administrative part of the collaboration.		■	■				■		
	Audit the UBC environment to identify regulations hindering UBC and seek ways to steamline and reduce bureaucracy for UBC at an institutional and regional level		■	■				■		

What	Seek ways to develop improved cross-cultural understanding between the academic and business environment									
Why										
How	Encourage academic-mentoring for businesses as well as 'academics in residence' opportunities to provide business with academic-world experience. This can improve cultural understanding and provide connections back into academia.			■				■	■	
	Expose academics to real-world and entrepreneurial influencers through programmes such as 'entrepreneurs / business leaders in residence' and business-mentoring for academics. These business people work alongside academics to provide academics with business-world experience and provide connections back into business.			■				■		
	Create initiatives that establish academics as external advisors on company boards as well as industry professionals and / or other employers involved in university and faculty boards			■				■	■	
	For businesses starting out in cooperation, assist them to find the most appropriate collaboration partner and partner them with an academic experienced in working with business		■					■	■	■

c) Area: Supporting Mechanisms

INSIGHT 11 A LONG-TERM STRATEGIC COMMITMENT, UNDERPINNED BY A STABLE SUPPLY OF RESOURCES, PROVIDES A FOUNDATION ON WHICH UBC RELATIONSHIPS CAN DEVELOP

		Policy				Responsibility				
		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
What										
Why	For academics, UBC is a discretionary activity and for both HEIs and business, cooperation is not necessarily a natural activity. In these circumstances, appropriate mechanisms can be put in place to encourage and support cooperation between the two									
How	Provide a clear UBC strategy and development policy, which is aligned and included in the university or business mission as well as the long term strategic planning of the HEI or business.		■	■				■	■	
What	Put appropriate mechanisms in place to support the development of UBC (2)									
Why	Whilst including UBC in the strategic mission and vision of the university is highly adopted in European HEIs, reinforcing that strategic commitment with resources is significantly less developed. Additionally, only 37% of cooperating businesses have a strategy for UBC									
How	Ensure that there is a person responsible for the executing of the strategic development of UBC at the HEI or business.			■				■	■	
	Establish common terminology and visions for UBC amongst key stakeholders. This could encompass terminology such as university-business cooperation, entrepreneurship, engagement as well as defining the role the individuals, organisations or regions should play in these different contexts.			■				■	■	
	Establish internal awareness raising activities including recognising UBC on the website and within newsletters, create internal events and forums as well as inviting external guest speakers.	■						■	■	
	Before implementing mechanisms to support UBC, audit the environment to have clarity about which supporting mechanisms are already in place and what is needed.			■				■	■	
What	Create 'corporate relations' offices / adjust the role of existing technology transfer offices									
Why										
How	Establish an office that supports UBC by (i) clearing the path of obstacles for cooperators (e.g. reducing bureaucracy), (ii) supporting the development of external relationships (e.g. helping to access funding opportunities, organise research contracts) as well as (iii) project managing collaborative projects to ensure that benefits are delivered for all stakeholders			■				■	■	

INSIGHT 12 TO DEVELOP UBC, MORE FUNDING IS NOT NECESSARILY THE ANSWER... START SMALL!

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Seek meaningful ways in which academics and business people can be brought together									
Why	To find common ground/interest between academics and business people as a basis for forming a relationship									
How	Seek opportunities to create and develop relationships such as through a 'societal grand challenge' collaborative project, regional innovation boot-camp weekends, executive education master thesis collaboration.									
	Create small 'packaged' opportunities to collaborate e.g. master-thesis supervision, student 'consulting' project with business / external stakeholders a blog article, small UBC projects around a common area of expertise.									
	Create and promote events that encourage networking of academics and students with business people to help the development of relationships e.g. academic pitching competitions, topic-related breakfasts etc.									

INSIGHT 13 SIMPLE (AND FLEXIBLE) UBC STRUCTURES TO SUPPORT UBC

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Develop simple (and flexible) UBC structures support UBC									
Why	HEIs provide a breeding ground for developing entrepreneurial talent and ventures because of its access to education, mentors, infrastructure and networks that support incubation									
How	Offer clear and transparent public-private funding structures for the creation of joint labs, institutes and collaborative research centres.									
	Provide funding to develop relationships between HEIs and business at different stages of development by differentiating between shorter-term funding for 'starting up' new collaborations and longer-term funding for 'scaling up' proven collaborations.									

INSIGHT 14 MEASURING THE (RIGHT) OUTCOMES OF UBC IS IMPORTANT TO MANAGE IT

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Develop indicators and measurements of UBC which capture both explicit and tacit outcomes as well as longer term impact across the full spectrum of UBC activities									
Why	Current HEI funding frameworks, measurements and indicators as well as international university rankings recognise a limited range of UBC activities and are relatively homogeneous. The result is a HEI sector with a similar lack of diversity									
How	Establish national / regional surveys of employers measuring the satisfaction with university curricula and their graduates together with other employ-ability metrics. Require HEIs to monitor student employability metrics for their graduates.		■	■			■			
	Provide a systemic evaluation of employer's needs as a basis for creating new curricula and adapting existing curricula within existing programmes as well as on creating lifelong learning concepts and business training opportuni-ties for employers.			■			■	■		
	Establish measures and indicators for HEIs, which capture the broader long-term impact of UBC, not only limited to their valorisation, but also an engaged first (education) and second (research) mission.			■			■	■		

d) Area: Context

INSIGHT 15 UBC NEEDS PEOPLE WITH THE RIGHT SKILLS AND MIND-SET TO ENGAGE SUCCESSFULLY

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Increase the UBC experience of both academics and business									
Why	Current HEI funding frameworks, measurements and indicators as well as international university rankings recognise a limited range of UBC activities and are relatively homogeneous. The result is a HEI sector with a similar lack of diversity									
How	Adjust employment criteria of academics to put more emphasis on experiences outside of academia as viable criteria for employment.		■				■	■		
	Include having an entrepreneurial mindset as part of the hiring criteria for future academic employees, especially for positions expected to work more intensively on external engagement.		■				■	■		
	Employ 'boundary spanners', knowledge transfer professionals who have a deep understanding of business and academia, to support the knowledge transfer / exchange process and development of relationships especially early in relationship development process			■			■	■	■	■

INSIGHT 16 NON-COOPERATING ACADEMICS AND BUSINESSES OBSERVE THEIR OWN LACK OF UBC CAPABILITIES

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Codify and professionalise the skills and competencies for UBC and develop UBC capabilities in both academia and SMEs									
Why	Non-cooperating academics and businesses perceive their UBC skills and knowledge lower than those that do cooperate									
How	Provide programmes (e.g. e-courses, workshops, guides) that develop specific UBC knowledge and skills for both academics and SMEs.		■				■	■	■	■
	Create professional development programmes for the professional development of knowledge transfer professionals.			■			■	■	■	■
	Create a UBC-buddy programme for experienced UBC academics to partner with academics not-cooperating with business.	■		■			■	■	■	■
	Create a UBC-buddy programme for experienced UBC businesses to partner with businesses not-cooperating with HEI.	■		■			■	■	■	■

INSIGHT 17 SITUATIONAL FACTORS OF BOTH HEIS AND BUSINESS AFFECT THEIR ABILITY TO COOPERATE

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Promote a more differentiated HEI sector with different models of external engagement (1)									
Why	Non-cooperating academics and businesses perceive their UBC skills and knowledge lower than those that do cooperate									
How	Recognise, promote, fund and regulate different definitions of 'elite' universities including excellence in business-partnership, entrepreneurship, employability, regional development, lifelong learning or dual study programmes.	■					■			
	HEI managers to utilise the European Commission's HEInnovate as a tool for discussion and self-assessment of innovation within the HEI. The tool can also be useful for Regional development agencies working with HEIs.			■			■	■		

What	Promote a more differentiated HEI sector with different models of external engagement (2)									
Why	Those academics with any business experience are already significantly more likely to cooperate with business once they are inside the HEI									
How	Consider employing academics who have already worked within business or who have engaged in entrepreneurial ventures as a pre-requisite for employment.		■				■	■		

INSIGHT 18 REGIONAL BUSINESSES ARE THE MAIN COLLABORATION PARTNER

		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
		Policy				Responsibility				
What	Seek to find ways specifically for SMEs to engage more with HEIs									
Why	SMEs get their innovation ideas mostly from suppliers and other businesses and often don't have the capability to absorb knowledge from HEIs									
How	Fund collaborative regional and/or supply chain consortiums, which include both large companies and SMEs. This will better allow SMEs to exchange knowledge, skills and technology with both large companies who can support knowledge translation and HEIs.	■	■			■	■	■		

What	Seek to find ways specifically for SMEs to engage more with HEIs (2)									
Why	Broader collaborations spread the risk and investment required for more radical forms of innovation									
How	When creating funding programmes, consider structures that have larger partners (designated as 'anchor' partners) committed to the life of the project and combine this with other smaller players that have more feedback to more flexibly come and go from the initiative.	■	■	■		■	■	■	■	■
	Integrate UBC activities, and especially the education related types, into the European Regional Development Fund to finance UBC on a regional level.									
	Small and micro companies to have a lower and more straightforward regulation and flexible access to cooperation with HEIs.	■	■			■	■	■		

INSIGHT 19 BUILDING A SUPPORTIVE UBC ECOSYSTEM HELPS TO SUSTAIN UBC IN THE LONG TERM

		Policy				Responsibility				
		Funding	Regulation	Organisation	Information	EC	Nat/Reg Gov.	HEI Mngt.	Business	Intermediaries
What	Develop a UBC culture (1)									
Why	Longer term financing allows the stability for relationships to further develop and expertise to develop									
How	Develop and deepen relationships through longer term (five years plus) funding for research cooperation between proven project consortiums of private and public stakeholders.	■				■	■	■		

What	Develop a UBC culture (2)									
Why	Despite new communication technologies, physical location still plays a role in developing long-term relationships									
How	Using the university campus as a platform, develop modern collaborative precincts as well as co-location possibilities, which bring together excellence in HEIs and business. Ensure that there is an onsite relationship management function that can play a major role in supporting the development of UBC.	■		■		■	■			
	Identify the strengths and weaknesses of the organisation (HEI or business) as well as the region as a source of potential opportunities for UBC, for cluster development and smart specialization.			■					■	■
	Identify UBC champions or ambassadors within the HEI or business and empower them to promote and drive the topic.			■				■	■	

What	Raise the profile of UBC in academia and business environments and develop ways for academic and business professionals to gain and share UBC experiences									
Why										
How	Create a community or network of external like-minded collaboration-driven academics and /or innovation-driven businesses. These networks can facilitate regular internal stakeholder meetings around external engagement at the HEI and meetings, networking events and matchmaking with external partners.			■			■	■	■	■
	Create national / regional forums on UBC or related topics such as university engagement, regional innovation or entrepreneurship, to promote how collaboration can strengthen regions, create innovation, improve employ-ability and develop the economy.			■			■	■	■	■
	Create national / regional / organisational awards and prizes for excellence in UBC.			■			■	■	■	■
	Create a programme at the HEI that invites the world of work into the HEI through invited presentations and for business to be able to request a presentation from an academic.			■			■	■	■	■

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