ENGAGEMENT
READINESS
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Engagement Readiness Investigation Report

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The Engagement Readiness Monitor Investigation Report

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1. Introduction and Methodology

The principal aim of this report is to synthesise results of different phases of investigative research carried out as part of the Engagement Readiness Monitor project and make recommendations on a conceptual framework for engagement readiness. In doing so, this report will inform the subsequent preparation of the Engagement Readiness Self-Assessment Framework and the Engagement Readiness Toolkit, which will include a self-assessment tool for higher education institutions (HEIs) to evaluate their own engagement readiness. Investigative phases of research entailed i) conceptualisation, ii) benchmarking analysis of measurement tools, iii) literature reviews, and iv) in-depth semi-structured interviews with relevant stakeholders in the European Union, North America, and Australia.

Methodology

The initial phase of research resulted in preparation of key concepts as well as a methodological approach by l'Institut Mines-Télécom Business School (IMTBS) for the exploration of academic and grey literature as well as the practice of university-business cooperation[1] (UBC)[2] stakeholders. Thus, the methodological approach included a set of variables to be explored qualitatively across theory and practice for later synthesis/integration.

DEFINITIONS

"Engagement" is defined as collaboration, cooperation or partnership with a focus on how higher education institutions (HEIs) cooperate/collaborate/partner with business, government, and society in order to increase employment, productivity, social cohesion, etc.

"Readiness" is defined as both the *preparedness* and the *willingness* of HEIs (higher education institutions) to cooperate, collaborate or partner. *Preparedness* includes having the necessary resources, competences, structure, etc. that would allow an HEI to cooperate/collaborate/partner if so desired. *Willingness* includes the traits, behaviors, values, etc. of an HEI that indicate that it is "inclined or favorably disposed" [3] to cooperate/collaborate/partner.

The **benchmarking analysis** included mapping and reviewing existing tools for measuring engagement readiness and one good-practice case study from a university developing their own tool for engagement. Located in Annex III, this analysis includes an overview of methodological approaches used by the tools' developers and their application in the field. Results of this analysis indicate differing approaches to factors measured and the target audience.

[1] For the purposes of this report, "university" is considered a synonym for any higher education institution (HEI), and as such the terms are used interchangeably.

[2] While there are multiple types of engagement activities, university-business cooperation is a major one and was therefore explored explicitly during the research phase. This is reflected in the findings that follow.

[3] Overar

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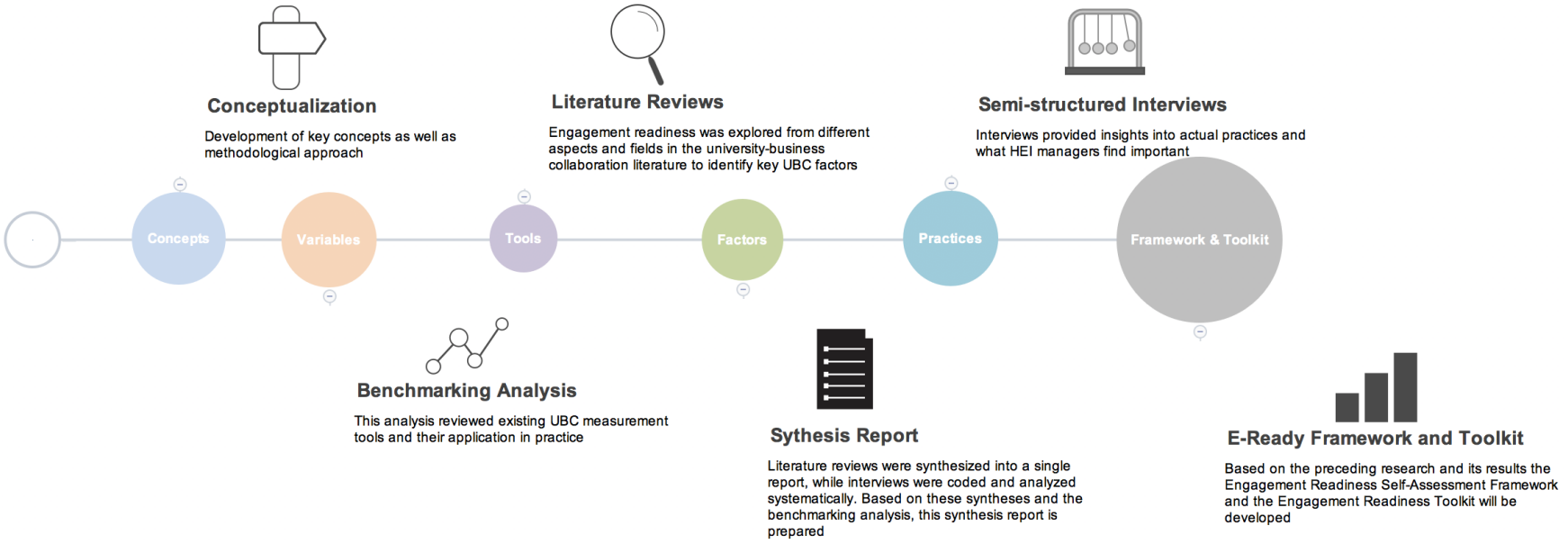
The **literature reviews** included distinct analyses of the academic and grey literature on i) university-business cooperation (UBC), ii) the knowledge transfer & technology transfer processes, iii) technology readiness level, iv) the concept of readiness with a focus on innovation, and v) academic or university and/or collaboration/engagement "readiness". These distinct reviews were later merged into a single literature review synthesis report by integrating key factors and their classification in groups. The conducted literature reviews showcase an extensive but laxly connected knowledge production not methodologically comparable due to differences in units of analysis and methods used in most cases. Although factors that have been pinpointed as relevant in the literature have been grouped, their categorisation is abstract as in reality they are intertwined and manifest themselves in complex interrelations with each other.

Semi-structured interviews have been conducted with 50 UBC practitioners. These include a mixture of HEI leadership and business sector experts, with most practitioners coming from HEIs, in the following 17 countries: Australia, Belgium, Canada, Croatia, Czech Republic, Finland, France, Germany, Ireland, Italy, the Netherlands, Scotland, Slovakia, Spain, Sweden, the United Kingdom, and the United States. These interviews provided insight into actual UBC practice and what really matters "on the ground" when it comes to engagement readiness.

Figure 1: Methodological Approach for the Engagement Readiness Monitor Project



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Engagement readiness can be approached as institutional/organisational as well as a process or product-oriented factor. For the purposes of this report but also for the overall results of this project, engagement readiness is utilised as an attribute of organisations. The reason behind such a decision lies in the objectives of the project which are focused on fostering the institutional readiness of the universities to develop long-term cooperation with business and other social actors.

While our analysis started with the Benchmarking Analysis, it is the last part of this report (Annex III). It describes existing engagement readiness tools and are included in this report for better understanding of approaches and factors used, but also for easier comparison with the conceptual framework and factors highlighted in our analysis. Although overlaps in factors exist, our analysis emphasises three factors as crucial for engagement readiness: i) an ecosystem approach for HEI's *modus operandi*, ii) an open, adaptive and collaborative organisational culture, and iii) collaboration embedded in educational pedagogy. Why this emphasis? Although universities can have in place all other operational resources, without these organisational factors their engagement will be sporadic and their industrial and social impact limited.

Conceptual Framework

Engagement readiness for university-business cooperation (UBC) is a broad concept in theory and practice. Both the literature review and interviews showcase that UBC takes place in a variety of forms and channels involving different types of stakeholders. If we commence even with the simplest investigative approach using "the 5 Ws" (Who, What, Why, When, Where) while looking at a particular HEI, we will immediately notice that responses to these 5 Ws differ based on what we are examining. There is a wide array of different forms of engagement from short- to long-term partnerships, loosely to tightly knit collaborations, and cooperation with societal actors ranging from non-profit organisations to actors on all governance levels. UBC being a type of relationship, it is a variable itself alongside its agents/stakeholders and can take various forms (bidirectional, multidirectional, single, ongoing, etc.). Furthermore, UBC manifests itself though different channels of communication that can be informal, formal, virtual, in-person, commercial, non-profit, service oriented, etc. Therefore, any type of assessment of institutional practices in the context of UBC needs to consider the multifaceted aspect of engagement readiness.

Engagement readiness itself includes two main characteristics of individual academics but also of HEIs: willingness and preparedness to engage. According to Curwood et al. (2011), collaboration readiness implies not only that academics and their institutions need to be willing, but also prepared or capable to engage in effective partnerships. Our interview research confirmed this fact. On the willingness side, both HEI and academic readiness were characterised in terms of having an interest and motivation to engage with external actors. Whereas preparedness refers to the resources and structures an HEI has in preparation for engagement with external actors, or on the individual level this means academics having capacities to engage in UBC. Both aspects are equally important.

While there are many factors that contribute to university readiness for engagement (as presented in Annex I), several key overarching themes that are crucial for UBC were identified in the research:

1. An ecosystem approach. First, HEIs that successfully engage in UBC have adopted an ecosystem approach to their development and operations. They are embedded in the **social and economic development of their local, regional and national communities**.

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They adapt to changes in their environment and take part in actively shaping opportunities.

2. Open, Adaptive and Collaborative Organisational Culture. This approach extends to work with an HEI's partners, primarily businesses and governments, and entails adopting a **collaborative mindset** and adjusting to the cultural differences of an HEI's counterparts. This collaborative mindset is reflected in an **HEI's structure and strategic mission** which are then reflected in **administrative procedures and policies** on all levels.

3. Collaboration Embedded in Research and the Educational Pedagogy. In this context, the HEI's engagement is an integral part of its **research programs** and **educational pedagogy**. Collaboration is fostered through learning processes in various ways. Education aims to be engaged and entrepreneurial.

4. Key Organisational Resources. Finally, successfully engaged HEIs have **knowledge/technology/partnership offices and competent staff**, they provide **financial resources for UBC** and they **incentivise and reward** their academics, students and alumni for engagement.

The highpoint of successful engagement of HEIs is their commitment to fostering informal and formal relationships and communications between external actors and an HEI's academics, managers, students and alumni in teaching, research and valorisation.

The order of themes in the following sections reflects their relevance for engagement readiness. The ecosystem approach is mentioned before the organisational culture because of the difficultly in determining whether the organisation emerges out of its environment, or if the environment produces organisations. For the purposes of our research and the final objective of the project, we assume HEIs to be already existing and operating. In this instance, the first step in the self-assessment process should be an understanding of the social and economic ecosystem in which the organisation operates. This context matters a great deal. Universities do not operate in abstract or similar environments. In fact, their historical, political, social and industrial circumstances vary considerably. Having an in-depth understanding of these aspects and building an organisational culture based on what is available and what should be in place is crucial. In fact, this approach is in line with the classical strategic planning for organisations where values, vision, mission is interrelated with the political, economic, social and technological (PESTEL) analysis. Finally, our emphasis does not mean that HEI's are determinant of their environments, but rather they must thoroughly understand it to be able to adapt to and shape it. The next section explains in more detail what the ecosystem approach entails.

Report structure

This report describes each relevant factor, in order of importance, based on our analysis of the theory and the practice. The first section describes several aspects of the ecosystem approach, which is followed by a section on open, adaptive and collaborative culture. Here we highlight two important segments of organisational setup: flexible administration and collaboration-attuned hiring and career advancement policies. The section on collaboration embedded educational pedagogy explores different elements of engaged and entrepreneurial universities. The section on key organisational resources describes in more detail the three most important resources our research identified as crucial to engagement: i) the existence and operations of knowledge transfer offices (KTO) or technology transfer offices (TTO), ii) communication networks, and iii) financial resources. The final section brings everything together and adds other factors that have been identified in earlier tools and research. The factors are structured around our conceptual framework but further divided as input, output and impact elements to help the assessment conceptualisation.

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2. The Ecosystem Approach

The principal common trait of all HEIs that successfully engage with industry and society is that they thoroughly understand the social and economic ecosystem in which they operate. This understanding entails i) socio-economic considerations of the position of the geographical region in which they operate, ii) the role of their HEI in that social and industrial ecosystem, and iii) the relationships and common denominators their HEI has with different communities within the regional ecosystem. These communities can be local, regional, national, and international.

Indeed, one of the research findings is the high importance of the geographical location of an HEI in the shaping of its opportunities to engage with businesses and other organisations. This is because to foster successful HEI engagement with external actors, it is important to adopt an ecosystem approach in which the institution becomes an active part of its local, regional, national, and in some cases international environment. HEI engagement in UBC means being fully embedded and engaged in the surrounding wider community. Such **ecosystem engagement requires "deep knowledge" and "on the ground" understanding** of the socioeconomic needs of the university's wider local and regional community, which eventually fosters development of a "shared vision" and "common denominators" between HEIs and their different counterparts in UBC. It is this shared understanding that allows for successful engagement, because for collaboration to be successful, the university must be able to produce useful and applicable outcomes in terms of research, knowledge, and technology. As such, HEI readiness for engagement entails the production of practical and applicable outputs that can address the needs and contours of the wider business and social community surrounding the university.

The main overarching conclusion of the research is that there is **no "one-size-fits-all" solution** for successful HEI engagement in UBC. Thus, it is crucial to understand the specific context of each individual university, both as an institution and as an institution embedded as part of a larger and distinct local, regional and national community. The challenges, opportunities, and strengths and weaknesses that each HEI faces in its attempts to successfully engage will depend on its individual characteristics, relationship to the community in which it is found, and the contours of its wider national context.

IMPLICATION

Our analysis reveals that a deep understanding of (i) the ecosystem within which an HEI operates, (ii) the factors shaping this ecosystem such as policy, (iii) the partners within it, and (iv) an HEI's own role within this ecosystem is fundamental to engagement readiness. With this understanding, an HEI can adapt its strategy and structure, which in turn helps develop a culture of collaboration discussed in the next section. An ecosystem approach should be considered a priority in the self-assessment framework.

Building on this, the most important trait is the "ecosystem approach" to engagement. Since by nature an ecosystem is a complex, adaptive, and multidimensional system, for UBC to be successful the value of engagement must be integrated in all levels and aspects of university functioning both internally and externally with its wider community. This ecosystem approach compels organisations to analyse their markets as business networks and to explore the roles of various organisations in a market (for example dominator, keystone, and niche as proposed by Gothlich, 2003) and how these roles determine their market strategies and factors that contribute to collaboration success and stability.

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Thus, HEIs need to consider the industrial orientation, R&D intensity, entrepreneurship (Sjöö & Hellström, 2019), the overall supply and demand processes, culture, traditions, markets, climate, politics, demographics, and technology of their regions (Kaklauskas et al., 2018). Some possible indicators to explore these different aspects of regional context, according to the Knowledge Transfer Metrics, include:

- National R&D spending as percentage of GDP
- National Higher Education Expenditure on R&D (HERD)
- National Business Expenditure on R&D (BERD)
- Availability of public funding programmes to support knowledge transfer (KT)/Industry engagement
- Availability of investment capital.[4]

2.1. Considering & Shaping the Policy-Level Context

Since HEIs are embedded in a specific national context, their social ecosystem engagement is highly dependent on **national UBC policies**. If a country lacks the national structure, legislation, funds, personnel, and interest necessary to help universities cooperate with external actors and to overcome the administrative and bureaucratic barriers that hinder these forms of collaboration, it is more difficult for HEIs to engage even if they have an individual dedication to partnerships. Since engagement begins as a cultural value and universities are integral parts of a community, it is logical that a national culture of cooperation is an incredibly important component determining engagement readiness.

The research for this report included data from a variety of different countries on four continents. HEIs in countries that had a **national culture of collaboration** including specific funding requirements and other legislative elements promoting engagement demonstrated a higher level of engagement readiness as exemplified through the presence of specialised engagement structures within the university and mature partnerships with various businesses. On the other hand, universities in countries that lacked the national structure, legislation, and culture of cooperation expressed frustration over the difficulty they had in initiating and managing successful cooperation, collaboration, and partnerships. In some cases, these institutions had knowledge transfer offices (KTOs), technology transfer offices (TTOs), or other offices dedicated to engagement but were nevertheless struggling to promote and maintain partnerships.

More recently, international trends in engagement readiness have become evident. Since engagement can take many innovative forms including multiple partnerships between universities, businesses, and other actors in different countries, the wider continental environment also plays a determinant role shaping the ease with which HEIs in those regions can collaborate and partner.

HEI engagement readiness varies significantly from university to university and from country to country. Each university will engage in a way that corresponds to its individual institutional and wider cultural environment and specificities. While there are certain structural and operational mechanisms that are common denominators of engagement readiness, such as the presence of offices, policies, and an ethos of cooperation and collaboration, the ways in which these are organised, the forms that they take, and the way in which they operate will vary significantly from case to case. In all cases, the most important point that was made throughout the

[4] Campbell, A., Cavalade, C., Haunold, C., Karanikic, P. and Piccaluga, A. (2020). Knowledge Transfer Metrics - Towards a European-wide set of harmonised indicators, Karlsson Dinnetz, M. editor(s), EUR 30218 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-76-18885-8, doi:10.2760/907762, JRC120716. https://publications.jrc.ec.europa.eu/repository/handle/JRC120716

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interviews was that **engagement readiness constitutes a cultural value of an ecosystem approach to collaboration, cooperation and partnership that is as important on an individual institutional level to the wider national, and the international context in which that institution is located**.

Although the wider social context is beyond the immediate control of HEIs, they need to properly understand policies, funding, human capital, and other aspects that shape the environment in which they operate. Such understanding provides a basis for taking on existing opportunities. In contexts where cultural and material support for UBC is lacking, universities can take an active role in the society to address this problem and engage in public advocacy and partnership-building that can generate new pro-UBC values and structures. Thus, HEIs need to consider government incentives, such as legislation, and financial incentives such as UBC funding and taxes. (Sjöö & Hellström, 2019; Kaklauskas et al., 2018).

2.2. Understanding Partners

Research results strongly indicate that HEIs and researchers who are ready to engage have a **profound understanding of their partners**, of partners' organisational structure, manner of operations, and specific technological or knowledge needs. Successful UBC takes place when both parties have clear understanding of what they are gaining from their collaboration. This connection is sometimes termed as "mutuality" in the literature. Jackson, Mavi, Suseno & Standing (2018) define mutuality as something that is to be gained by both parties. Therefore, collaboration takes place when both parties have an interest in building a partnership. These partnership interests are usually based on a clear understanding of all factors that shape that collaboration.

To develop this understanding, it is useful to explore some of the key barriers to engagement that are based on cultural differences between partners. These cultural differences between HEIs and business are so important that the two groups were repeatedly characterised in interviews as coming from "different worlds," with "different languages," "different timeframes," and with a different "ethos." Particularly, **differences in university and business time orientation** are identified as significant potential barriers to successful UBC. Universities are characterised by a longer time orientation than businesses, with increased bureaucracy and slower decision-making processes; a long-term oriented pedagogy focused on cultivating knowledge over the course of years; a fixed timeframe defining the academic year; and generally longer timeline for producing research and collaborative deliverables. Businesses, on the other hand, are characterised as having short-term timeframes; fast turnarounds; and room for quick-paced innovation. Therefore, transparent conversations between an HEI and its potential partners need to occur in order to openly define shared goals and timeframes for collaborations and cooperative partnership arrangements.

Similarly, **language differences between HEIs and industry** are singled out as key influencing factors for engagement readiness that could act as barriers in the absence of a common language. Universities need to know and use the same language as businesses for them to establish and successfully work towards shared project objectives and goals. In terms of funding, due to the specificities of different industrial sectors and businesses, HEIs must adopt a targeted engagement strategy that is tailored to the language of businesses they would like to work with. In many cases, this communicative strategy varies from department to department, with applied sciences departments working with different businesses than health or social science departments.

Development of **common operating principles and common ontologies** between an HEI and its business and societal partners foremost fosters trust. As with any other cultural aspect of collaboration, trust emerges as very important. University-business cooperation is multi- and inter-disciplinary. It involves different stakeholders that have different purposes

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and different ways to work. To successfully engage each other, develop a project and carry it forward, **trust is crucial**. Without trust, the cultural differences and the organisational boundaries would be so heavy that neither HEIs nor business would take the risk to collaborate. Trust is positively related both to knowledge transfer and innovation performance (Hajidimitriou et al., 2012). Many factors influence trust formation, such as partner reputation, flexibility and transparency of intellectual property (IP) policies, shared governance and sanctions and other control forms. Although it is easier to build trust from already existing relationships, intermediaries and guarantors can successfully bypass this obstacle through mechanisms that allow universities and businesses to openly work together, democratically discuss issues, and clearly define roles.

BUSINESS ENGAGEMENT READINESS

The question of what makes a business ready to engage was posed to some respondents. For HEIs, it is important to also observe the following factors in potential business partners to ensure their readiness for cooperation. HEIs should seek a partner who…

- Has similar values around integrity and quality
- Is willing to trust the process
- Is willing to explore topics and possibilities
- Is willing to invest time, effort and resources into the cooperation
- Is open to learning something
- Has an understanding of the IP frameworks within which universities operate (university: open access to IP)
- Knows and understands the academic environment and has a 'collaboration competence'

BUSINESS PERSPECTIVE ON ENGAGEMENT READINESS

The business perspective on engagement readiness was investigated in interviews with representatives from a business background. In these interviews, it was emphasised that productive collaboration between businesses and HEIs is the result of:

- The intersection of the strategic values for both parties,
- Mutual understanding of the principles of operation of the other party,
- Openness to the search for a common denominator of cooperation, despite differences in core activities, and
- Relevance of the cooperation.

If the collaboration starts from a common will, mutual desire, and relevance, it is highly likely to be developed, especially when it relates to research activity.

Aside from a company's demands for solutions that HEIs can offer, readiness comes from promoting the operation, development, and innovation of companies through research. Usually, businesses prefer HEIs which:

- Are able to explain how UBC collaboration should be organised,
- Have a good understanding of partners from other sectors,
- Are involved with intermediaries, boundary spanners, tech incubators, and start-ups, and
- Have a clear focus on the potential collaboration.

Companies would be more interested in investing in an entire ecosystem than just a single university with fewer skills and opportunities. They also prefer HEIs which can offer short, one-page reports useful for industry, have one stop shop/a single point of contact, offer courses or degrees in companies' strategic competence, and have good technology readiness level, transfer readiness level, and talent readiness level. The criteria that are being used to evaluate a possible partnership will depend on the type of collaboration.

Finally, resources are vital for engagement, and the number of resources dedicated to engagement can be a very good indicators of readiness.

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2.3. Know Thyself

Research shows that successful cases of engagement showcase not only an in-depth understanding of business, technological or social needs on one side, but also a profound knowledge of HEIs' organisational, research and technological competencies, projects and possibilities. This means that in addition to understanding the social ecosystem in which they operate, HEIs need to engage in **thorough organisational self-assessments to fully understand their own organisations**. This report is tailored to produce a self-assessment framework. However, the level of organisational self-understanding explored here is even wider in scope.

Engaged HEIs are deeply aware of their own resources, teaching and research activities, and how these fit or can fit needs and interests of external actors. For example, an innovation and technology transfer manager in a university doesn't only continuously monitor and engage with potential partners but follows her/his university's researchers and projects. Such monitoring and assessments should be performed regularly as they should offer insight into changes in the environment and ways in which internal factors can be adjusted accordingly.

Self-understanding needs to extend across the organisational, faculty/institute and individual level for HEIs to be fully ready for UBC. This means that HEIs need to foster this kind of knowledge production through top-level management, specialised innovation and knowledge transfer offices, in research teams and departments, and finally on an individual level referring to researchers, teachers, managers, and students.

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3. Open, Adaptive and Collaborative Organisational Culture

This factor is directly linked to those in the preceding section. The top-level management of an HEI needs to understand the main traits of its organisation. Organisational culture shapes all traits of organisations, including soft (beliefs, knowledge, attitudes, customs, etc.) and hard factors (structure, policies, rules, the provision of staff, training, technology, and other resources, etc.). Transitioning towards more collaborative environments requires a **well-developed collaborative culture** which includes institutional *willingness* to change, openness, flexibility, commitment, leadership, trust-building, self-learning, continued training, long-term and global vision, effective communication, knowledge sharing and innovation, and collaborative partnerships (Romero et al, 2007b; Canhoto et al. 2016; and Ryan, 2009). Collaborative culture fosters creation and continuation of soft and hard factors that enhance "the capabilities of others and the willingness to adapt for the benefit of all" (Romero et al, 2007b). In practice, this means the development of common operating principles, common ontology, interoperable infrastructures, and cooperation agreements (Romero et al., 2007).

The main takeaway from the research is the overwhelming importance of developing a **shared culture of collaboration between HEIs and external actors** that extends to all levels of the HEI. The ease with which this culture can be fostered in an individual academic institution varies depending largely on the university's age, historical legacy, orientation, and geographical location. For example, more recently established universities or universities that focus on applied sciences were reported to have an easier time adapting themselves to the time, language and culture of business than older, more established universities with deeper-rooted cultural traditions. Nevertheless, an HEI should adopt and promote an institution-wide culture of cooperation and collaboration as part of its mission and adapt its structures accordingly so successful engagement can and does occur.

Our analysis of the interviews indicates that a key agent in fostering institutional engagement readiness and cultural acceptance is **top-level HEI management**. This means that HEI leadership creates not only strategic orientation and an institutional approach for engagement but generates a specific organisational culture that sets the tone for everything else, for communication networks, financial resources, hiring practices and operational support. In this way, the Engagement Readiness Self-Assessment Framework and the Engagement Readiness Toolkit that are products of this research will necessarily require direct involvement and use by the top-level HEI management for proper analysis and later implementation of assessment findings.

IMPLICATION

A culture of collaboration, like the ecosystem approach, is vital to an HEI's engagement readiness. This culture is closely linked to an HEI's strategy and structure, which in turn is impacted by its understanding of the ecosystem it operates within and its efforts to adapt to this ecosystem. These relationships should be captured in the self-assessment framework in order to evaluate engagement readiness more accurately.

Becoming engagement ready will in many cases necessitate some form of strategic change orchestrated by HEI leadership. Thus, an HEI's engagement readiness is closely linked to its change readiness. The following table presents antecedents and challenges and barriers that have been identified in the academic literature as important when considering change readiness

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in organisations. These factors can be helpful in identifying the assessment categories but also specific indicators when analysing organisational culture. This means they can be translated into specific organisational characteristics for assessment purposes.

Table 1: Change readiness antecedents and challenges and barriers in academic literature

Category	Change readiness antecedents	Change readiness challenges and barriers

Structure and culture	• Decentralisation *(Zammuto & O'Connor, 1992; Williams, 2011)*
	• Specialisation *(Damanpour 1991; Williams, 2011)*
	• Differentiation
	  ○ Differentiation *(Zammuto & O'Connor, 1992)*
	  ○ Functional differentiation *(Damanpour, 1991; Williams, 2011)*
	• Professionalism [professional knowledge requires both education and experience] *(Damanpour, 1991)*
	• Flexibility
	  ○ Flexible organisation design and ability to change routinely *(Worley & Lawler, 2009)*
	  ○ Capability to be morphogenic [fluid organisational structure, ongoing organisational learning, and selecting and retaining managers with morphing mind-sets] *(Marshak, 2004)*
	  ○ Flexibility-oriented values *(Zammuto & O'Connor, 1992)*
	• Innovation structure *(Williams, 2011)*
	• Sufficient absorptive capacity *(Williams, 2011)*
	• Policies and procedures
	  ○ To reflect the culture *(Williams, 2011)*
	  ○ To deal with the emotions aroused by change *(Rafferty et al., 2012)*
	• Acceptance of adaptability and development *(Rafferty et al., 2012)*
	• Participatory decision-making structures *(Williams, 2011)*
		• Organisational focus, operational structure and 'core business' *(Blackman et al., 2013; Blackman, 2014)*
		• Staff turnover *(Blackman et al., 2013; Blackman, 2014; Mitton et al., 2007)*
		• Decision making and capabilities *(Blackman et al., 2013; Blackman, 2014)*
		• Misalignment of evaluation and accountability *(Blackman et al., 2013; Blackman, 2014)*
		• Competing interests *(Mitton et al., 2007)*
		• Researcher incentive system *(Mitton et al., 2007)*
		• Centralisation *(Damanpour, 1991)*
		• Unsupportive culture *(Mitton et al., 2007)*
		• Bureaucracy (Davey et. al. 2018)
		• Lack of dedicated time for cooperation (Davey et. al. 2018)
		• Routine seeking *(Oreg, 2003)*
		• Emotional reaction *(Oreg, 2003)*
		• Short-term thinking *(Oreg, 2003)*
		• Different missions and objectives (Davey et. al. 2018)
		• Differing timeframes (Davey et. al. 2018)

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	• Effective use of change management processes (communication, participation, leadership) *(Rafferty et al., 2012)* • Academics with the skills and knowledge for engagement (Davey et. al. 2018) • Academics with a positive attitude to engagement (Davey et. al. 2018) • Senior management position with responsibility to oversee engagement (Davey et. al. 2018) • Academics with the understanding of the business needs or business experience (Davey et. al. 2018) • Specific strategies established for engagement (Davey et. al. 2018)	
Communication	• Internal and external communication *(Damanpour, 1991)* • Interfunctional and interorganisational coordination and collaboration/connectedness *(Williams, 2011)* • Shared understanding of objectives and outcomes *(Blackman et al., 2013)* • Face-to-face exchanges *(Mitton et al., 2007)* • Positive communication (e.g., via the website, via internal magazines and emails) about engagement within the university (Davey et. al. 2018)	• Conflicting time frames *(Mitton et al., 2007)* • Limited time to make decisions *(Mitton et al., 2007)* Poor choice of messenger *(Mitton et al., 2007)* • Information overload *(Mitton et al., 2007)* • Traditional, academic language *(Mitton et al., 2007)* • No actionable message (*Mitton et al., 2007)* • Different 'language' spoken between the protagonists (Davey et. al. 2018)

3.1. Strategic Orientation Towards Engagement & Meaningful Social Impact

If HEIs need to introduce an institution-wide "culture of cooperation and collaboration" to foster successful engagement, as established in the previous section, then having a **strategic orientation and implementing supporting mechanisms** is in turn vital for its development.of a culture of collaboration. This includes the need to have a **"vision"** and a **"mission"** that values engagement as a fundamental part of the institution and its organisation. These should be reflected in the strategic orientation of the HEI. This strategic orientation then translates to institutional policies supporting engagement on all levels and through all stages, from the selection and hiring of university staff, to policies for their tenure, promotion, and career advancement. These types of proactive policies both allow for and incentivise the willingness of university staff and academics to actively collaborate with external actors. Furthermore, the strategic

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orientation towards engagement should be manifested in the HEI educational pedagogy as well, and be fostered through educational collaboration, university entrepreneurship, and research related collaboration.

The **strategic orientation towards social and industrial engagement of HEIs** is driven by individual and organisational motivations for meaningful impact. The key motivator for engagement among academics and researchers is the individual's drive to produce research or work that is meaningful, applicable, or practically relevant to society. Academics that are open to engagement are characterised by an interest to improve or make a difference in society and to do something with an importance that extends beyond the limits of the university. In some cases, this interest may be financially driven or motivated by personal reputation, but in all cases the primary driver for an individual academic to engage is to have a positive impact on society. Moreover, collaboration can provide both intellectual and economic benefits, including access to skills, funding, data and equipment. It also helps to build direct contact with local stakeholders, thus a better understanding of their needs and the collaboration environment required to innovate successfully. The same is true at the institutional level, universities should define their desired social impact.

Many of the HEI representatives interviewed for this report find **the university's role in their local and regional community as well as the university's responsibility to positively contribute to the socioeconomic growth of their society** in which they are located as the key strategic driver for their organisations. In the case of some public universities, this orientation is built into the public funding that the institution receives. In other cases, HEIs themselves initiate various community development programs as a means of attracting more talent, increasing the employability of their graduates, and promoting other forms of mutually beneficial synergy with the businesses and societal actors surrounding the university. This occurred through tight, long-term partnerships between a single, large business and a single university as well as through a collection of small project-based collaborations with multiple businesses and organisations.

In the case of some countries, national law requires that HEIs be active components in regional economic growth and development. **HEIs can act as important growth accelerators for local and regional development**, especially due to their ability to address the specific business needs that surround them. This can be an important factor in increasing the reputation of a region so that more talented individuals are attracted to that region to the benefit of both the HEIs and businesses that are located there. As explored in the previous section, the specificity of the local and regional context in which a university is located is of fundamental importance. If a university is in an area with a dense entrepreneurial infrastructure, it will have a very different portfolio of engagements than a university in a region with a limited number of businesses present. These contextual realities will directly shape the number, size and opportunities for UBC partnerships. Likewise, in cases where state or local governments had agencies or policies that promote innovative districts and collaborative environments, it was easier for the HEIs represented through interviews to engage with their communities. **The strategic orientation of HEIs should reflect these specific contextual realities**.

When it comes to determining the strategic orientation of an HEI and how collaborative it is, it is leadership, i.e., the top-level management in HEIs that plays the key role. The leadership generates the organisational culture and develops institutional policies that determine whether an organisation is oriented towards engagement. The following table includes antecedents of leadership supportive of engagement are identified in academic literature. They can be used as factors to assess leadership aspects of the organisational culture in HEI.

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Table 2: Antecedents of leadership supportive of engagement

Antecedents of leadership supportive of engagement

• CEO readiness for change (Rafferty et al., 2012)
  ○ Pattern breaking behaviour (Blackman, O'Flynn, & Ugyel 2013)
  ○ Managerial attitude towards change (Damanpour, 1991)
  ○ Clear mandate and central leadership (Blackman, et al., 2013)
  ○ Administrative intensity [higher proportion of managers] (Damanpour, 1991)
  ○ Articulation of a group-level vision (Rafferty et al., 2012)
  ○ Risk tolerance and positive self-concept of managers (Simpson, D. D. 2002)
  ○ Ability to recognise the value of a technology for the company (Tatikonda & Stock, 2003)
  ○ Consultative, facilitative and flexible leadership (Williams, 2011)
• Strategies
  ○ Strong future focus and more weight to possible future scenarios when making strategic decisions (Worley & Lawler, 2009)
  ○ Robust strategies and momentary advantages (Worley & Lawler, 2009)
  ○ Established strategies and committed resources for engagement (Davey et. al. 2018)
  ○ High-level persons responsible for engagement (Davey et. al. 2018)
• Support from authority
  ○ Authority to implement changes (Mitton, Adair, McKenzie, Patten, & Perry, 2007)
  ○ Senior leader support (Holt, Armenakis, Field, & Harris, 2007)
  ○ Involvement of decision makers in research planning and design (Mitton et al., 2007)
  ○ Support for risk-taking and experimentation (Williams, 2011)
  ○ High levels of trust in vertical and horizontal relationship (Williams, 2011; Rafferty et al., 2012)
  ○ Development of incentives (Williams, 2011)
  ○ Provision of support and training (Mitton et al., 2007)
  ○ University leaders experienced in engagement in education and/or research (Davey et. al. 2018)
  ○ University leaders with a positive attitude to engagement (Davey et. al. 2018)

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3.2. Administrative Structure & Policies that Facilitate Engagement

Although a "culture of collaboration" begins at the top level, it must be present on all levels and in all aspects of an HEI's overall mission and functioning. This implies both placing value and importance on collaboration and putting into place the **administrative and operational policies and structures necessary to foster and facilitate engagement**. This should begin at the recruitment stage for university students, faculty and staff. Potential candidates should be selected based on their openness to collaboration, they should be informed of the importance the university places on cooperation, and they should be trained in the competencies necessary for engagement from the start.

Ideally, this creates a positive feedback loop in which the more engagement ready talent a university has, the more successful collaborations will be initiated. As these successful cases are communicated and rewarded internally and externally, the more existing students and faculty will be motivated to engage. In parallel, the university's record of successful partnerships will inspire confidence among industry and social actors acting as a pull factor that attracts more potential partners. Over time, this movement will improve the university's overall reputation and ranking, which will later attract more talented students, researchers, faculty, and staff.

For this positive cycle to function, an individual HEI must put into place the structures and policies necessary to facilitate and ensure successful UBC. These structures can take various forms, but no matter what the form is, it must be **staffed by individuals that are both passionate and knowledgeable about innovation and engagement with external actors**. They must have both the hard and soft skills needed to initiate contact, build lasting fruitful relationships and networks, ensure communications, and act as a liaison that coordinates between businesses, social actors and the university.

This requires the **commitment of all levels of administration and the active encouragement of collaborative activities and opportunities throughout the university**. Different departments, schools and specialties should be given the opportunities and physical spaces in which they can interact, collaborate, cooperate and iterate projects together. Successes should be celebrated and rewarded in various ways. Furthermore, administrative procedures should be streamlined to fast-track and simplify engagements with full managerial support being given to individuals with an interest in initiating joint projects and partnerships. This implies having support for engagement from the highest levels of the university administration down to the students and promoting a bottom-up culture of cooperation including interdisciplinary studies, projects, exchanges, and communication. The more cohesive the university's internal structure, functioning, and administration are, the more ready it is to engage with external actors as an institution. To these ends, administrative flexibility is one of the key factors of HEI preparedness to engage.

Streamlining administrative policies can also help bridge the cultural gap with businesses. The goal is to streamline administrative processes to be as flexible and open to innovation as possible. This includes minimising institutional bureaucracy to speed up the decision-making process, ensuring communication and cooperation between the university's individual schools or departments and creating specific offices or structures dedicated to the engagement process.

3.3. Collaboration-Attuned Hiring & Career Advancement Policies

Engaged universities pay **careful attention to the hiring of university staff as well as the policies for their tenure, promotion and career advancement** to adjust it to their collaborative culture. Both HEI and academic readiness is

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characterised in terms of having the ability to engage with external actors. This means that academics and researchers have the available time necessary to seek, build, and nurture a network of relationships with various actors in the sectors that correspond to their personal research and intellectual interests. One of the main barriers to engagement is the **time constraints that university academics and researchers face** due to their extensive teaching, publishing, researching, and advising roles within the university. Therefore, to promote successful engagement, time must be made available for engagement activities. This means that engagement should be clearly defined in academic roles and contracts and time should be allocated for these activities.

Furthermore, UBC requires a **specific set of competencies** such as "people skills," "relationship building," and other "soft skills". Engaged universities need to develop and implement hiring policies that attract staff with the appropriate competencies. Additionally, they need to integrate specific trainings for these skills in various university programs as they develop the "human capital" of an HEI, which was identified as the most important input/resource needed for successful engagement.

Another mechanism for UBC is development of **incentives for academics and researchers to engage** with external actors. While it is vitally important for the university to instate an ethos of collaboration, that cultural value needs to be transmitted to students, professors, and researchers to incite them to proactively seek opportunities for cooperation and partnership. To do so, a university-wide collaborative mentality must be fostered through a value system that rewards and encourages engagement and innovation. This means incentives for engagement exist, while barriers are addressed.

One way of doing so, as identified by multiple interviewees, is to **integrate engagement performance into the career advancement tracks** for university staff. Giving benefits to staff for engagement was cited as an important means of incentivising collaboration. Some examples of these benefits

ACADEMICS' ENGAGEMENT READINESS

Some interviewees were also asked what made an individual academic ready to cooperate. Summarising the responses, academics who are ready to collaborate:

- Overcome the paradigm that universities do only research and have an interest in bringing research into practical use
- Attend events, network, learn what partners are looking for to identify matching interests and fits for joint research,
- Consider UBC worth their time and relevant to professional and institutional growth
- Have an understanding of, or experience in, industry
- Have a desire to fulfil the third mission of the university in their work

Academics are ready to engage when they understand other parties' needs and are able to deliver value to them. Readiness is visible through high levels of alignment with stakeholders and institutional determination to collaborate.

It is also important how well an academic recognises the different forms of engagement activities including research, education, and other social opportunities. Beyond willingness, there must be readiness to work extra hours, and be flexible and responsive to the situation as well as the cooperation partner.

Academics who are ready to cooperate are able to unite different cultures and be multilingual, speaking both 'academic' and 'business' language. The best way to learn this is through experience. Academics with fluid careers that span both academia and industry are often more likely to collaborate, because they have an open mind towards engagement, in terms of collaboration, co-learning, and co-creation, and they are also more comfortable describing their research. Being a team player, coachable, open to criticism and ready to learn from interaction are other signs of readiness to collaborate.

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included but were not limited to the provision of microgrants for academics' research interests, the integration of engagement into tenure consideration, featuring the academics responsible for successful collaboration in university communications, developing special key performance indicators (KPIs) for university staff that go beyond the volume of publications and patents, and instituting polices for various other forms of career advancement based on academics' attempts at engagement. Along similar lines, a need for the university to allow flexibility for academics so that even if they experience unsuccessful engagement outcomes or failed projects they are not penalised for their attempts. The main objective of incentives is to encourage students and academics to actively engage, collaborate, cooperate and innovate.

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4. Collaboration Embedded in Research & Education

Engagement readiness is strongly associated with the research profile of the HEI as well as an educational pedagogy that incorporates collaboration as part of its curriculum. Therefore, both the **value of and the skills needed for collaboration and cooperation should be integrated into the university's research programs and educational programming**.

IMPLICATION

HEIs that are engagement ready foster academic entrepreneurship and embed collaboration into pedagogy. These activities are also characteristics of entrepreneurial and/or engaged universities as described in literature, and as such some established indicators of entrepreneurial and/or engaged universities could be used when developing the self-assessment framework.

4.1. Academic Entrepreneurship & Research Collaboration

Academic entrepreneurship refers to mechanisms that foster start-up and spin-off creation and has also been expanded to include research collaboration through joint R&D, consultancy and the commercialisation of R&D. The research-related collaboration process is the most common form of academic entrepreneurship, because companies can actively fund research fellows and PhD programs to explore specific research areas. Research covers several aspects of this topic: the initiation mechanism of university-business cooperation (such as initial conditions, initial objectives for long-term collaboration research partner selection process, and IP negotiation), organisational framework and project management practices, mechanisms for knowledge transfer, mechanisms for supporting collaboration and individual level collaboration mechanism (Fernandes et al., 2018; Thune and Gulbrandsen, 2014; Biscotti et al., 2012, Garousi et al., 2016; Nielsen and Cappelen, 2014). Furthermore, businesses have interest in collaborating due to technology scouting both for patents and spin offs.

Historians of technology record three activities of commercialisation of knowledge, (i) consulting, (ii) patenting / licensing, and (iii) full-blown forms of commercial entrepreneurship, such as spinouts. It should be noted, however, that spin-out creation has not been as widespread as consulting in the past. Nevertheless, it was widespread in sectors and countries lacking formal intellectual property protection work (Mercelis, Galvez-Behar, Guagnini 2017). Dalmarco et al. (2018) studied the organisational prerequisite for entrepreneurial university, highlighting the importance of soft bureaucracy, which increased flexibility and adaptabilities required by the institution to enable this.

4.2. Engaged & Entrepreneurial Learning

Many different forms of a collaborative curriculum design and delivery were proposed in the interviews, such as the use of special advisory boards made up of industry experts who would work with university staff on the design of its courses and programs. It was also emphasised that business experience should be considered as a form of coursework that could be evaluated as part of students' advancement in their degree programs. This is important in relation to PhD level programs.

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UBC in education is usually categorised in three interrelated groups of activities, (i) educational collaboration, (ii) university entrepreneurship, and (iii) research related collaboration. Thanks to **educational collaboration** (i.e., tailored degree, jointly organised courses, and thesis projects), business and universities share knowledge and integrate it through the joint sense-making process (Kunttu, 2017). Moreover, through educational collaboration, business and university can jointly work to help students in job placement and career guidance, addressing at the same time both business and student needs. The importance of **student internship programs and academic exchange programs** with businesses was repeatedly suggested in interviews as a means of building bridges between university and industry. Internships were identified as a key factor for the creation of employment opportunities for students by providing businesses with a pool of experienced talent to hire from.

Collaboration with businesses on curriculum design and delivery can facilitate entrepreneurial learning in HEIs. A group of Finish researchers (Ruskovaara, Rytkölä, Seikkula-Leino. & Pihkala, 2015) emphasise that entrepreneurial learning needs to entail meaningful education and teaching based on socio-constructivist and sociocultural educational concepts where the teacher is a learner too (importance of teachers' self-reflection, Shulman & Shulman, 2004). Following Novak & Govin (1984), they highlight that "meaningful learning" should be reflected in educational goals, contents, work methods, learning environment, business culture, assessment, goals and add that such education should include experimental learning (Kolb 1984). They pinpoint competencies that emerge out of entrepreneurship: bearing uncertainty (Drucker, 1985), making new combinations (Schumpeter, 1934), exploring opportunities (Kirzner, 1973; Shane and Venkataraman, 2000), emergence and creation of organisation (Pinchot, 1985; Gartner, 1988), community and social entrepreneurship (Johannisson and Nilsson, 1989). To foster these competencies, entrepreneurship education should entail learning through/for/about entrepreneurship (Gibb, 2001 & 2005), learning to understand entrepreneurship, learning to become entrepreneurial, learning to become an entrepreneur (Hytti, 2002), self-orientation, external entrepreneurship (Kyrö, 1997), and internal entrepreneurship (Kyrö, 1997; Borba, 1989).

The embedding of the value of and the skills needed for collaboration and cooperation into HEIs' research programs and educational content, as well as engagement more generally, are two key characteristics of an entrepreneurial and/or engaged university (Etzkowitz, 2013). As such, it can be useful to consider established indicators for entrepreneurial and/or engaged universities when developing the Engagement Readiness Self-Assessment Framework. For example, the European Commission and OECD established eight dimensions for entrepreneurial HEIs[5] which includes the Entrepreneurial Teaching and Learning as a dimension. This dimension is comprised of the following indicators:

1. The HEI provides diverse formal learning opportunities to develop entrepreneurial mindsets and skills.
2. The HEI provides diverse informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills.
3. The HEI validates entrepreneurial learning outcomes which drives the design and execution of the entrepreneurial curriculum.
4. The HEI co-designs and delivers the curriculum with external stakeholders.
5. Results of entrepreneurship research are integrated into the entrepreneurial education offer.

[5] These measurements are based on the earlier OECD/European Commission Guiding Framework for Entrepreneurial Universities. Retrieved from: https://www.oecd.org/site/cfecpr/EC-OECD%20Entrepreneurial%20Universities%20Framework.pdf

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5. Key Organisational Resources

While an HEI's strategic orientation towards deep engagement with industry and society is crucial, without adequate organisational resources, UBC cannot take hold. While all organisational resources are listed in the final section, this section highlights three organisational resources that emerge from the conducted interviews: i) Existence of a Knowledge Transfer Office (KTO), Technology Transfer Office (TTO), or Partnership Office, ii) Communication Networks, and iii) Financial Resources.

IMPLICATION

While our analysis showed that engagement readiness is possible without the following organisational resources if an HEI has an ecosystem approach and a culture of collaboration, the availability of these resources can facilitate and streamline engagement and should therefore be included in the self-assessment framework.

5.1. Knowledge Transfer Office (KTO)/ Technology Transfer Office (TTO)/Partnership Office

One of the factors that emerged as crucial to HEI engagement readiness is related to the existence and operations of knowledge transfer offices (KTO) or technology transfer offices (TTO). In fact, one of the universal responses in our interviews to what constitutes HEI engagement readiness was the **presence of a Knowledge Transfer Office (KTO), Technology Transfer Office (TTO), Partnership Office or other specialised structure that operates as a single point of contact** dedicated to promoting, facilitating, negotiating, and managing UBC projects and agreements. TTOs act as an interface between researchers and industry (Villani et al., 2016) that fulfil their role by managing established processes for intellectual property management, a strong research orientation and qualified human resources (Olaya Escobar et al. 2017). Smilor and Matthews (2004) point out that the quality of TTO employees has a direct impact on knowledge and technology transfer (KTT) activities. Thus, not only do these structures need to be in place, but they also need to have **staff that is trained in the competencies specific to successful engagement**, including both the "soft relationship-building skills" and the knowledge of intellectual property rights, patents, knowledge transfer, budgets, contracts, and other technical aspects that shape HEI engagement. Although academics have technological know-how, they do not necessarily have the managerial skills to fill in a patent, enter into an agreement with a company or create a spin off.

Engagement-specific structures should also have **staff that is dedicated to the negotiation and facilitation of project management**, specifically collaborative projects. One of the main barriers that was identified in the interviews was the difficulties in finding a common agreement on issues such as intellectual property rights, patents, and knowledge ownership that is produced during joint projects. Therefore, it is critically important that IP specialists can advocate for academics and researchers in project negotiations. Not only does this protect and incentivise academics to engage, but it also ensures that project agreements are transparent and mutually beneficial with clearly defined roles and outcomes. Another key aspect of project negotiation is an HEI structure that can guarantee the data protection necessary to protect the confidential and sensitive data that

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results from collaborative projects, which is of particular concern to industry representatives. Finally, staff within these structures should also act as negotiators and contract coordinators with financial and budgetary expertise so that the funds needed for projects are both sought and effectively administrated.

According to the interviewed experts, expert staff members should first ensure a **proactive communications strategy** that provides information on potential projects, calls for research, events that promote collaboration, and case studies of successful cooperation. These communications should be two-fold in nature. **Internal communications** within the university need to occur to promote interdepartmental cooperation and collaboration and to reinforce these values. Similarly, this specialised engagement staff or structure should also organise workshops, seminars and events such as "hackathons" and alumni gatherings that bring together students, staff and researchers from different disciplines and provide them with opportunities to meet and engage with industry representatives. This is a means of nurturing the initial contacts and relationships that can lead to later collaborations. To these ends the creation of incubators, interdisciplinary laboratories, and other open spaces that bring together diverse students, faculty, staff and industry representatives was underscored as a means of promoting engagement.

Meanwhile, **communications should be made to external actors** to highlight the university's strengths, research orientation, potential projects, and track record of successful collaboration. To attract potential partners, the wider community needs to be aware of what the university is doing and what opportunities exist for collaboration. Likewise, promoting successful projects and their outcomes through communications promotes trust and the attractiveness of an HEI as a potential partner. In this sense, these university structures should operate as liaisons promoting connections and linkages between the HEI and the wider community of external actors.

5.2. Networks of Communication

As with the case of Knowledge Transfer Office (KTO), Technology Transfer Office (TTO), or Partnership Office, successfully engaged HEIs foster **extensive communication continuously through various mechanisms**. Communication opportunities facilitate the creation of networks that results in the creation of valuable social capital for academics and managers which then is embedded in an HEI's organisational operations. Both the academic literature and our empirical research highlight the importance of communication networks. The most common categorisation in the literature (adopted by authors such as Lemos and Cario (2017) and Arza and Vazquez (2010)) bases its distinction on the interaction modality with industry:

- Bi-directional channels, i.e., networking with companies, joint R&D projects.
- Commercial channels, i.e., patents and technology licenses, but also incubators and spin-off.
- Service channels, i.e., consultancy and technical assistance, staff mobility and training staff, and informal information exchange.
- Traditional channels, i.e., conferences, publications, graduate employment.

According to this research, traditional and bi-directional channels are preferred due to the tendency to pursue more traditional goals without taking the risks of new entrepreneurial missions (Berbegal-Mirabent et al., 2013), while the commercial channels are the least preferred. Additionally, informal interactions are more highly considered than formal linkages, because "organisations create the context for the collaboration, while motivation and maturity for that depend rather on the specific characteristics of acting individuals and teams than on general organisational processes" (Rajalo and Vadi, 2017: 43).

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The relevance of existence of personal relationships and informal interactions for successful engagement is further confirmed in our interviews with practitioners. In fact, **relationships were one of the main factors that influence the ability of HEI to engage** with industry and other external actors. In response to questions about how engagement begins, most of the responses included a reference to existing "personal relationships," "informal exchanges," and "personal networks" of relations. These networks were equally important on the individual academic level as on the university level. Furthermore, it is important to emphasise that the type of relationships that were identified as successful were those that were based on trust, transparent communications about project goals, objectives, and the roles of all parties involved, mutual benefit, and on interactions that extend beyond a single project into long-term collaborations and exchanges.

For individual students and academics, previous relationships with external actors were often the basis for collaboration. Students that gained experience through internships and thesis projects were characterised as highly desirable for later hiring by businesses. Direct collaborations between students and business in research projects are often the beginning of the spin-offs, patents, knowledge transfers, and other key outputs of the UBC process. Allowing students, the opportunity to conduct research in cooperation with businesses was identified as an important means of ensuring the relevance and applicability of their research results, giving businesses access to upcoming research results that are important to their interests, and teaching students how to collaborate successfully. This acts as an incentive for students to engage by increasing their employability, putting them into contact with potential future employers, and steering them towards relevant research. On the industry side, this incentivises them to engage with the university by giving them early access to research results, relevant knowledge, and a talent pool that has the transferable experience and knowledge needed. In doing so, this brings businesses into contact with the university acting as an opportunity for the development of the exchanges and relationships that form the basis of long-term engagement.

The **personal networks of academics** are a primary motor for initiating collaboration with businesses and other external actors. This was particularly true in cases in which the university did not have a well-developed infrastructure for cooperation, such as a knowledge transfer office or a liaison dedicated to building relationships with external actors. The personal networks of academics can result from their attendance at conferences, informal exchanges through different events, through their informal relationships, or through their consulting activities with industry representatives and other social actors, among others. The following channels of informal communication were identified in the literature:

- 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; Davey et al, 2018).

On the university level, relationships were also identified as a key factor influencing positive and productive UBC. One of the important elements in a university's ability to engage is their reputation as an institution in terms of university ranking. Beyond the university's reputation, a record of successful engagement was also identified as a critical element in attracting businesses and other actors. As such "university experience" and a "record of successful engagement" were both repeatedly cited in interviews as

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shaping an HEI's readiness for engagement. The need for the university to have a dedicated office, staff or liaison that worked to approach businesses is underscored, create opportunities to foster engagement, such as workshops or meet and greet events, develop a proactive communication strategy that informs businesses of the university's strengths, research interests, and successful engagement stories, and to work to promote relationships by matching appropriate university staff with external actors with specific needs that fall within their competency. The more a university is involved and integrated in their wider socioeconomic community that surrounds them, the easier it is for them to develop the long-term relationships that build the foundation of successful collaboration.

The need to **involve university alumni** is another feature of successful UBC. Alumni represent an important resource for promoting engagement if they are actively involved and motivated in promoting their institution's UBC. Alumni that start their own businesses or that go to work for other businesses can increase the employment opportunities for graduating students by hiring them or advocating for their hiring. Alumni-owned businesses or organisations can become key partners that collaborate with their former HEI. Alumni were also identified as a potential source of financing for projects and university initiatives.

Furthermore, **staff exchanges**, in which university staff spend time working at a business, ensure that university academics get real experience that they are then able to integrate into their pedagogy and courses. In both cases, these types of exchanges were identified as key elements for engagement readiness because they allow university actors to build relationships with industry representatives.

Finally, the recent research on novel structures of collaboration indicates a need to further adjust "collaboration readiness" measurements to these new channels: the collaborative networked organisations, the virtual breeding environment and the virtual organisations.

Collaborative Networked Organisations (CNOs), or collaborative networks can be defined as "networks of organisations that are largely autonomous, geographically distributed, and heterogeneous in terms of their: operating environment, culture, social capital and goals. Nevertheless, these organisations collaborate to better achieve common or compatible goals, and their interactions are supported by computer networks" (Romero et al., 2007).

Virtual Breeding Environments (VBEs) represent "an association or pool of organisations and their related supporting institutions, adhering to a base long-term cooperation agreement, and adoption of common operating principles and infrastructures, with the main goal of increasing both their chances and their preparedness towards collaboration in potential VOs" (Camarinha-Matos & Afsarmanesh, 2006).

Virtual Organisations (VOs) represent "a temporary alliance of organisations that come together to share skills or core competencies and resources in order to better respond to a collaboration opportunity, and dissolve when their goal has been achieved" (Camarinha-Matos & Afsarmanesh, 2006).
There are certain differences in assessing the readiness for collaboration to participate in long-term strategic networks like VBEs or short-term collaborations such as VOs, importantly from both the collaboration "applicant" and "collaboration initiator", where the assessment takes place from both sides.

In terms of VBE members' readiness assessment, Romero et al. summarised assessment criteria relating to:

- Corporate governance (purpose for collaboration, strategic orientation of the expected outcomes and relevance for the organisation, motivations to engage in collaboration, etc.),
- Enterprise architecture (focussing on organisational agility evaluated based on adaptability, promptness and innovation). The

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dimensions of the evaluation of the enterprise architecture include market, processes, resources, organisation, information/ knowledge,

- Past performance– assessment of past collaborative activities and the forms those took.

Relating to VO Partner's readiness assessment, Romero et al. underlined:

- Competency-base characteristics (Ermilova & Afsarmanesh, 2006) to evaluate the competency, capability, capacity, availability, and conspicuity of a VBE member to collaborate in a VO constellation,
- A performance assessment in terms of performance indicators that can evaluate the performance of the overall operation of the organisation in terms of price, delivery date, quality level, etc., and trust level (Msanjila & Afsarmanesh, 2006) as well as past performance.

5.3. Financial Resources

"Funding," "budgets," and "finance" for engagement has significant influence on the UBC process. Multiple industry representatives identified university funds as pull factors for initiating collaborations with universities. This was particularly true for small and mid-sized enterprises that may lack the financial resources needed to undertake significant research projects. Likewise, university representatives confirmed that they can use their budgets as a means of attracting businesses to work with them. However, it was clear that to do so, universities must have a targeted approach to businesses offering a proposal that is tailored to individual business or industry needs rather than a generic proposal that is not specific to any sector. In this way, the interviews cited the importance of the university to clearly identify its strengths and weaknesses, as well as its assets and possibilities that can be used for engagement. Going further, for collaboration and cooperation to be successful in both cases, it is critically important for universities and their external partners to clearly identify their needs, their possibilities, their objectives, their assets, and the roles of each party.

In many cases, university representatives identified the **need to attract external collaboration and funds**. This was true for public universities that may not be able to secure enough public funds to finance their advanced research initiatives or laboratories. Universities face intense competition for securing funds. As such, UBC becomes an important means for them to both increase their competitiveness for public funding and to open alternative avenues for private funding.

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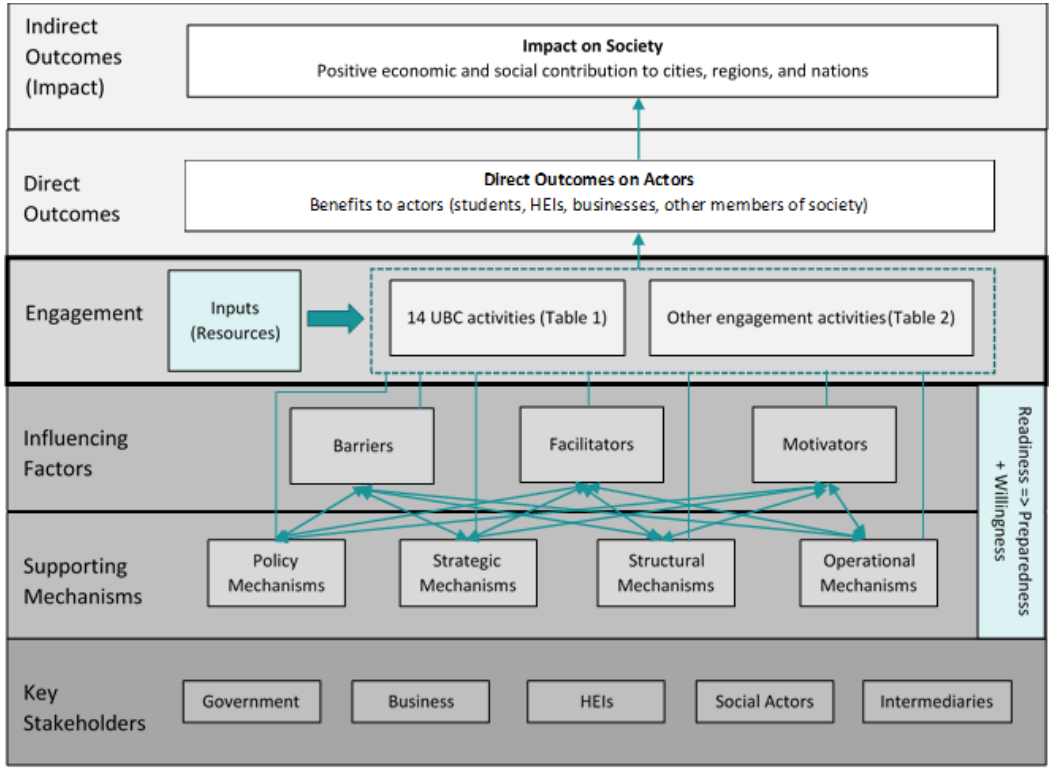
6. Towards an Engagement Readiness Model

As discussed in the Introduction, the initial phase of the research carried out for this report included setting a methodological approach, during which key concepts and an initial set of variables were defined to guide the exploration of HEI engagement readiness. Variables were based on an initial model developed to explore engagement readiness (seen in Figure 2 below), which is adapted from the UBC Ecosystem Framework, developed by authors Galan-Muros & Davey in the publication *Galan-Muros, V.; Davey, T. (2017) The UBC Ecosystem: Putting together a comprehensive framework for university-business cooperation. Journal of Technology Transfer*.

Figure 2: An initial model to explore engagement readiness



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In this foundational model, engagement readiness, an antecedent of engagement activities (along with resources), consists of a combination of influencing factors and supporting mechanisms. By determining the preparedness and/or willingness of HEIs to undertake engagement activities, the focus of the conducted research was to explore the relationship between the inputs (resources), influencing factors and supporting mechanisms, and readiness to undertake engagement activities. The results of this research, described in detail in previous sections, are summarised in Table 3 below.

Table 3 Summary of Dimensions of HEI Engagement Readiness

Priority	Dimensions of Engagement Readiness		
1	Ecosystem Approach (Supporting Mechanisms)	Understanding of Ecosystem	Understanding socioeconomic context of ecosystem in a particular geographical region (size and scope of region self-defined by HEI)
			Understanding role of HEI within ecosystem
			Understanding of relationships between different communities in ecosystem
		Understanding of Culture of Collaboration in Ecosystem	Understanding of policy context in ecosystem that can impact engagement
			Understanding organisational structure of government(s) in ecosystem and how it impacts engagement
			Understanding of funding mechanisms and incentives available for engagement in ecosystem
		Understanding of Potential/Current Engagement Partners in Ecosystem	Understanding of current and potential engagement partners' organisational structures
			Understanding of current and potential engagement partners' technology/knowledge needs
			Understanding of current and potential engagement partners' manner of operations
			Understanding of barriers to engagement related to cultural differences between partners (including differences in time orientation, language differences, etc.)
			Understanding of key facilitators of engagement (trust, common operating principals, common ontology, etc.)
		HEI Self-Understanding	Understanding of HEI's own organisational competencies for engagement
			Understanding of HEI's own research competencies for engagement
			Understanding of HEI's own technology competencies for engagement
			Understanding of HEI's own resources for engagement
2	Open, Adaptive, and Collaborative Culture & Structure (Supporting Mechanisms)	Adaptive Institution	Ability of HEI to adapt to ecosystem and any changes within it
		Institutional Orientation Towards Engagement	Institutional vision/mission that values engagement
			Institutional orientation towards social impact
		Individual Orientation Towards Engagement	HEI leadership supportive of engagement
			Individuals at all levels motivated by social impact

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		Overall Administrative Structure & Policies that Facilitate Engagement	Recruitment policies oriented towards engagement
			Engagement oriented policies that extend to all levels of organisation
			Streamlined policies and structure to facilitate engagement
			Flexible bureaucratic structure
		Collaboration-attuned Human Resources Policies	Hiring prioritises individuals with passion, knowledge and skills relevant to engagement
			HR policies that remove barriers to engagement by academics
			HR policies that incentivise engagement for academics
			Engagement performance integrated into career advancement policies
3	Collaboration Embedded in Research and Education (Supporting Mechanisms)	Research	Existence of academic entrepreneurship
			Existence of research collaboration with external partners
		Education	Entrepreneurship learning embedded in curriculum
			Collaboration with external partners on curriculum design and delivery exists
4	Key Organisational Resources (Facilitators and Resources)	Institutional Structure Includes Dedicated Office/Team for Engagement (Resource)	Existence of KTO/TTO/Partnership Office
			Staff with engagement-specific skills (soft and hard skills)
			Staff dedicated to engagement management
			Structure that ensures data protection
			Structure with proactive communication strategy relevant to engagement (internal and external)
		Institutional-level Networks of Communication (Resource)	Established channels of communication relevant to engagement (bi-directional, commercial, service, traditional)
			Relationships with past, current and potential engagement partners established and maintained at institutional-level
			Management of HEI's engagement-related reputation
			Alumni networks utilised for engagement
		Individual-level Networks of Communication (Facilitator)	Relationships with past, current and potential engagement partners established and maintained by academics
			Relationships with past, current and potential engagement partners established and maintained by students
		Financial Resources (Resource)	Budget for engagement structure and activities
			Targeted approach for use of budget to attract to support engagement activities (requires partner understanding)
			Mechanisms for attracting funding for engagement (where appropriate)

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6.1 Conclusion & Recommendations

Our research results confirm the interplay of initial elements and their relationships in fostering HEI engagement readiness. However, it is important to emphasise here that interplay between factors and relationships between all internal and external HEI stakeholders are not linear. Rather, they reinforce each other and generate feedback loop mechanisms. **This means that any form of organisational assessment should consider the institutional dynamics and account for change that takes place when a part of the system is replaced, added or transformed.** Furthermore, this finding is aligned with the first factor we emphasised in this report: the ecosystem approach. Precisely due to this dynamic and the complex nature of the social world, the ecosystem approach, when adopted by HEIs, enables them to assess, reflect and adapt their structure and operations to changes in their environment. This in return requires organisations to adopt an open, adaptive and collaborative organisational structure. Such structure is reflected in administrative and hiring policies. Openness to collaboration implies organisational embeddedness in extensive formal and informal communication channels for HEI leadership, KT managers, researchers and students as well. This includes teaching and educational pedagogy, as learning, research and the HEI's third mission should be strongly intertwined. Our research highlights the need to have a Knowledge Transfer Office (KTO)/ Technology Transfer Office (TTO)/Partnership Office in place and support for engagement though financial mechanisms as well. However, these operational resources come later and are not as crucial as determinants of successful and meaningful social engagement as other **soft cultural factors**.

Based on the research carried out for this report, our principal recommendations for the development of the Engagement Readiness Self-Assessment Framework are:

1. The different dimensions and factors impacting engagement readiness should be weighted differently in the Engagement Readiness Framework and Self-Assessment Tool, with the ecosystem approach and open, adaptive and collaborative organisational culture being weighted more heavily than others.

2. As mentioned previously, the relationship between all the different factors impacting engagement readiness should be considered. For example, a higher "score" in one dimension would result in a lower or higher score in another automatically.

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Annex I: List of Indicators Identified in Research

Literature-Based Indicators

Based our initial model, the following table provides an overview of engagement readiness factors and indicators. Beside our interviews, these indicators are based on similar categories and indicators developed by:

- Seppo & Lilles (2012), Note: compiled by authors based on Barnes et al. 2002, Bercovitz, Feldman 2008, Perkmann et al. 2011, Langford et al. 2006, Iqbal et al. 2011, Tijssen et al. 2009, Luoma et al. 2011.

- Davey, T., Meerman, A., Galán-Muros, V., Orazbayeva, B., & Baaken, T. (2018). The State of University-Business Cooperation in Europe. Luxembourg: Publications Office of the European Union. Retrieved from: https://www.ub-cooperation.eu/pdf/final_report2017.pdf

- Campbell, A., Cavalade, C., Haunold, C., Karanikic, P. and Piccaluga, A. (2020). Knowledge Transfer Metrics - Towards a European-wide set of harmonised indicators, Karlsson Dinnetz, M. editor(s), EUR 30218 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-76-18885-8, doi:10.2760/907762, JRC120716. https://publications.jrc.ec.europa.eu/repository/handle/JRC120716

Although various factors are listed together, it is important to reemphasise that the qualitative/cultural factors highlighted in this report have a profound impact on engagement readiness. Therefore, these cannot be of the same "weight" when constructing measurement indicators for an organisational assessment tool. Furthermore, due to their qualitative and nuanced nature, the question arises of which indicators should be used for their investigation and in what way.

Table 4: Indicators Identified in Literature

Categories	Indicators
Indirect Outcomes (Impact)	Societal benefits- evidence–based case studies on the outcomes because of access to technology and new knowledge: impact on new products or process (pollution, costs, hazard etc.), impact on policy, healthcare interventions etc. Economic Benefits- The broader economic benefits are challenging to capture and will often require externally commissioned expert support. Usually, such studies are lengthy and expensive and rely on assistance from the companies and other non–academic "users", but such studies which may demonstrate Economic Value Added (EVA) and job creation within a region or country can be powerful. They should be undertaken on an occasional basis.

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	Productivity growth, turnover growth, export growth, and the increase in exports created by new inventions, net increase of jobs, and employment growth
Direct Outcomes	Recruitment of graduates/Graduate employment; Science citation index; Success of spin-off companies; Jobs created in spinoffs; Aggregate investment in spinoffs; Products on market; Culture change in PRO (Percentage of researchers engaged in KT and change over time; Net promoter score for engagement in KT; Prominence of KT in PRO strategy; % change in PRO funding for KT/KTO).
Engagement Activities (Inputs)	**Education**: • Curriculum co-design (e.g., employers involved in curricula design with HEIs), • Curriculum co-delivery (e.g., guest lectures), • Mobility of students (e.g., student internships/placements), • Dual education programmes (e.g., part academic, part practical), • Lifelong learning for people from business (e.g., executive education, industry training and professional courses), • Postdoctoral or doctoral positions offered within alliance / Graduate fellowships, Joint supervision **Research**: • Research collaboration agreements & research contracts with non–academic third parties — number, • Collaborative research (Where both the firm and the PRO participate in the design of the research project, contribute to its implementation and share the project outputs); Contract research (Where all research is performed by the PRO), % of Research collaboration agreements & research contracts which have led to IP license or assignment • Research collaboration agreements & research contracts with non–academic third parties — gross revenue to PRO (Detail by: Collaborative research, Contract research; Further breakdown: By companies, By other non–academic third parties, Direct funding from non–academic third party); Total funding (non–academic third party plus any co–funding e.g., from the EU, national government), • Publications; joint publications, • Secondment of researchers, • Consultancy agreements with non–academic third parties— number (By business, By other non–academic third parties) • Consultancy agreements with non–academic third parties— gross revenue to PRO (By business, By other non–academic third parties)

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	• Mobility of staff (i.e., temporary mobility of academics to business and of businesspeople to HEIs) Valorisation: • Invention disclosures (IDF)— number; % of IDFs resulting in license or assignment • Licences & assignments— number; Licence by type— number; MTA; Patent, copyright, trademark & know–how Software; IP Protection by type (Patent filings, Copyright registration, Trademark registration, Plant variety); By type of transaction (Licence, Assignment); % of patents licenced or assigned; License revenues • Licences & assignments — gross revenue to PRO; Licence by type — gross revenue to PRO (MTA, Patent, copyright, trademark & know–how Software); By type of transaction (Licence, Assignment) • Spinoffs— number; Spinoffs— commercial value; Spinoffs Stage — number: Spinoffs Formed, pre–investment; Spinoffs Receiving first investment; Spin–offs Maturity— companies in existence 5+ years Acquired; Spinoffs— gross revenue to PRO from equity sale
Influencing Factors	**Facilitators:** Organisational ecosystem approach; Open, adaptive and collaborative culture; Flexible administrative structure and policies **Researchers' capabilities**: Number of publications, citations, projects, reports or patents done in the past; Technical knowledge resources (Damanpour, 1991); Sophisticated knowledge management (Williams, 2011); Thorough understanding of existing infrastructure, skills, relationships and practices [knowing partnership opportunities, funding, etc.] (Williams, 2011); Networks (Mitton et al., 2007); Leaders or innovation champions (Fitzgerald, Ferlie, Wood, & Hawkins, 2002); Opinion leader or champion (Mitton et al., 2007); Technological skills. **Researchers' motivation**: Third mission part of job contract; Number of previous industry contracts in the department/university; Number of strategies concerning industry-university cooperation in the department/university; Number of resources dedicated to support cooperation in department/university; Perception of researcher about the benefits from the cooperation with industry; Monetary incentives for collaboration
Supporting Mechanisms	**Policy:** Existence of PRO KT & IP Policies; PRO KT Strategy; Collaboration-attuned hiring and career advancement Policies

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	Strategic: Strategic orientation towards meaningful social impact; Sufficient time to make decisions; Share governance (e.g., participation of academics on business boards and businesspeople participation in HEI board) **Structural:** Flexible Administrative Structure and Policies; Existence of PRO KT & IP Office and competent staff **Communication networks:** Alumni offices and networks; Collaborative Networked Organisations (CNOs), Virtual Breeding Environments (VBEs); Virtual organisations (VO); Boundary spanning functions; Science parks; Business incubators; Career fairs; Interviews; Staff exchanges; Workshops/seminars; Meetings; Guest speaking/lectures. **Operational:** R&D expenditure; research expenditure in PRO; Direct funding via the PRO for KT *e.g.,* to KTO; Indirect funding via the PRO for KT *e.g.* proof of concept; Existence of KTO; Age of KTO; Total annual budget for KTO; IP & Patent budget; Annual budget; Number of FTE in KTO; Number of RTTP qualified FTE; Shared resources (e.g. infrastructure, personnel); Support contract; university's governmental income; non-government donations, Research grants and contracts; Software grants; Hardware grants; Industry sponsorship of university research; Scholarships; Students' consultants; Undergraduate research program support; Industry affiliates/advisory program; Students organisations' sponsorship; Executive sponsorship; Number of researchers.

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Indicators from Benchmarking Analysis

During the benchmarking study carried out as part of the research phase of the Engagement Readiness Monitor project (the full study can be seen in Annex III), several frameworks and tools with existing indicators were reviewed. As the frameworks/tools reviewed are related in some way to engagement readiness, the indicators they use can be helpful for the development of an engagement readiness framework and HEI self-assessment tool.

The Accreditation Council for Entrepreneurial and Engaged Universities (ACEEU)

The ACEEU gives accreditation to entrepreneurial and engaged universities. As engagement readiness is an antecedent of engagement in organisations, the indicators developed by the ACEEU can potentially assist in the development of an engagement readiness framework. These indicators are listed in Table 5 below.

Table 5: Standards of the Accreditation Council for Entrepreneurial and Engaged Universities (ACEEU)

Dimension	Indicators
Orientation and Strategy	Institutional Commitment
	Shared Goals
	Financial Planning
People and Organisational Capacity	Leadership
	Staff profile
	Incentives and rewards
Drivers and Enablers	Culture
	Internal Support Structures
	Service Alignment
Education, Research and Third Mission Activities	Education
	Research
	Third Mission Activities
Innovation and impact	Continuous improvement
	Influence within the Ecosystem
	Impact

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HEInnovate

HEInnovate is a self-assessment tool developed by the Organisation for Economic Co-operation and Development (OECD) to support policy makers and HEI leaders to enhance the entrepreneurial and innovative potential of higher education institutions. It is organised around eight dimensions dealing with innovation in HEIs. These dimensions and their associated indicators are in Table 6 below.

Table 6: HEInnovate - The eight dimensions

Dimension	Indicators
Leadership and Governance	1. Entrepreneurship is a major part of the HEI's strategy.
	2. There is commitment at a high level to implementing the entrepreneurial agenda.
	3. There is a model in place for coordinating and integrating entrepreneurial activities across the HEI.
	4. The HEI encourages and supports faculties and units to act entrepreneurially.
	5. The HEI is a driving force for entrepreneurship and innovation in regional, social and community development.
Organisational Capacity: Funding, People and Incentives	1. Entrepreneurial objectives are supported by a wide range of sustainable funding and investment sources.
	2. The HEI has the capacity and culture to build new relationships and synergies across the institution.
	3. The HEI is open to engaging and recruiting individuals with entrepreneurial attitudes, behaviour and experience.
	4. The HEI invests in staff development to support its entrepreneurial agenda.
	5.Incentives and rewards are given to staff who actively support the entrepreneurial agenda.
Entrepreneurial Teaching and Learning	1. The HEI provides diverse formal learning opportunities to develop entrepreneurial mindsets and skills.
	2. The HEI provides diverse informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills.
	3. The HEI validates entrepreneurial learning outcomes which drives the design and execution of the entrepreneurial curriculum.
	4. The HEI co-designs and delivers the curriculum with external stakeholders.
	5. Results of entrepreneurship research are integrated into the entrepreneurial education offer.
	1. The HEI increases awareness of the value of entrepreneurship and stimulates the entrepreneurial intentions of students, graduates and staff to start-up a business or venture.

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Preparing and Supporting Entrepreneurs	2. The HEI supports its students, graduates and staff to move from idea generation to business creation.
	3. Training is offered to assist students, graduates and staff in starting, running and growing a business.
	4. Mentoring and other forms of personal development are offered by experienced individuals from academia or industry.
	5. The HEI facilitates access to financing for its entrepreneurs. 6. The HEI offers or facilitates access to business incubation.
	6. The HEI increases awareness of the value of entrepreneurship and stimulates the entrepreneurial intentions of students, graduates and staff to start-up a business or venture.
Digital Transformation and Capability	1. The HEI fosters a digital culture and implements and monitors a digital strategy supporting innovation and entrepreneurship.
	2. The HEI invests in, manages and continuously improves a fit-for- purpose digital infrastructure.
	3. The HEI actively supports the use of digital technologies to enhance quality and equity in teaching, learning and assessment.
	4. The HEI actively uses open educational resources, open science and open data practices to improve the performance of the institution and increase its impact on its ecosystem.
	5. The HEI makes full use of its digital capacity to promote sustainable and inclusive innovation and entrepreneurship.
	6. The HEI fosters a digital culture and implements and monitors a digital strategy supporting innovation and entrepreneurship.
Knowledge Exchange and Collaboration	1. The HEI is committed to collaboration and knowledge exchange with industry, the public sector and society.
	2. The HEI demonstrates active involvement in partnerships and relationships with a wide range of stakeholders.
	3. The HEI has strong links with incubators, science parks and other external initiatives.
	4. The HEI provides opportunities for staff and students to take part in innovative activities with business / the external environment.
	5. The HEI integrates research, education and industry (wider community) activities to exploit new knowledge.
The Internationalised Institution	1. Internationalisation is an integral part of the HEI's entrepreneurial agenda.
	2. The HEI explicitly supports the international mobility of its staff and students.
	3. The HEI seeks and attracts international and entrepreneurial staff.
	4. International perspectives are reflected in the HEI's approach to teaching.
	5. The international dimension is reflected in the HEI's approach to research

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Measuring Impact	1. The HEI regularly assesses the impact of its entrepreneurial agenda.
	2. The HEI regularly assesses how its personnel and resources support its entrepreneurial agenda.
	3. The HEI regularly assesses entrepreneurial teaching and learning across the institution.
	4. The HEI regularly assesses the impact of start-up support. 5. The HEI regularly assesses knowledge exchange and collaboration.
	6. The HEI regularly assesses the institution's international activities in relation to its entrepreneurial agenda.

The TEFCE Framework

A trend in fostering development of entrepreneurial universities and engaged universities has emerged as various proposals and measurements towards this objective are proposed. The TEFCE Toolbox for Community Engagement in Higher Education is a new framework that stimulates universities and their communities to jointly carry out a process to examine their community engagement in a robust and comprehensive way. *The TEFCE Toolbox: An Institutional Self-Reaction Framework for Community Engagement in Higher Education*[6] defines seven thematic dimensions of community engagement in higher education.

Table 7: The TEFCE Framework

Dimension	Indicators
I. Teaching and learning	I.1. The university has study programmes or courses to respond to societal needs that are specific to the university's context and its external communities. I.2. The university has study programmes or courses that include a community-based learning component for students. I.3. The university facilitates the participation of community representatives in the teaching and learning process (in a curricular or extra-curricular context). I.4. The university has study programmes or courses that are created, reviewed or evaluated in consultation/cooperation with the university's external communities.
II. Research	II.1. The university carries out research focusing on the societal needs of the university's external communities. II.2. The university carries out collaborative/participatory research in cooperation with the university's external communities.

[6] Farnell, T., Benneworth, P., Ćulum Ilić, B., Seeber, M., Šćukanec Schmidt. N. (2020). TEFCE Toolbox: An Institutional Self-Re ection Framework for Community Engagement in Higher Education. Zagreb: Institute for the Development of Education. https://assets.website-files.com/5b913aa0b07f229bed84209d/5fc001621c2973222bea0acf_TEFCE_Toolbox.pdf

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III. Service and knowledge exchange	III.1. University staff contribute to debates and initiatives that address societal needs of the university's external communities. III.2. University staff provide their knowledge to support and/or build the capacity of the university's external communities. III.3. University staff community-engagement activities have resulted in demonstrable benefits for the university's external communities.
IV. Students	IV.1. Students deliver community-engagement activities independently through student organisations or initiatives. IV.2. The university facilitates and supports partnerships between students and external communities.
V. Management (partnerships and openness)	V.1. The university has a track record of mutually beneficial partnerships with its external communities. V.2. The university makes learning and research resources accessible to its external communities. V.3. The university has facilities and services that are jointly managed and/or accessible to its external communities.
VI. Management (policies and support structures)	VI.1. The university provides support and/or incentives for community-engagement achievements by its staff, students and external communities. VI.2. The university has a support structure (e.g., committee, office or staff) for embedding and coordinating community-engagement activities at the university level. VI.3. The university has staff-development policies (e.g., recruitment, tenure, promotion) that include community engagement as a criterion. VI.4. The university has a mission, strategy, leadership and (funding) instruments that specifically promote community engagement.
VII. Supportive peers	VII.1. The university has prominent academic staff members that have a strong track-record of community engagement and that advocate for its further advancement. VII.2. The university's academic staff are acceptive of the idea of university-community engagement and of the value and rigour of community-engaged teaching and research.

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Annex II: List of Interviewees by Country

Name	HEI/Company	Country
Calum Drummond	RMIT University	Australia
Cécile Cavalade	ASTP	Belgium
Lidia Borrell-Damián	Science Europe	Belgium
Ishwar K. Puri and Arleen Dosen	McMaster University	Canada
Smiljka Vikić-Topić	University of Zagreb	Croatia
Eva Janouškovcová	Masaryk University in Brno/Transfera.cz	Czechia
Jaroslav Menčík	MAVERICKS	Czechia
Pavel Csank	Moravian-Silesian Innovation Center	Czechia
Pavel Kordík	Czech Technical University	Czechia
Věra Šťastná	Charles University	Czechia
Antero Kivelä	Jyväskylä University of Applied Sciences	Finland
Ari-Pekka Kainu	Satakunta University of Applied Sciences	Finland
Jaana Seppälä	Kasvu Open Ltd.	Finland
Mika Karjalainen	Jyväskylä University of Applied Sciences	Finland
Mikko Korpela	Crazy Town Consulting	Finland
Minna Lappalainen	Jyväskylä University of Applied Sciences	Finland
Pasi Teräväinen	Jyväskylä University of Applied Sciences	Finland
Pekka Jääskö	University of Oulu	Finland
Pia Dolivo	University of Helsinki	Finland
Tapani Laitinen	Witas	Finland
Antoine Lepretre and Aymeric Penven	HEC Incubator	France
Christophe Haunold	University of Luxembourg	France
Raffaele Trapasso	OECD	France
Jochen Barth	Fraunhofer-Gesellschaft	Germany
Natascha Eckert	Siemens	Germany
Irene Sheridan	Munster Technological University	Ireland
Ruaidhri Neavyn	Irish Higher Education Authority	Ireland

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Christian Lechner	LUISS	Italy
Giuseppe Conti	Netval	Italy
Shiva Loccisano	Politecnico di Torino	Italy
Silvia Vecchi	University of Bologna	Italy
Maik van der Linden	ASML	Netherlands
Jarmo Eskelinen	University of Edinburgh	Scotland
Alexandra Gačevičová	Slovak Investment and Trade Development Agency	Slovakia
Vladimir Sucha	European Commission/JRC	Slovakia
Marina Ranga	European Commission	Spain
Pablo D'Este	INGENIO	Spain
Victoria Galan-Muros	Innovative Futures Institute	Spain
Fredrik Hörstedt	Chalmers University of Technology	Sweden
Jan Axelsson	Linköping University	Sweden
Magnus Klofsten	University of Linköping	Sweden
Tuula Teeri	The Royal Swedish Academy of Engineering Sciences (IVA)	Sweden
Anonym	Unknown	UK
Martin Davies	UCL Innovation & Enterprise	UK
Michael Hill King	HUAWEI	UK
Frederick Wehrle	University of California, Berkeley	USA
Keith Marmer	University of Utah	USA
Leah Burton	North Carolina State University	USA
Ted Townsend	University of Memphis	USA
Tony Denhart	GE	USA

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Annex III: Full Benchmarking Analysis

Purpose of the Benchmarking Analysis

Existing tools will provide the Engagement Readiness Monitor project with a foundation from which a self-assessment tool for HEIs can be developed. This annex details six tools for measuring engagement readiness and one good-practice case study from a university developing their own tool for engagement.

General Tools

The Knowledge Transfer Metrics tool aims to standardise metrics for knowledge transfer (KT) within the European Union, providing a general basis for the establishment of further assessment tools that will be compatible and comparable across regions. The report provides 10 recommendations towards the standardisation and use of a common set of European KT indicators and data reporting, with the goal of a simpler assessment of KT while considering the complexity of KT.

The 10 recommendations are as follows:

1. Scope of KT Indicators
2. Core Indicators Set
3. Evidence-based case studies
4. Tracking the development status of KT
5. Common Definitions
6. Implementation Expert Group
7. EU-wide Centralised Collecting and Reporting
8. Integrated Database
9. Involvement of Government Bodies
10. EC Cross Programmes Consistency

Across all the recommendations is the emphasis on developing consistency and uniformity across KT outlets. This is accomplished while also expanding the range of indicators beyond patenting, licensing volume, spin-offs, and commercial value to include the likes of teaching, publications, and networking among others.

Because of the wide range of indicators, it is recommended that these indicators be categorised as inputs, which can be further categorised as internal context and environment, and outputs, which can be further categorised as activity and impact and given supplementary indicators. Internal context measures the elements required for a PRO to develop an environment conducive to KT with supplementary indicators showing how operations may be furthered. Environmental indicators assess the external environment, such as funding opportunities or access to facilities that may affect KT, with the supplementary indicators looking at national or regional environmental dimensions and regulatory/ legal frameworks. The activity indicators are more traditional indicators, addressing volume of activity and revenues from KT, with supplementary indicators going into more detail on the core indicators. Impact indicators are limited to societal and economic impacts. All data collected must be backed up by case studies backed by evidence to show the benefits of all channels.

Harmonising the indicators allows KT to be tracked and understood, allowing for better analysis and planning for operations and strategic development. One form of harmonisation is through the definitions of indicators, which is a focus point of this report. Standard definitions in line with international longitudinal surveys were used to define the core indicators.

One Implementation Expert Group has already been convened to determine the barriers for adopting common indicators (the most common being

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reluctance to adopt in a system with existing indicators to definition and calendar inconsistencies), but a further Expert Group is needed to work out consensus for the indicators and mechanisms with stakeholders. Further centralisation can come with data collection and reporting across Europe with a standard set by the European Commission, which has the capabilities and KT credibility to handle a task of this magnitude. This can be further supported by a central database for reporting to allow analysis, data cleansing and longitudinal reporting, and the Commission itself dedicating time to ensure that it is developing consistent internal KT definitions and programs. KT can be further supported by government encouragement.

An assessment using the indicators could be undertaken at the level of an individual PRO or amongst a group of PROs. The concept of grouping is a useful one as it permits a more meaningful comparison of PROs that, for example, may be of a similar size and may have a similarly mature KTO. Using the input and output indicators will enable a PRO to get a sense of the effects of external factors or internal operational factors. To do this, however, requires the ability to access the data or data comparisons and this is where a centralised repository has an important role to play, necessitating the adoption of harmonised indicators and definitions.

Measurement Tools

The remaining tools are built to assess institutes and their personnel. Table 5 shows a quick comparison of the tools, followed by an in-depth analysis of each of the tools

Table 5: Overview of Benchmarked Frameworks and Tools

Tool	Level of Assessment	Measurement Method	Length	Format	Process	Visualisation of Results
MTEE	Individual	Likert Scale 1-5 based on agreement with statements	10-15 minutes	Online, only in Finnish	User answers 72 questions on a scale of 1-5	Feedback received in an email with written feedback based on the self-assessment
ACEEU	Organisational	Impartial review of an institution's alignment to ACEEU Standards based on reports, observations and interviews	10 months or more	Online/ in person	Self-evaluation → external group evaluation → review committee	Several reports
HEInnovate	Individual and Organisational	Rating from 1-5 based on whether the user agrees or disagrees with a statement	20 minutes (approximately)	Online	User reviews 8 sections with several statements and selects the most appropriate rating from 1-5	Bar charts on the HEInnovate website
OECD	Organisational	Likert scale 1-10 based on agreement with statements	1-2 weeks (Estimated)	PDF format online	Institution staff self-assess themselves	Accessed via the institution's personal OECD account
TEFCE	Individual and Organisational	Scored 1-5 based on levels of engagement	6 months (estimated)	Physical materials	Quick scan → evidence collection →Mapping report → Participative dialogue →Institutional report	Viewed in templates provided by TEFCE

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The Measurement Tool for Entrepreneurship Education (MTEE) establishes several definitions of entrepreneurship that are useful for standardising a general view of what it means to be entrepreneurial. Entrepreneurship is defined in Seikkula-Leino, J. et al. (2010) in five ways:

1. Bearing uncertainty: the entrepreneur attempts to find a balance between supply and demand,
2. Making new combinations and innovations- developing new products, methods, or markets,
3. Exploring Opportunities,
4. The emergence and creation of Organisations,
5. Community and Social Entrepreneurship

These definitions serve as the basis for the tool used to assess entrepreneurial education, attempting to reduce the uncertainty over the exact definition of entrepreneurship as much as possible.

The MTEE is the first of three tools that are designed for individual level assessment. Its construction is based on various studies, and it is designed to measure the respondent's entrepreneurship promotion activities in HEIs. Altogether 9 Finnish Universities were involved with the co-creation project in which the tool was constructed for the teaching, development and administration staff. Later, respondents from 21 Finnish Universities were included in the data for the research in couple of scientific articles which aimed to validate factors demonstrating the linkage between teaching methods and managerial approach.
The MTEE tool is publicly available in Finnish only, asking respondents what they do when they are teaching and/or promoting entrepreneurship. Starting with background questions, educators are asked about 17 topics regarding their personal and in class entrepreneurial experiences, including work experience in an industry and as an entrepreneur, entrepreneurs visiting the class, students visiting the companies, thesis work, and research, among others. The questionnaire has 72 questions in total. There are six main topics or categories with 7-9 subcategories. The scale for each of the items is five-scale Likert, where 1 equals "I totally disagree" and 5 equals "I totally agree." The content of the questionnaire is divided up into the following categories, pedagogical choices Entrepreneurial patterns, networks and collaboration, learning environment and society, and entrepreneurial characteristics.

After completing the questionnaire, the user receives written standardised feedback via email which is then followed up with personal feedback about their teaching and entrepreneurship promotion activities. Their score is based on their mean of each topic and feedback is provided on four levels, advancing – middle way – good way – excellent. The teacher can compare their mean scores to others' means, as well as their own previous self-assessment level.

The Accreditation Council for Entrepreneurial and Engaged Universities (ACEEU) tool targets HEIs to provide a standard for and acknowledge accomplishment in entrepreneurship and engagement. An ACEEU accreditation provides institutions recognition for their work in entrepreneurship and engagement. This tool was designed for universities because no other mechanism exists to provide this recognition, thus allowing universities to showcase their achievements in engagement and entrepreneurship. The standards that are set by the ACEEU Accreditation Committee help promote a baseline standard for entrepreneurship and engagement, promoting innovation and collaboration to meet and exceed standards. Candidate universities must submit an Eligibility Application to see if they at least meet the baseline standards for accreditation, which will determine whether the process towards accreditation will continue.

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The accreditation process is a four-phase process consisting of Eligibility Application, Self-Evaluation, Peer Review and Final Application. These four phase are further broken down into 20 steps that must be followed to be awarded accreditation. The results are visualised through several reports that are produced throughout the process, one after each phase, and results are seen through the decision of the Accreditation Committee, either as accreditation without conditions, Accreditation with conditions or denial of accreditation.

The minimum time needed for accreditation as advertised by ACEEU is around 10 months, a rough timeline being Application around 6-8 weeks Self Evaluation around 17 weeks, the peer review about 12-13 weeks and the final evaluation around 8 weeks for a Total of around 10 months. The process usually takes 12-16 months, however. The estimated staff efforts total around 240-440 hours depending on experience with accreditation procedure, availability of documents and pro-activeness. The length of time and the necessary commitment from institution staff is a barrier, as is the cost, which for full accreditation is 12.500 euros.

The eligibility application determines if the applicant university falls within the scope of the standards and will determine if the process moves forward. The self-evaluation measures the university's activities in entrepreneurship and engagement. This is followed by a visit by a three-person Peer Review Team, who visit the university to meet with faculty and staff that lead development, implementation and monitoring of the entrepreneurial and engagement strategies. The process is finished off by a review from the Accreditation Committee and Accreditation Council, who review the file to determine that procedure was followed and all ACEEU standards are met.

There are both online and in person steps to secure accreditation, however most of the work is physically in hand or in person. The online system supports the applicant university throughout the process. Once logged in, the website allows the university to track the status of their application, access documents needed for the process and upload any required documents or supporting materials during the accreditation process.

Universities are required to be members of ACEEU to initiate the process and maintain their accreditation. This membership comes with exclusive benefits for both applicants and accredited universities, such as access to networks, tools for further development, free and reduced prices to events and a guidebook to assist the university in marketing its accreditation. ACEEU has accredited five universities thus far.

The OECD Guiding Framework for Entrepreneurial Universities provides entrepreneurial universities a mechanism for self-reflection and identify their strengths and weaknesses and develop a strategy to strengthen themselves. This framework gives universities a valuable tool, based on characteristics of existing entrepreneurial universities, to give them inspiration to learn and inspire their direction. Entrepreneurial universities have no single definition, but carry inventive, creative and practical approaches to global challenges. Technological revolutions, new economic knowledge and conditions and funding sources have drastically redefined the roles of universities in modern society. Entrepreneurial Universities, epitomised by practices of knowledge exchange, research, teaching and learning, governance and external relations have the capabilities to meet these new challenges. Because an entrepreneurial university doesn’t have one precise definition, this Framework attempts to cover all potential definitions of entrepreneurial universities

Seven areas of concern encompass the definition of an Entrepreneurial University. These factors are leadership and governance, organisational capacity, people and incentives, entrepreneurship development in teaching and learning, pathways for entrepreneurs, university-business/ external Relationships for Knowledge Exchange, the Entrepreneurial University as an international institution and measuring the impact of the entrepreneurial university. Each area of concern is examined via given statements regarding

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institutional policy and strategy. Due to the various definitions of an Entrepreneurial University, it is unable to be comprehensive, and instead aims to cover as many variations of entrepreneurial universities as possible

The assessment is available online to anyone in PDF format and information from the assessment is stored on the user's personal OECD account. The Guiding Framework provides case materials taken from literature used to develop the assessment and other sources to inspire strategic development after determining strengths and weaknesses. These materials cover many initiatives and categories and provide references or contacts to further development.

HEInnovate is a second self-assessment tool developed by the OECD to support policy makers and HEI leader to enhance the entrepreneurial and innovative potential of higher education institutions. As a part of HEInnovate, the OECD has published eight country reviews examining how policy can support and incentivise HEIs in promoting entrepreneurship and innovation.

It is a free tool for Higher Education Institutions (HEIs) who wish to explore their innovative potential. This tool is designed for HEIs who are interested in assessing themselves against several statements related to the entrepreneurial and innovative nature of their higher education environment. It allows HEIs to assess their institution in eight different areas, with each 5-6 statements related to its entrepreneurial activities, including leadership, staffing and links with business. Extensive training and support materials, including practical case studies, are available to support workshops and further development within the institutions.
The tool is intended to be used by HEIs in all Member States that want to assess the entrepreneurial and innovative nature of their higher education environment with the purpose of helping HEIs assess their current situation and identify potential areas for action. The tool can be used both by individuals and groups. The group function is a way for HEIs to open the discussion within an HEI. These groups can be formed by individuals from a single or multiple institutions and could be constituted of all different types of stakeholders (either internal or external). To use the tool, the user must create an account online only. The tool is embedded in HEInnovate's own website and users can access it through their own profile. With this profile, users can create a new self-assessment, view and manage existing self-assessment, and create groups. This registration is free and open to the public. To start a group assessment, one user must become "group administrator" who can then invite anyone (via e-mail) to be a part of the group.

The tool covers eight different areas. These are Leadership and Governance, Organisational Capacity: Funding, People and Incentives, Entrepreneurial Teaching and Learning, Preparing and Supporting Entrepreneurs, Digital Transformation and Capability, Knowledge Exchange and Collaboration, the Internationalised Institution, and Measuring Impact.

After completing the self-assessment, which should take around 20 minutes, the user will be able to view the results in the online dashboard. A bar chart shows the average score in each of the eight areas. There is also a detailed overview, showing the users input for each of the statements in each category. The user can also compare one of its specific self-assessment against all its completed self-assessments in a bar chart. To compare evolution over time. After completing the self-assessment, the user will also be presented with recommended resources based on the areas with a lower score, that the user can then view and/or download. This is a selection of all the resources that can be found on the website, outside of the dashboard.
The user will find recommended resources based on the assessment which are grouped in the categories case studies, videos, and guidance notes. The website also provides a specific section with resources and can be accessed without logging into an account. Here the user (or website visitor) will find case studies, user stories, guidance notes for each statement, other documents (e.g., country reviews and other reports), digital resources, EPIC

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tool (Entrepreneurial Potential and Innovation Competences course assessment tool), entreTime (a pilot of a new entrepreneurship education service, focussed on upskilling educators). Additionally, HEInnovate also organises events, such as a webinar series which take place once every month and invited speakers in discussions and experience sharing around innovation and entrepreneurship in higher education. There is also a Workshop Training Manual available which is a guide for someone from the HEI or external institutions to deliver HEInnovate workshops, with the aim to introduce the participants to HEInnovate. During the workshop, the users (either from one or more HEIs) will have the chance to use the self-assessment tool and share their experiences and ambitions. HEInnovate has over 4000 registered users and 700 completed self-assessment forms across all the Member States.

The TEFCE Framework, an Institutional self-reflection framework for community engagement in Higher Education, "stimulates universities and their communities to jointly carry out a process to examine their community engagement in a robust and comprehensive way" (TEFCE, 2020). The Toolbox is a second tool that is available to both institutions and individuals. The TEFCE Toolbox operationalises the TEFCE Framework and serves as a reference tool for universities, their internal staff and community members to better understand the dimensions of community engagement, its level at a given institution as well as helps identify the gaps and develop the systems for improvements.

The Toolbox is the result of a co-creation process involving over 170 participants from eight countries over 18 months. The Toolbox prototype and method is based on a study Mapping and Critical Synthesis on the State-of-the-Art in Community Engagement in Higher Education (Benneworth et al., 2018). The final version of the TEFCE Toolbox is the result of collecting practices from over 120 practitioners and discussions between 50 experts and representatives of universities and their communities during piloting visits at four higher education institutions with diverse institutional profiles (University of Rijeka, Croatia; University of Twente, Netherlands; Technische Universität Dresden, Germany, and Technological University Dublin, Ireland). Furthermore, the TEFCE Toolbox was presented to and discussed with leading international stakeholders in higher education as well as with universities worldwide. The TEFCE Framework and the TEFCE Toolbox is a relatively new tool, being finalised in 20219-2020 by the consortium of partners led by Technische Universität Dresden and Institute for the Development of Education (Croatia). The framework is based on a robust review of existing tools for community engagement in higher education.

Universities with an interest in community engagement are the primary target group of the TEFCE Toolbox and are expected to be the 'early adopters' of the TEFCE Toolbox. This could include both universities that are already community-engaged universities or that are interested in becoming more community-engaged. The Framework can be also used on the faculty/departmental level. University staff and students that are already involved in community-engagement activities, along with their external partners, are the second target group of the TEFCE Toolbox. These includes the personnel interested and intrinsically motivated to provide their time to participate in the TEFCE Toolbox application by reflecting on their institution's community engagement practices.

The TEFCE Toolbox provides a mechanism and underlies the structure to assess and build upon 7 thematic dimensions of community engagement which are further divided into 2 to 4 sub-dimensions, thus resulting in a total of 20 sub-dimensions. Each dimension is assessed based on a level-based scale, with ascending levels from 1 to 5. Importantly, not only is the breadth of activities within the dimension is assessed, but the characteristics of community engagement for each dimension are identified based on 1—5 scale via Institutional community-engagement heatmap, measuring authenticity, societal needs, communities, spread, sustainability.

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The TEFCE Framework outlines an extensive process for the assessment of an institution's community engagement practices comprising 5 stages and employing 4 main tools:

- Quick scan assessing the dimensions of engagement present at the institution, analysing the best practices,
- Collecting evidence assessing the levels of the dimensions of engagement, outlining the best practices - Undertaking mapping report with the development of the institutional community development "heatmap",
- Organising a participative dialogue (open discussion among university management, students and the community on strength and areas of improvement) and undertaking a "slip dot" analysis,
- Finalising the process and producing the final report mapping the results, celebrating good practices and highlighting areas for further improvement

The framework is further divided into dimensions of engagement. The TEFCE Toolbox provides additional templates and step-by step guide to identifying the dimensions of engagement:

- Levels of engagement– see "Methods of assessment". The TEFCE Toolbox provides additional templates and step-by step guide to identifying the dimensions of engagement.
- Institutional community-engagement heatmap- colour-coded matrix to synthesise the findings for each dimension and to further determine the extent to which community engagement is multifaceted and embedded at the university. The TEFCE Toolkit provides additional templates and step-by step guide to identifying the dimensions of engagement.
- Slipdot analysis- customised 'SWOT' analysis to facilitate self-reflection discussions (via workshops or focus groups) between all stakeholders about the results of the implementation of the entire TEFCE Toolbox process. Its purpose is to validate the conclusions, acknowledge achievements and define areas for improvements.

The Toolbox outlines the process for self-assessment while simultaneously being a collection of physical tools to assist the self-assessment and is estimated to take 6 months to complete. The following resources are needed for the TEFCE assessment implementation: – one coordinator to organise the Toolbox's application, the evidence collection, meetings/ workshops and produce the resulting report (approx. 10-20 working days) – one researcher (or expert), needed to lead/ensure the quality of the mapping and analysis and the self-reflection process (approx. 5-10 days) – 7-10 working group members (including management, staff, students and community representatives) to participate at meetings/workshops (approx. 1-3 days) – 20-40 university and community members to contribute to collection of practices (approx. 1 hour per participant to complete form). The Framework is a finalised, ready to use set of physical materials not yet offered in an interactive digital format.

The Framework is easy to navigate as it comprises clearly defined dimensions, sub-dimensions and levels of university-community engagement. The Toolkit is highly user-friendly with clearly defined process to undertake the assessment, tools for each step of the assessment, and well-developed instructions for utilising each tool. The process for the analysis of the results is not as robust. While there is a template for the final reporting, the instruction and navigation of the analysis is not present. Furthermore, while the framework utilises 1-5 scale-based level model, in practice only 3 levels per sub-dimension are clearly defined, leaving uncertainty for the user to estimate the "in-between" levels. The dimensions are teaching and learning, research service and knowledge exchange, students, management (partnerships and openness), management (policies and support structures) and supportive peers. The TEFCE project consortium organises workshops and webinars to educate others on the use of the TEFCE framework and TEFCE Toolbox.

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Annex IV: Project Partner Information

University Industry Innovation Network (Amsterdam, NL) – University-Industry Innovation Network (UIIN) – is a European-wide network that focusses on establishing and improving relationships between education and industry. Through its projects, consulting services, professional education and research activities, UIIN is a leader in the development of engaged and entrepreneurial universities and has grown to be the preeminent organisation dedicated to the topic in Europe.

Jyväskylä University of Applied Sciences (Jyväskylä, FI) – JAMK University of Applied Sciences (JAMK) in Central Finland, is a HEI with expertise in 8 different fields of study. The social impact of JAMK stems from the interaction between education, RDI efforts and the business services. The guiding concept of JAMK's operations is "Turning expertise into competitiveness", which effectively means active engagement and cooperation of the university with external regional actors inluding local municiplaities and companies in the region (especially SMEs). Furthermore, through its award-winning Team Academy entrepreneurship programme, JAMK has taken a leading position in innovative entrepreneurship pedagogies.

Institut Mines Télécom Business School (Paris, FR) – Institut Mines-Télécom Business School (IMTBS) is one of 13 graduate schools in the Institut Mines-Telecom, one of France's major educational and research establishments. IMTBS has a strong connection to local networks of SMEs in both research and education playing a central role in developing both ground-breaking and applied research to support SME innovation and providing education for future employees. IMTBS is internationally renowned in its field with very close links to business and government.

University of Bologna (Bologna, IT) - The University of Bologna (UNIBO) was founded in 1088. It is one of the most renowned and prestigious universities across Europe. Through AlmaGoals, it is committed to the achievement of the UN SDGs 2030 Agenda. Since 2012 UNIBO is an active member of the European Institute of Innovation & Technology (EIT). Knowledge transfer to the third sector is ensured by Almacube, the UNIBO incubator. UNIBO is member of a number of National and International Networks related to UBC and knowledge transfer. UNIBO has been participating in hundreds of European research and academic cooperation projects.

Charles University (Prague, CZ) – Charles University (CUNI) is the biggest university in the Czech Republic and is a leading academic institution in the Central European region. CUNI is divided into 17 faculties, 4 academic institutes, 5 other workplaces for educational, scientific, research, development and other creative activities and provision of information services. Moreover, thanks to its independent unit, the Centre for Knowledge and Technology Transfer (CPPT), CUNI provides also with information and support services for knowledge and technology transfer. It supports the commercialization of products and services originating in the faculties and other organizational units and it cooperates with science and innovation-oriented SMEs, global companies as well as public sector and NGOs

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