



# Academic and Practitioner Proceedings of the 2024 UIIN Conference: Challenges and solutions for fostering entrepreneurial universities and collaborative innovation

2024 UIIN Conference, hosted on 27<sup>th</sup> – 29<sup>th</sup> May at Madrid, Spain

# **Academic and Practitioner Proceedings of the 2024 UIIN Conference series: Challenges and solutions for fostering entrepreneurial universities and collaborative innovation**

**2024 UIIN Conference**

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# **ACCESS - Appraise Curriculum Content for Entrepreneurship in Secondary Schools**

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## **Abstract**

Government and policy makers recognise the importance of Entrepreneurship Education (EntEd) with targeted goals at all levels of education. However, Fayolle et al., (2018) notes that policy makers, practitioners and educators consider that EntEd should be focused on new venture creation leading to the development of new jobs, ways to increase competitiveness within organisations, and having a central role in addressing global and social development needs. It also enables individuals to grow personally through the development of skills and leads to increased school engagement (Lackeus, 2015). In the Republic of Ireland, the National Skills Strategy 2025, recognises the wider value of EntEd through skills development such as creativity, risk taking, managing projects. However, it does indicate that at second level/post primary EntEd can be incorporated into Business Subjects or Transition Projects. Universities widely adopt and embed EntEd within programmes of study beyond those just within the business schools. Despite its growing importance, EntEd research is primarily focused at higher level education with limited studies conducted on post primary level (Fayolle, 2018; Hagg & Kurczewska, 2021).

Building on the successful schools' outreach activities delivered by DICE Academy: Design Innovation Creativity Enterprise at Atlantic Technological University (ATU) Donegal (ROI) and Ulster University Business School (Magee, UK), this research provides an understanding of the level of entrepreneurship education being taught at second level schools. The study outlines the variances and similarities across the Northwest border region between ROI and Northern Ireland (UK jurisdiction). The findings outline the challenges that post primary schools encounter when developing entrepreneurship education. The study involved 41 post primary schools providing education to the young people of the Northwest with 27 post primary schools in Donegal County Council (ROI) and 14 post primary schools in Derry and Strabane District Council (Northern Ireland, UK) areas.

This research has benefited the discipline of EntEd greatly. This particular region (the DCC and DCSDC region) is severely impacted by high levels of unemployment and social and economic deprivation. This research has not only benefited in developing an understanding of the level of which EntEd is taught in the region, it has also highlighted the challenges that educators in post primary education face when developing this area further. This is not unique to this border region. The challenges that emerged are universal across the island of Ireland and thus bringing the research in this discipline to a new level. The conference workshop highlighted that the research findings are now enabling a conversation around the challenges that post primary educators are encountering.

## **Keywords:**

Entrepreneurship education, curriculum development, ecosystem

## **1 Introduction**

Over the past 15 years, Entrepreneurship Education (EntED) has gained significant curricular attention worldwide (Fejes, et al, 2018). This has been evident in European countries with EntEd being implemented into education programmes (see e.g. European Commission, 2012). The European Union has carried out the majority of the research in the field of EntEd. This area of research was first presented in a 2004 EU Commission report that examined conditions in all EU member states and found evidence of good practices throughout the continent. However, how to apply this best practice throughout the entrepreneurial ecosystem proved to be a challenge (EU Commission, 2004, p. 9). Despite its growing importance, EntEd research is primarily focused on higher level education with limited studies conducted on post primary level (Fayolle, 2018; Hagg & Kurczewska, 2021).

The teaching and delivery of EntEd in post-primary schools remains ad hoc and sporadic. The majority of related research literature concentrates on the "what" and "how" of enterprise education; however, little is known about the optimal framework for its delivery or the specific elements that make a teacher, school, or community more likely to successfully integrate enterprise education into the curriculum (Mc Conway, 2020).

Post primary schools in Ireland have access to a wealth of resources to support EntEd. This is clear from the post-primary curriculum in Ireland, where it is covered as an explicit topic (DES, 2019a). Nonetheless, the curriculum's delivery presents a hurdle. EntEd is part of all business syllabi however, the priority for teachers is in preparing students for exams above efficiently imparting EntEd. Hence, enterprise knowledge, rather than skills, are developed in the classroom (McConway, 2020). Hence, it seems that the language and goals of the government and policy makers do not align with the reality that students encounter while learning in their schools (Kelly, 2009, p. 11). This is also evident in the post primary education system in Northern Ireland.

The aim of this research is to map and understand the level of entrepreneurship education (EntEd) being taught at post primary schools in the Northwest region on the Island of Ireland which for the purposes of this study is defined as Donegal County Council (DCC) (ROI) and Derry City & Strabane District Council (DCSDC) (Northern Ireland, UK) to establish baseline and variances across the region. All schools (27 in DCC and 14 in DCSDC) were invited to participate in the completion of initial questionnaires and follow up interviews with both school leaders (Principals and Vice Principals) and subject leaders (Department Heads of Business Studies).

There are 41 post primary schools providing education to the young people of the Northwest with 27 post primary schools in (DCC) and 14 post primary schools in

(DC&SDC), with 70% of these schools in DCC registered as disadvantaged schools and 64% of pupils in the schools in the DCSDC receiving Free Schools Meals. These indicators demonstrate the high level of social deprivation and economic hardship. Unlike any other region on the island, and due to the different education systems, the lack of opportunities for students across the North West to learn and work together is stark. This is a direct impact of the fact that 84% of Donegal's border adjoins Derry City and Strabane District Council, (Donegal ETB, 2018). The different education systems and lack of opportunities to work together have created challenges and barriers for the region to develop economically, to similar levels as other regions on the island of Ireland. Hence, the following research proposals were developed and investigated:

1. Is entrepreneurship education taught in second level schools in the North West City Region and at what levels?
2. Identify challenges, opportunities, and barriers that teachers experience teaching entrepreneurship.
3. Identify international best practice in the area of entrepreneurship education with focus on pedagogical and curriculum development.
4. Examine the entrepreneurship ecosystem for the region to identify synergies and linkages that can help engage and support teaching in schools.

The paper commences with a review of the literature, followed by the methodological approach and concludes with a discussion around key findings and recommendations.

## 2 Literature review

Entrepreneurship education has become a popular educational stream with a body of research (Abdelkarim, 2021; Lin et al., 2023; Yang, 2021) espousing its value related to, economic development (Ayodotun et al., 2021; Ndofirepi, 2020), individual skills and competencies development (Jones et al., 2019; Oosterbeek et al., 2010), intrapreneurship (Rahman et al., 2022) and social justice (Dodd et al., 2022). It is regarded as essential to improving all citizens' growth, employment, and social inclusion. As a result, it is being taught in more and more European national curricula (Eurydice, 2016). Accordingly, the data lends credence to the idea that societies with higher proportions of individuals who have an entrepreneurial propensity—characterized by their inventiveness and creativity—are more likely to advance socially and economically than those with lower proportions.

Many studies and Government policies give due consideration to the skills, competencies and attitude that are required to support future generations during the continuous unprecedented economic and social ambiguity (Harlan, 2016). Worldwide, EntEd is now a top educational objective for many nations when educating their youth (Boffo et al., 2020).

## **2.1 Entrepreneurship Education**

The philosophical underpinnings EntEd are deeply embedded in distinctions in the modern conception of entrepreneurship, such as the creation of organizations (Gartner, 1988), opportunity recognition and creation (Shane and Venkataraman, 2000), entrepreneurial action (Rasmussen and Sørheim, 2006), venture creation (Neck and Greene, 2014), value creation (Jones et al., 2020; Lackeus, 2018) and experience-based learning (Hagg and Kurczewska, 2019). Studies have sought to build systematic capacity by adding knowledge about the needs, contents, and methods of entrepreneurship education (Fiet, 2001a; Solomon, 2007; Sommarstrom et al., 2017). EntEd seeks to provide students with all the necessary skills, knowledge and motivation that can enable them to successfully carry out entrepreneurial activities. Based on theoretical studies by [Gibb \(1996, 2000, 2000a, 2005\)](#), entrepreneurship education concerns learning through, for and about entrepreneurship.

Previous research on EntEd has highlighted that there are two leading and distinctly different ways that EntEd is defined, a broad and a narrow definition (see e.g. Mahieu, 2006). According to the narrow definition, entrepreneurship education is equivalent to a particular course that prepares young people to launch their own businesses. Non-commercial re-use, distribution, and reproduction of the work are allowed in any format as long as the original work is properly cited and isn't changed, expanded upon, or altered in any way. The broader definition links entrepreneurial education to general abilities that are considered beneficial for lifelong preparation and that all students should acquire. With should differing definitions, teachers encounter difficulties when attempting to put curriculum knowledge into reality since there are varying opinions on what entrepreneurship education actually entails (Lefller, 2009) which might have consequences for the quality of teaching and learning (Wallin, 2014). This is particularly true when new curriculum content is introduced.

Entrepreneurship Education Management Theory (EEMT) is believed to aid directing of EntEd.

According to Bikse et al.(2014), is based on the following core principles:

- Entrepreneurship education is viewed as a complex set of measures which include the formation of a national strategic plan, the creation of entrepreneurship education content, teacher training, the development of teaching aids and organization of the contemporary learning process (Schultz, 1963);
- Entrepreneurship education elements are integrated at all levels of education and into all subjects; it is carried out according to the principle of consecutiveness and is available to every student; and

- Entrepreneurship education ensures the development of students' entrepreneurial competences. (p. 71)

EEMT positions entrepreneurship education as a matter of pedagogy, curriculum, and educational policy. (Hadley et al, 2023)

## **2.2 Benefit of Entrepreneurship Education**

According to Jackson et al. (2023), EntEd has the potential to benefit all students and is transformative in nature. It gives students the chance to develop a variety of entrepreneurial competencies, including confidence, self-efficacy, creativity, problem-solving, and lifelong learning habits. It can help students take advantage of opportunities (Kuratko, 2005) and ideas and turn them into something valuable for others (Lackeus, 2013). However, because it is typically only available through business classes/subjects, not many students can take use of this opportunity.

While a small percentage of secondary school-aged students consider entrepreneurship as a feasible career path (Geldhof et al., 2014), research has been conducted to better understand how schools may help young people acquire an entrepreneurial propensity, including the development of different entrepreneurial dispositions. Consistently, studies have outlined that young entrepreneurs tend to display the following characteristics.

- Tolerance for risk, drive for achievement, and sense of control locus of control (Ayodotun et al.,2021).
- Confidence, determination, innovativeness, courageous, and profit driven (Saygin, 2020);
- Self-regulation, creativity, and financial risk tolerance (Geldhof et al., 2014)

## **2.3 Challenges encountered by teachers**

Individual teachers and their pedagogies are the key factor concerned with the ability to achieve the goals of EntEd (Seikkula-Leion et al., 2013b). Even though the value and advantages of EntEd are frequently emphasised (Jones & Matlay, 2011), it is still seeking teachers' legitimacy (Fayolle et al., 2016; Foliard et al., 2018). Many believe that legitimacy of the curriculum on entrepreneurship education is weak, and that teachers have levelled several criticisms towards this curriculum and the process of its implementation. The question of legitimacy seems to be connected to the classification and framing of entrepreneurship. This resonates from a number of factors. First, there isn't enough time to devote to entrepreneurship education, and teachers don't know what it is exactly; Second, entrepreneurship education takes up time that could be spent on other crucial subject matter; Third, many believe that being an entrepreneur is a natural trait rather than something that can be learned (Fejes et al., 2018). A barrier to full

integration of all secondary curriculum subjects into EntEd remains the general perception that “entrepreneurship” is solely confined to business subjects. (Kirkley, 2017). There has been additional conjecture that a more limited interpretation of entrepreneurial conduct that concentrates only on business-related topics is easier for educators and learners to comprehend and embrace. However, there is a risk that this viewpoint will impede the integration of entrepreneurship into the school's culture and inhibit a greater display of entrepreneurial activity in other subject areas (Kirkley, 2017).

Additionally, it has been argued (Seikkula-Leino et al., 2010) that teachers have not found it easy to implement EntEd because of lack of understanding about the aim, goals, procedures, outcomes, and techniques of EntEd (Sommarström et al., 2017). The difficulties in defining EntEd's qualities for teaching and learning are made worse by the seeming lack of agreement on what EntEd is (Neck and Corbett, 2018). This also includes the absence of instructional approaches and underlying teaching paradigms. Therefore, it appears strange that context receives relatively little consideration in the development of entrepreneurial pedagogy and in the instruction of entrepreneurship (Neergaard and Christensen, 2017).

Entrepreneurship education relies on experience and storytelling, rather than structured proofs, formulas or equations. For this reason, entrepreneurship education needs a contextualized perspective. As the tools of how to be or become entrepreneurial are not complete, entrepreneurship education needs context which is scaffolded (Neergaard and Christensen, 2017). Accordingly, we need to pay attention to context-specific aspects, when we design entrepreneurship education. It can be argued that not only context does matter (Barab and Plucker, 2002), but also it is foundational to any learning which is intended to be situated in practice, as it weaves together a multitude of factors influencing the learning processes that takes place (Cope, 2005). This is particularly important as entrepreneurship education has seen a significant increase in the past decades (Kuratko, 2005; Nabi et al., 2017), with increasing attention on learning designed for gaining experience and preparing for practice (Lackéus et al., 2016). Teachers are finding it challenging to try and achieve this within the classroom.

If certain topics are not examinable, or can be avoided because they require greater support, then these activities will not be prioritised or even included by subject teachers (McConway, 2020). However, these educational opportunities and exercises could offer pupils the richest learning experiences. But they are frequently left out since they are thought to be a waste of time (Trant, 2007). Another issue is that these important choices, which affect how a student experiences enterprise in post-primary education, are made locally in each classroom and are not the consequence of any one national strategy (Mc Conway, 2020). As there is also no formal assessment process in place to evaluate whether students meet the requirements for developing entrepreneurial skills. With no formal assessment in place, there is now a greater need on teaching all children

the enterprising capabilities from an early age, today, to prepare them for action tomorrow and to help capitalise on the new ecosystem of entrepreneurs and innovators that the nation is building in order to remain competitive and enable young people to thrive in a dynamic and ever-changing world, given that these skills are not formally developed or assessed in schools. (Jackson et al, 2023).

In order for teachers to be supported in the development of EntEd and entrepreneurial culture and ecosystem must be developed. It is not possible to establish an entrepreneurial community or school just by implementing EE. The key to a successful cultural shift toward "Entrepreneurship" is collaboration, sharing, inclusion, and support from all relevant community stakeholder groups (Kirkley, 2017). Kirkley (2017) also found that broad community representation at Board level and enthusiastic principal support for entrepreneurship education leads to greater cultural integration within the school and significantly more positive commitment from the community. In many countries across Europe have implemented EntEd across the curriculum.

## **2.4 Enterprise Education within the Irish post-primary curriculum**

Enterprise/entrepreneurship was introduced to the Business Studies syllabus as part of a reformed junior level in 1989 and as part of a redeveloped business syllabus in the senior cycle in 1997. The teaching of enterprise at both levels is mostly focused on the skills and characteristics of an entrepreneur and how setting up a business benefits the local community (DES, 2016). It tends to be presented as a stand-alone topic and is normally a chapter in a business textbook for junior and senior cycle. The explicit syllabus requirements are knowledge based and the provision of evidence of the development of enterprise skills is not a mandatory element of the syllabi. Other opportunities for enterprise learning do exist within the senior cycle. It is an activity-based programme which was developed to provide students in senior cycle with transferable skills (DES, 1994). The programme is taught and delivered alongside the established Leaving Certificate through student participation in two modules. The aim was to develop cross curriculum links. However, this did not materialise. (DES, 2019c). Ireland's National Skills Strategy, 2025 outlines a commitment to the development of EntEd through the development of entrepreneurship guidelines for schools.

## **2.5 Entrepreneurship Education: Northern Ireland context**

Encouraging entrepreneurship has been and still is a significant concern in Northern Ireland. However, this region is lagging behind the rest of the United Kingdom. The Department for Economy has highlighted that they need to ensure that entrepreneurship is understood, nurtured and encouraged throughout our education system, from early primary school through to university. This is particularly true for Northern Ireland as they emerge from a post-Brexit Northern Ireland where a cohesive entrepreneurship

support system will be even more important (Dept. of the Economy, Entrepreneurship in Northern Ireland Context Paper November 2018).

### **3 Method**

The study adopted a mixed method approach. Initial stages involved desktop research to scope out the research topic and identify best practice exemplars. This research formed the basis of two questionnaires (quantitative method) – one for Principals and the other for Business Studies teachers. These questionnaires were administered across all post primary schools in Donegal County Council and Derry City Strabane District City. The questionnaires were pilot tested with a sample of principals and teachers before it was distributed to the wider schools group. The data from the questionnaires was analysed and this formed the basis of the questions for the second stage of data collection. This stage required the undertaking of focus groups and semi structured in-depth interviews (qualitative method). Interviews with both school leaders (Principals and Vice Principals) and subject leaders (Department Heads of Business Studies) were undertaken.

A cross-border workshop was facilitated to share best practice, discuss challenges delivering and importance of EntEd. This was a very positive step and resulted in a wide range of participants. In addition to the school staff involved in the study, several external agencies attended the workshop, including Government representatives.

### **4 Findings**

This research has benefited the discipline of EntEd greatly. This particular region (the DCC and DCSDC region) is severely impacted by high levels of unemployment and social and economic deprivation. This research has not only benefited in developing an understanding of the level of which EntEd is taught in the region, it has also highlighted the challenges that educators in post primary education face when developing this area further. This is not unique to this border region. The challenges that emerged are universal across the island of Ireland and thus bringing the research in this discipline to a new level. The conference workshop highlighted that the research findings are now enabling a conversation around the challenges that post primary educators are encountering.

This study supports Kirkley (2017) and found that one of the major barriers to developing EntEd is that it is confined to business study modules in both Ireland and Northern Ireland. This study furthers this discussion and the challenges that school staff encounter when teaching EntEd. The key challenges were deemed to be:

#### **4.1 Resource constraints: primarily finance and time**

There are challenges to delivering EntEd across the curriculum and within the school timetabling and exam restrictions and for teachers to discuss/share pedagogical approaches

In order to overcome this challenge, this research found that schools require more financial support to engage in innovative projects. For example, travel costs to be covered so can attend events and staff resourcing. The schools also outlined that access to external guest speakers/mentors through more involvement from the community entrepreneurial ecosystem would help overcome many challenges.

#### **4.2 Syllabi/Curriculum**

Schools from both the Republic of Ireland and Northern Ireland were unanimous in their agreement that the school curriculum are not enabling EntEd. They highlighted that the school curricula is too focused on grades and not on enabled students to develop the skills that EntEd brings. They further emphasised the need for the development of the entrepreneurial mindset. This could be brought into a number of other modules in the form of problem solving and creative thinking. As this is not examined, there is limited emphasis around this. The overly grade-focused

The region in which this study took place is unique in the fact that there is no ‘official border’. However, due to Brexit, Northern Ireland is no longer operating within the EU. Culturally, there is a lot of cross border activity and under the Shared Ireland agreement, there is a strong emphasis on building relationships within this region to ensure the peace and prosperity continues. The study found that there is a strong desire between the school community on both sides of this unique region. The study found that there is a lack of active and professional school links on a cross-border basis. Importantly, there is a strong desire by educators to develop cross border relationships. The educators suggested further external engagement and co-operation through the use of external agencies and resources to offer a more applied approach to EntEd would be very beneficial. Overall, this study has provided stakeholders (e.g. government departments, schools, business development agencies, enterprise groups) with a new baseline from which to develop linkages and synergies to schools and education partners, linking further into the local ecosystem in the Northwest Border region.

### **5 Recommendations**

The study proposed the following recommendations to enable the development of EntEd within post primary schools.

One of the key findings was the lack of engagement between industry and HEI in the region with post primary schools. There is a need to develop a Community of Practice. This Community of Practice would:

- Involve regional stakeholders, schools, teachers, businesses, and policy makers.
- Linking in with the Northwest entrepreneurial ecosystem.
- Encourage “good practice” exchange visits at a local and international level.

This study supports Neck and Corbett, (2018), Robinson et al., (2016) in the need for training for teachers to be able to implement EntEd effectively. Specifically, the study recommends:

- Design a programme of EntEd focused workshops knowledge, experience, and engagement.
- Link with universities to provide support.

This study supports Fejes et al., (2018) that there needs to be a review of the curriculum. The study recommends the following considerations should be made in relation to the curriculum:

- Reduce curriculum and make it more flexible.
- Consider EntEd being taught across other subjects outside of business.
- Expose pupils to entrepreneurial education benefits beyond enterprise development.

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# **A grounded theory study of the values, beliefs, and assumptions in the recognition of prior learning**

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## **Abstract**

Recognition of Prior Learning (RPL) is a key aspect of lifelong learning provision. It serves university-industry interaction by providing for the assessment of non-formal and informal learning for non-standard admissions, advanced entry, and for credits/grades (CEDEFOP, 2023). A lot of RPL research to date is policy driven with little focus on the organizational cultural context, and the philosophical positions within this, aspects of which inform the RPL assessment itself (Friesen, 2011; Hamer 2016; Travis, 2017). To address this knowledge gap, this research examines the underlying values, beliefs, and assumptions in the RPL in Higher Education in Ireland. Using a critical constructivist grounded theory and interpretive approach, the theoretical framework incorporates Schein's organizational culture model and Van-Kleef's RPL model. Through 82 semi-structured interviews with mentors, assessors and past RPL candidates, the study finds that honesty, fairness, openness, and equity are central values supporting RPL and lifelong learning. The study finds positive beliefs about RPL, and lifelong learning. However, these beliefs are underpinned by assumptions that academic standards must be maintained. In addition, other findings report on the challenges within RPL, and that support is required for its effective implementation. It concludes by emphasizing the need to foreground these values, beliefs, and assumptions in future RPL policy, practice, and research to enhance access to Higher Education.

## **Keywords**

Recognition of Prior Learning, Values, Beliefs, Assumptions.

## **1 Introduction**

Given the rapidly changing nature of society, our lifestyles and the workplace, it is understandable that the Recognition of Prior Learning (RPL) has become an integral part of lifelong learning provision in Higher Education (HE) (Bjursell, 2020; CEDEFOP, 2023; Duvekot, 2014). Recognition of Prior Learning or Validation, as it is termed in the *European Guidelines for Validating Non-formal and Informal Learning* is:

*A process of confirmation by an authorised body that an individual has acquired learning outcomes measured against a relevant standard and consists of the following four distinct phases: identification, documentation, assessment, and certification (CEDEFOP, 2023: 9).*

With RPL all learning, prior formal, non-formal and informal learning is valuable. In education RPL provides for non-standard entry to programmes, advanced entry, and

exemptions with credits/grades enabling individuals to gain formal qualifications, thereby enhancing employability and personal development. It plays a vital role in providing more flexible and accessible learning pathways, thus supporting those experiencing rapid changes in the workplace (Duvekot, 2014; EGFSN, 2011).

Despite significant progress in the field of RPL, a considerable portion of the research is driven by policy considerations, often overlooking the importance of organizational contexts and the philosophical underpinnings that play a crucial role in RPL assessments (Friesen, 2011; Harris *et al.*, 2011; Hamer, 2016). This study aims to fill this gap in existing literature by exploring the foundational values, beliefs, and assumptions associated with RPL in HE in Ireland. This paper will offer a summary of the research.

The literature section of this paper discusses the extant literature in relation to RPL and organizational culture, and the theoretical framework employed. The research methodology describes the critical constructivist grounded theory and interpretive approach used. The results and discussion section presents the main findings and gives due consideration to the implications for RPL policy and provision. The conclusion brings recommendations as they relate to policy, practice, and future research opportunities.

## 2 Key literature

The RPL process enables the identification, documentation, assessment, and certification of learning (CEDEFOP, 2023; NQAI, 2005). It plays a crucial role in lifelong learning by advancing the human capital agenda, which enhances employability, mobility, reskilling, and upskilling (EGFSN, 2011; Yang, 2015).

For employers, RPL brings economic benefits as it can guide recruitment and work organization (CEDEFOP, 2024; EGFSN, 2011). RPL is a driver of engagement between employers and HE and other training providers. RPL supports staff development strategies, through mapping existing and future staff skills and requirements (EGFSN, 2011). Employees who engage with RPL benefit personally, economically, and socially through the acknowledgement that RPL brings and the subsequent possibilities for progression or change in their career (CEDEFOP, 2024; Merriam and Bierma, 2014).

Despite RPL becoming more accessible over the last ten years, significant efforts are still required to fully implement the 2012 Council Recommendation on RPL in education (CEDEFOP, 2023). RPL can present obstacles for potential candidates and faculty in Higher Education institutions (HEIs), as noted by Hamer (2011, 2016) and Singh (2015, 2017). Van Kleef (2007) identified conceptual confusion in RPL as an issue that needed further research. Travers and Harris (2014: 236) focused on the importance of the RPL mentor's input to help the candidate find their strengths, position their evidence, and overcome barriers.

Sandberg and Andersson (2011: 774) reported candidates harboured a 'mystified view' of HE, and particularly the use of academic language. Sandberg and Andersson (2011), and subsequently Sandberg (2014), applied Habermas's theory of communicative action to examine this lack of understanding within the RPL process. Sandberg (2014) suggests that fostering communicative action within RPL can promote mutual understanding, thereby supporting the reproduction and maintenance of the lifeworld.

All parties involved in RPL serve distinct roles, whether in constructing and substantiating the RPL case or in its evaluation. According to Travers (2017: 216), the philosophical perspectives of those engaged in RPL can significantly affect its acceptance and implementation. Currently, there is a scarcity of research focusing on this critical aspect of RPL, highlighted by studies from Hamer (2016), and Travers (2017), Shalem and Steinberg (2006). Hamer (2016: 3) suggested that the "assessment philosophy" of the Assessor, which encompasses values, beliefs, and intentions, plays a significant role in moulding the RPL experience. Consequently, the combined effects of the organizational culture and the motivations of the RPL candidate shape the RPL process (Hamer 2016). Hamer's (2016) study is significant and indicates that understanding the underlying values, beliefs, and assumptions of those involved in RPL could facilitate a more comprehensive approach to its provision.

Values, beliefs, and assumptions may be intangible concepts, yet their influence permeates all aspects of life, playing a crucial role in shaping our cognitive framework (Allport *et al.*, 1970; Rokeach, 1975; Schein, 2004). Grasping the nature of values, beliefs, and assumptions, along with their operational dynamics and how they frame our interpretation of the world, is a deeply personal and thus complex task (Shealy, 2015: 5). Literature suggests that understanding the values of participants in RPL reveals the guiding principles behind their behaviours (Hamer, 2016; Mayton *et al.*, 1994; Rokeach, 1975). Beliefs serve as another avenue for RPL participants to highlight what they consider crucial in the process, acting as the foundation upon which values are built (Van Kleef, 2007; Rokeach, 1975; Leuty, 2013). While assumptions in RPL are more elusive because they are concealed, they express what individuals regard as true or assume without question (Schein, 2004). Collectively, these elements offer a comprehensive framework for analysing RPL from the standpoint of its key stakeholders. By making these elements explicit, it helps illuminate the philosophical underpinnings and guide future practices (Friesen, 2011; Hamer, 2016; Travers, 2017).

The practice of RPL is significantly impacted by organizational culture (Travers, 2017). Smircich (1985: 58) describes organizational culture as an inherent attribute, comprised of deeply embedded assumptions, commonly held beliefs, meanings, and values that collectively serve as a framework for action. Brown (1995) further characterizes it as a set of habitual behaviours that guide how individuals perceive and act in specific contexts.

Being part of a culture offers the benefit of automatic thinking and behaviour patterns (Lewin, 1952; Heider, 1958; Schein, 1990). Leaders shape the prevailing culture when their vision gains widespread acceptance through emotional, behavioural, and cognitive means (Schein, 1990, 2004; Durkin, 1981; Festinger, 1957). The importance of a culture's values, beliefs, and assumptions lies in their impact on the behaviour of individuals within that environment (Jordan *et al.*, 2008). While various frameworks for understanding organizational culture were reviewed, such as Hofstede (1997), Handy (1993), and Johnson and Scholes' (1999) cultural web, they were ultimately not suitable for this research. More relevant is Edgar Schein (2009) who defines culture as,

*A pattern of shared tacit assumptions that was learned by a group as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems* (Schein, 2009: 28).

Schein (2004) proposes that culture is manifest across three levels in an organization (Figure 1).

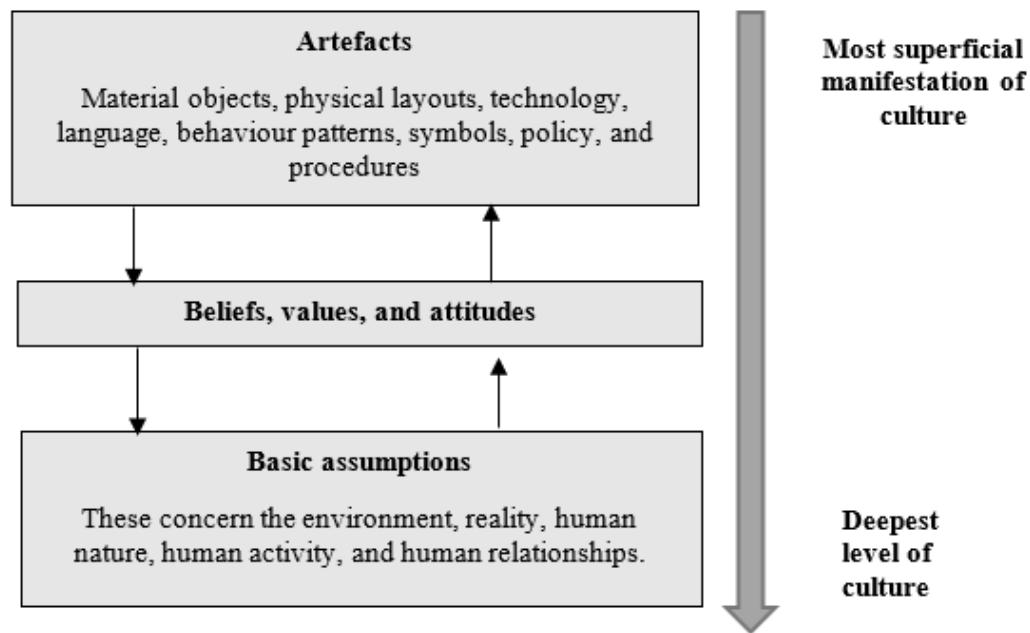


Fig. 1: Levels of culture and their interaction (Schein, 2004)

On the surface, the most noticeable aspects of culture include tangible elements like the physical arrangement of buildings or sites, dress codes, patterns of behaviour, and documents such as mission statements, annual reports, and policies (Brown, 1995; Schein, 1990, 2004). The second layer consists of visible yet deeper elements like

values, beliefs, and attitudes, which often evolve into implicit assumptions taken for granted within an organization (Schein, 1990, 2004). Brown (1995: 21) notes that values and beliefs form the cognitive foundation of an organization's culture, making it challenging to differentiate between the two, with attitudes acting as a bridge between values, beliefs, and emotions (Brown, 1995). The core of cultural understanding lies in basic assumptions, the third and most profound level, which are not readily observable (Schein, 2004). Schein's (2004) model illustrates a dynamic interplay among these three cultural levels, suggesting that values and beliefs together shape the underlying cultural assumptions within HEIs. Moreover, these elements, including artefacts, values, and beliefs, contribute to forming these assumptions, also referred to as "theories-in-use," which direct behaviour (Argyris and Schon, 1974; Argyris, 1976). These foundational assumptions typically go unchallenged unless prompted by change (Schein, 2004; Van Maanen, 1978), indicating that the deepest cultural layers in organizations and individuals usually remain constant, only undergoing scrutiny in the face of significant shifts or disruptions (Schein, 2004).

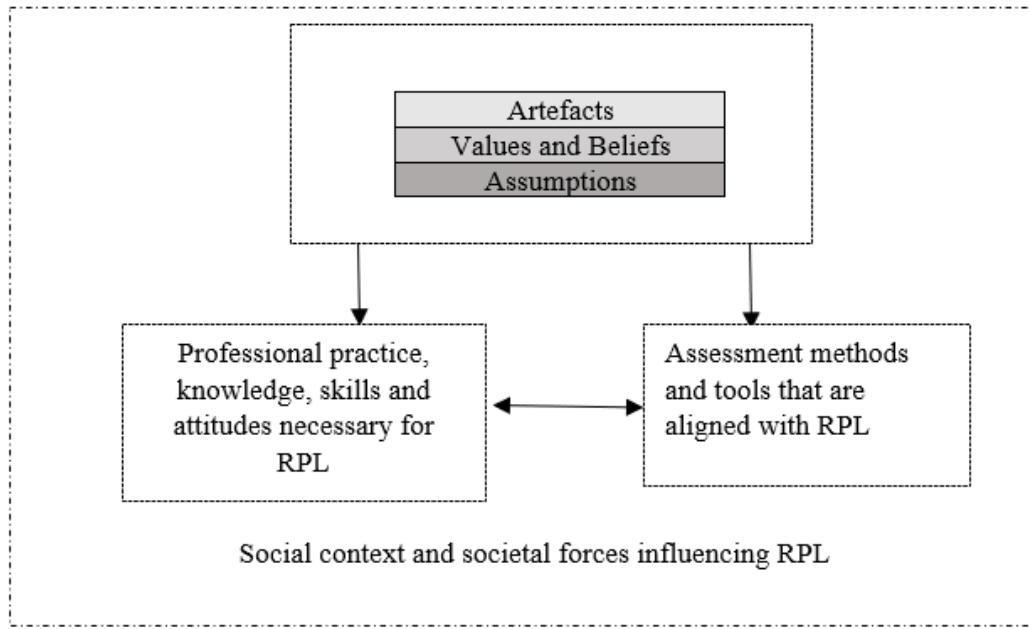
In the specific environment of HE, the cultural framework of a HEI significantly shapes the values, beliefs, and assumptions of its faculty and students, fostering distinct behaviours and attitudes (Billings and Terkla, 2014; Hamilton and Clandinin, 2011). Vision and mission statements at a high-level guide practice, which are then interpreted through the lens of both the organizational culture and individual preferences (Hamilton and Clandinin, 2011; Travers, 2017). Masland (1985) observed that universities with pronounced campus cultures tend to have faculty and staff who share cohesive beliefs and traditions, along with a collective commitment. On the other hand, in institutions where campus culture is weaker, there tends to be less consistency and shared commitment among the staff (Masland, 1985).

Van Kleef's (2007) work in Canada holds considerable significance for this study as it incorporates humanistic and critical theories into the framework of RPL. She developed a conceptual model for RPL that integrates both theoretical and practical components, placing a strong emphasis on values and beliefs at its foundation. Van Kleef outlined five interrelated perspectives within her RPL model:

- (1)The foundational values and beliefs that support RPL.
- (2)Theoretical views on adult learning that resonate with these foundational values.
- (3)The knowledge, skills, and attitudes of RPL practitioners.
- (4)Assessment techniques that reflect the underlying values.
- (5)The wider societal context in which RPL is situated.

Van Kleef (2007) believes that learning at a HE level does occur outside of academic institutions through life and work, that this learning can be assessed, and that it will not devalue the award, or impact on the student's success.

The theoretical framework for this study is designed by integrating Van Kleef's (2007) RPL model with Schein's (2004) theory on organizational culture, specifically focusing on the interplay of values, beliefs, and assumptions. Van Kleef's model, which merges adult learning theories with RPL practices and importantly emphasizes values and beliefs, serves as a robust foundation. Schein's (2004) contribution is invaluable as it delineates culture through a three-tiered structure, thereby contextualizing values, beliefs, and assumptions within a layered relationship. Moreover, Schein's model highlights the dynamic interdependence among cultural artifacts, beliefs, values, and assumptions, suggesting a mutual influence among these elements.



*Fig. 2: Theoretical framework (Schein, 2004; Van Kleef, 2007)*

Figure 2 offers the perspective needed to analyze the findings, as it is rooted in the practices of RPL and helps to reveal constructs that are typically concealed.

### 3 Research methodology

The research took a critical constructivist grounded theory and interpretive approach to explore RPL within Irish HE, focusing on the values, beliefs, and assumptions of assessors, mentors, and candidates. The assessor is tasked with evaluating the authenticity, reliability, and validity of the material submitted for assessment purposes. A mentor offers continuous assistance to an RPL candidate in preparing materials for evaluation. The candidate must create the RPL case for assessment (Travers and Harris,

2014). The qualitative research framework was underpinned by constructivist principles, to capture the nuanced perspectives of the involved actors. The researcher's philosophical underpinnings advocated for a relativist ontology and subjectivist epistemology, to recognize the existence of multiple realities and the collaborative nature of knowledge construction between the researcher and participants.

The research strategy employed semi-structured interviews (n=82), and theoretical sampling for data collection illustrating an iterative engagement with data collection and analysis to develop a grounded theory.

The analysis moved through three stages of coding, to yield 573 open codes in the first round, followed by five focused codes in the second round of coding and finally three theoretical codes, the most abstract codes. The five focused codes or conceptual categories provided the primary findings: Values in RPL; Beliefs Supporting Lifelong Learning and RPL; Assumptions about RPL's provisions and standards; Challenges in RPL; and RPL Supports. These categories guide the study's findings, offering insight into the dynamics of RPL in Irish HE.

## 4 Results and discussion

The five conceptual categories identified during the second stage of coding are presented and discussed below.

1. The values in RPL
2. Beliefs in support of RPL and lifelong learning
3. Assumptions in RPL
4. RPL is challenging
5. Supports are required

### 4.1 The values in RPL

The empirical findings show that similar value systems operate between the stakeholders in RPL with honesty, fairness, openness, and equity to the fore. However, the emphasis varied according to their roles.

For Assessors, the values of fairness, equity, and honesty stood out as the most critical. Assessor 09 states:

*Fairness for me is very much a core value* (Assessor 09).

RPL mentors prioritized trust, openness, and cultural acceptance as key values in RPL practices. Mentor 04 said that RPL can be seen as working outside of normal HE provisions and so they advocated for:

*Trust in the system ... and you are also trusting the student to develop something that is worthy of assessment and that it is a true representation of themselves. And I think that trust is one of the major values you have to have* (Mentor 04).

Candidates, on the other hand, placed the greatest importance on honesty within RPL, followed by openness and fairness.

*If you are the person going for RPL, you do need to be honest with yourself, and ask do I really have this experience?* (Candidate 05).

This study highlights that honesty is identified as the primary value in RPL by all involved parties. Despite its critical importance as noted here, honesty has not been a prominent theme in RPL literature, or in the foundational texts of RPL processes such as those by CEDEFOP or the NQAI in Ireland (CEDEFOP, 2023, NQAI, 2005). Interestingly while RPL guidelines and literature often address principles like openness, fairness, equality, and trust, explicit mentions of honesty are notably absent. This omission suggests that honesty might be an underlying assumption in RPL practices, yet its explicit recognition and incorporation into RPL policy and literature is lacking.

Furthermore, although honesty is scarcely mentioned in existing research publications on RPL, when it is referenced, it's typically in specific contexts rather than being explored as a fundamental value. This gap points to a potential oversight in empirical research on RPL values, leading to an underrepresentation of honesty in policy frameworks and literature.

## 4.2 Beliefs in support of RPL and lifelong learning

Beliefs are the second concept of interest, and they have cognitive, and emotional aspects which motivate behaviours and shape attitudes (Leuty, 2013; Rokach, 1975). The participants in this study echoed the findings in the literature, which emphasized the growing relevance of alternative pathways into HE in a rapidly changing macro-economic landscape (Bjursell, 2020; Duvekot, 2014; Fleming *et al.*, 2017). The two foremost beliefs identified were that lifelong learning is valuable and that alternative routes into HE are important. The comments capture the essence of the ideas expressed by participants.

*Education is for everybody, and learning is for life, I never believe that it is a benefit or a privilege, it is actually a right* (Assessor 10).

*They can undervalue an experience because it is not certified* (Mentor 01)

*Many of my age are returning to education. I think that it is extremely important that they are valued within the institution. I think having people with an industry background, having people who have seen the real world adds to the atmosphere in a class or within a course* (Candidate 31)

The two primary beliefs identified align with the current neoliberal or human capital framework, which prioritizes lifelong learning and advocates for alternative routes into HE, benefiting both the individual and the economy (EGFSN, 2011; Van Kleef, 2007). This study's findings align with Van Kleef (2007), emphasizing the significance of self-actualization as a driver for participating in RPL and lifelong learning. Participants conveyed the necessity of recognizing the various paths undertaken throughout one's life, a perspective supported in the literature (Duvekot, 2014; Merriam and Bierma, 2014).

### 4.3 Assumptions in RPL

There were two sets of assumptions in the findings, and they indicate that RPL can only be provided if the standards are upheld.

The initial set of assumptions primarily centres on the practical benefits of engaging with RPL, acting as the motivating factors for everyone involved. The predominant assumption is that RPL acknowledges prior learning experiences. This assumption resonated with all three participant groups, with the candidates in particular highlighting its importance.

*RPL brings credibility to valuable time and knowledge gained in the workforce and that this time is as valuable as academic time (Candidate 09).*

*RPL is primarily for the non-standard student, who hasn't reached his or her potential at a certain stage of life. And some of them re-discover education, and they re-discover it opens doors for them (Assessor 12).*

*You have to be able to say to the student, I completely acknowledge what you have done, it is completely legitimate, you have been out there in the world, you have huge experience that eighteen-year-olds don't have (Mentor 19).*

The second group of assumptions pertains to maintaining academic standards within the HE system. The primary assumption was the importance of maintaining the quality of awards, a view shared by all three groups but most notably by the assessors. Candidates also held the assumption that preserving the standard of the awards was crucial, viewing these standards as the ultimate benchmark back in the workplace. In contrast, mentors particularly focused on assumptions about RPL procedures and about operating securely within these.

*You have to value the standards of our education system. You have to stand up to people and say, this is the standard we are setting (Assessor 13).*

*What we are looking for here is consistency, so that there is no doubt whatsoever, no risk both to the programme and to the RPL system (Mentor 08).*

*Its important to meet the criteria of the module* (Candidate 10)

The assumptions that came to the fore in this grounded theory study have an inter-dependent aspect. These assumptions are non-negotiable as they represent what the participants take to be true and provide the philosophical basis for RPL activity (Schein, 2004). For the participants there are powerful motivations for engaging with RPL, such as the acknowledgement of prior learning, and not having to repeat learning (Duvekot, 2014). However, the findings show that RPL is conditional on the maintenance of other assumptions, such as those that demand that the academic standards are strongly upheld, and RPL procedures are rigorously applied. In effect, RPL is only effective if both sets of assumptions drive the process (Schein, 2004).

#### **4.4 RPL is challenging**

The remaining empirical findings provide insight into the challenges posed and reveal that RPL is a demanding field of practice.

The primary obstacle identified is the complexity of understanding the RPL requirements, a challenge voiced by all participants, especially the candidates and mentors. Grasping one's responsibilities within RPL is fundamental and should be clarified from the beginning, regardless of whether one is assessing, assisting, or compiling an RPL case. The candidates, who are tasked with developing a case for assessment, are the most vulnerable group. It is crucial for them to have a clear understanding of their responsibilities right from the start.

*Not sure as to what level of documentation or what level of paperwork was involved, or what the actual process would be* (Candidate 31).

*You need the public to understand it and it becomes a machine of its own* (Mentor 12).

*The language of the learning outcomes should be sufficiently clear and succinct to be easily understood* (Assessor 16).

The challenging nature of RPL was an overarching theme presented by the participants and this empirical data did not readily fit into the other conceptual categories about values, beliefs, and assumptions. Nevertheless, Van Kleef's (2007: 8) model also included the concept of 'social context and societal forces influencing RPL' which she characterized as influences that can either support or oppose RPL, encompassing dispositional, situational, economic, political, and demographic dimensions. This wide range of forces covers numerous potential challenges and so these empirical findings offer another layer of understanding about RPL provision. The research revealed that participants encountered several obstacles, noting the complexity of grasping RPL requirements, the challenges posed by formal language, and the time-consuming nature of preparing and evaluating RPL materials.

These findings highlight an unequal landscape where certain candidates navigated the process smoothly and understood the formal language readily, while others struggled (Hamer, 2011; Habermas, 1987; Sandberg and Andersson, 2011; Sandberg, 2014). The language used by HEIs to outline standards appears to introduce another obstacle (Shalem and Steinberg, 2006). Currently, it seems that individuals with the necessary cultural capital find the RPL process more accessible than those without prior HE experience, a trend also observed in other research (Hamer, 2016; Pokorny and Whittaker, 2014).

#### **4.5 Supports are required**

The final empirical findings from this grounded theory study show that participants require support to engage with RPL. The foremost form of support highlighted was the necessity for adequate resources to facilitate the RPL process, a sentiment echoed by all but particularly stressed by assessors and mentors.

*Having someone to call ...it is about picking up the phone, know who to call, and get the information* (Assessor 10).

*I think it is to clarify for them what we expect from the applicant, which is that framing of an argument, that convincing* (Mentor 11).

*So that there is someone that you can direct any questions to, that you may have* (Candidate 03).

The assessors and mentors in this study suggested that a straightforward RPL process is optimal for learners, noting that engaging in mutual dialogue, like informal conversations, can facilitate learners' readiness to grasp the concepts of RPL.

In terms of the theoretical framework for this research study, these findings directly inform aspects of 'professional practice' and 'assessment methods' on Van Kleef's (2007: 8) adapted model. The assessors indicated that resources contribute to enhancing a HEI's capacity for RPL, as expertise and knowledge accumulates over time. This concept of capacity building is supported by the literature (CEDEFOP, 2023; Duvekot *et al.*, 2020).

Furthermore, supporting the candidates to identify and value their prior knowledge provides a reassuring environment to explore their past. Assessors believe that candidates should be helped with the task of building an argument against a set of academic standards, and that RPL mentoring provides a safe environment for the applicants. Despite this, they also expressed the opinion that RPL represents an additional workload as RPL assessments are often time-consuming. Mentors took pride in their work, and their dedication was clearly reflected in the narratives they provided. The RPL literature also highlights the dedication of RPL mentors as a crucial element

that enhances RPL practices (Travers and Harris, 2014). In this research, mentors emphasise the importance of a supportive organizational culture for their work. This correlates with Schein's organisational culture theory and aspects of the RPL literature (Schein, 2004; Travers, 2017).

## **5 Recommendations**

This study concludes, based on the experiences of the three principal actors in RPL within Irish HE that RPL will be increasingly relied upon as the means to facilitate non-standard and advanced entries into HE for prospective learners (CEDEFOP, 2023; EGFSN, 2011). Supporting HEIs in meeting both individual and societal demands for RPL will be crucial in the upcoming years (CEDEFOP, 2023).

The research underscores the importance of maintaining standards for RPL provision and identifies challenges and necessary supports for its effective implementation.

It concludes by emphasizing the need to foreground these values, beliefs, and assumptions in future RPL policy, practice, and research to enhance access to HE.

### **5.1 RPL policy recommendations.**

The research highlights the importance of clearly articulating the values embedded within RPL policies, such as honesty, fairness, and openness, to a greater extent than is currently done. This study proposes that honesty should be more prominently acknowledged and integrated into RPL policies and discussions to accurately reflect its importance in the RPL process. Participants suggest that comprehensive policy statements that include RPL's fundamental values can serve as effective guidelines for internal practices (Travers, 2017). Such clarity can also prevent the rise of alternative values that could potentially exclude.

The research findings show that RPL is experienced as inherently more challenging than what is posited in the high-level policy documentation. Future policy documentation needs to reflect the realities of the challenging nature of RPL and re-emphasize the supports that should be available to applicants and staff (Habermas, 1987; Hamer, 2016; Travers and Harris, 2014).

The positive beliefs and the assumptions in the data illustrate the importance of keeping RPL at the centre of lifelong learning policies and reinforce the societal requirement for access to HE (CEDEFOP, 2023).

### **5.2 Practice recommendations.**

The primary findings highlight beliefs in the value of RPL, of lifelong learning and the significance of alternative routes into HE. Now is the time to reevaluate the role of RPL

in HE and to prepare for its future implementation for the next generation (CEDEFOP, 2023). This is particularly pertinent for Ireland, with its small economy tied to the broader European and global economies. The results show widespread support for RPL within the framework of a neoliberal agenda that benefits the economy (EGFSN, 2011). However, this study argues that the neoliberal perspective is not the sole aspect of importance, and RPL has the potential to offer benefits beyond mere economic advantages. All three groups involved expressed that they value the recognition that RPL grants to candidates, as a positive assessment validates non-formal and informal learning. Consequently, RPL assessments require careful attention, leading to implications for training and resources. Assessors in this research have suggested the development of a community of practice to foster a cooperative setting for RPL.

### **5.3 Research recommendations**

Future studies of RPL should consider values, beliefs, and assumptions as developing a repository of empirically grounded research will enhance all aspects of RPL.

Additional studies examining the obstacles within RPL should be conducted to determine if they align with the difficulties encountered in this research. Such investigations will enable policymakers, providers, and fellow researchers to form a comprehensive understanding of participant experiences, thereby improving the implementation of RPL.

### **5.4 Limitations**

Not every HEI in Ireland is included in this study. The researcher reached out to all institutions but only included those that consented to participate in the research. Additionally, the study was limited to using only qualitative semi-structured interviews for data collection. Employing a mixed-methods approach might have been useful.

#### **Conflicts of interest**

The authors declare that there are no conflicts of interest.

#### **Acknowledgements**

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# **Building a broad-based collaborative partner programme in digital technologies: The dScience Partner Programme**

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## **Abstract**

The Centre for Computational and Data Science (dScience) at the University of Oslo was set up in 2021. It is supported by a partner programme, in which leading Norwegian companies make a financial contribution and participate in its activities. The partner programme is managed and enabled by a corps of external engagement advisors who act as bridge builders (boundary spanners) between researchers and partners. The programme implements a project pipeline that will generate funded projects that advance the aims of the university and its partners. The pipeline is enabled through regular partner interactions and thematic working groups that scope research areas and build mutual understanding. We then use a short-term project model, called an Accelerated Impact Study, for prototype-driven research, feasibility studies and preparation of large-scale research initiatives. This paper presents the centre, its partner programme and describes the methods we have used thus far to build the programme.

## **Keywords**

Data science, collaboration, external engagement, partner canvas, digitalization.

## **1 Introduction**

The Centre for Computational and Data Science (dScience) is an interdisciplinary centre set up by the University of Oslo in 2021. Its role is to coordinate and advance the research and innovation of the university around digital technologies. The centre's partner programme was set up in 2022 and launched in 2023: Its aim is to partner with external companies and organizations to collaborate around aligning their challenges with the university's research and innovation activities. We have currently seven partners, representing the breadth of Norwegian industry and society. These are DNB, DNV, Equinor, Kongsberg Group, Norges Bank Investment Management (NBIM), Oslo City Council and South-East Norway Regional Health. This paper describes the partner programme and its mechanisms for building engagement. We also highlight some of the challenges and issues that needed to be addressed in building a partner programme in a research-intensive generalist university.

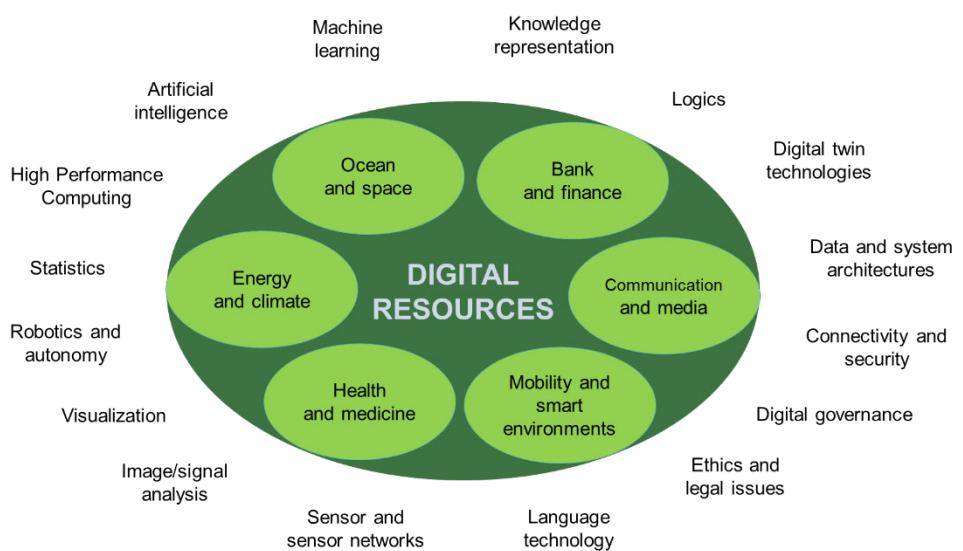
## **2 dScience and its partner programme**

### **2.1 The University of Oslo and dScience**

Founded in 1811, The University of Oslo is the oldest university in Norway and is the largest generalist university in the country. In 2023 it had 26,100 students and 7,200

employees. The university has eight faculties, covering humanities and theology, law, social sciences, medicine, dentistry and pharmacy, and natural sciences. The Faculty of Mathematics and Natural Sciences (MN) is the largest faculty, with 6,000 students and 1,500 staff. The University created dScience in 2021 after a lengthy process of consultation within the university and with its external partners. The centre is organized as part of the MN faculty but collaborates with researchers across the university.

The Centre provides an organization to build up the university's research, innovation, and engagement in computational and data science. This emphasis on both computational science – simulation, optimization, and numerical methods – and data science – statistics, machine learning and data management – overlap and share important intellectual foundations. The development of the Centre is anchored in the faculty's 2030 strategy<sup>1</sup>. Numerous research groups across the university either do foundational research or use these methods. Around 400 doctoral students or post-doctoral researchers were identified as working in relevant areas.



*Figure 1. The disciplines and impact areas for the dScience centre.*

The primary role of dScience is to build on this strength to sustain the university's international research capabilities and reputation. We also see that there is a pressing need to use digital tools and methods to advance the twin transition: green and digital. This requires interdisciplinarity and collaboration across faculties, between sectors and across borders.

The third role of dScience is to build up engagement with external parties, thereby leading to social development and national prosperity. The centre works closely with

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<sup>1</sup> [https://www.mn.uio.no/english/about/strategy/mn\\_strategibrosjyre\\_engelsk\\_web.pdf](https://www.mn.uio.no/english/about/strategy/mn_strategibrosjyre_engelsk_web.pdf)

the Oslo Science City innovation district, where we are an element in their digitalization and computational science initiatives.<sup>2</sup>

## 2.2 The Partner Programme

Our primary means of engagement with external parties is the partner programme. This is built up as a strategic, collaborative initiative, where companies and other external organizations commit to a five-year partnership, with an annual contribution to the costs of the centre.

The programme is built around three pillars: projects, people, and capacity building. We support this by organizing meeting places: seminars, workshops, lectures, and conferences that support these ends.

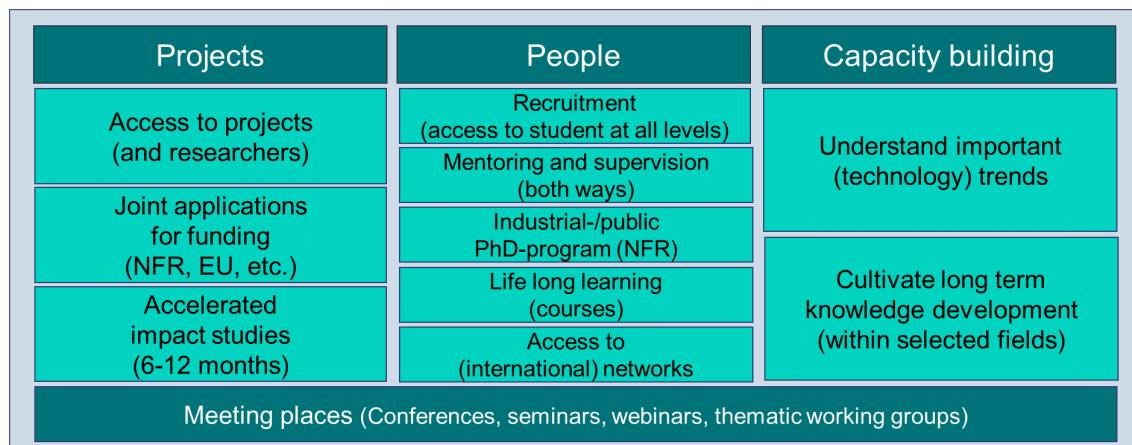


Figure 2. The three pillars of the partner programme.

The project and people pillars are short-term activities, but their content is influenced by the long-term capacity building work. The dScience Centre is a lean organization, with an enabling role. Research and innovation are done by researchers in their departments, in the context of defined projects. Our role is to work with the partners so that projects can be defined to meet the needs of both the partners and the researchers. In doing this we have seen the need to develop an agile project form that enables researchers and partners to work together on short-term projects that have the purpose of qualifying ideas and developing mature projects. We call these accelerated impact studies (AIS). These are described in more detail below.

The founding partners in the programme represent a broad cross-section of Norwegian industry and society. Three of the partners can be described as industrial partners. Equinor is a diversified energy company, Kongsberg Group is an industrial conglomerate, with maritime, defence, sensor, and digital businesses. DNV is a world-

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2 <https://www.oslosciencecity.no/en/kunnskap-og-innovasjon/digitalisering>

leading classification and risk management company. Two of the partners are in the financial sector. Norges Bank Investment Management (NBIM) is the manager of the Norwegian sovereign wealth fund. DNB is the largest commercial bank in Norway. South-East Norway Regional Health was the final founding partner. This organization is responsible for the hospital system in Oslo and its surrounding region. The health cluster in the programme was enhanced by Oslo City Council joining the programme in 2024. Oslo City Council is a unitary authority with county-level responsibilities for primary health care and nursing homes.

The centre is in negotiations with several other organizations and companies to expand the programme. We believe that a best size for the programme would be around twelve partners.

Despite the differences between partners, we see that the challenges of digitalization lead to many shared problems. For example, we have found that ideas from the industrial domain, such as digital twins, show promise in applications in the health domain. The partners also share a common interest in the foundations of computational and data science. They are also concerned with the governance, security, and safety of computer systems, what is now described as safety of artificial intelligence.

### **2.3 Building the Partner Programme**

We have approached the challenge of building the partner programme by adopting the following tools and methods. (1) We work with each partner, using a partner canvas (Frølund et al., 2018), to discuss and document their expectations and planned activities. (2) We have set up a strategic advisory committee, led by an experienced senior executive from industry to advise us on our activities. (3) We have employed experienced researchers and innovation advisors in a new role of engagement advisor. (4) We support thematic working groups as the primary vehicle for building collaboration. (5) We are exploring new models for collaborative projects that deliver feasibility studies and research results with shorter timescales than three years.

The next section describes each of these elements in more detail.

## **3 Elements in a successful partner programme**

### **3.1 Agreeing on aims and mechanisms: the partner canvas**

The partner programme built on the experience of Sirius, a successful collaborative centre for research collaboration. This centre was funded by the Research Council of Norway and worked for eight years on applying fundamental computer science in the energy industry. The centre is described in Cameron et al. (2018). This centre had at its conclusion, twenty industrial partners with various roles in the energy supply chain.

We adopted the Partner Canvas method, defined by Frølund et al. (2018) to on-board each dScience partner. This method had previously been used, with satisfactory results, to determine the expectations of partners in the Sirius centre (Cameron et al., 2019). We had a similar experience with the dScience partners. Key staff from dScience met with a team from each partner. The partners were represented by the executive sponsor of the partnership, the employee with responsibility for the partnership and additional employees with an interest in the centre. Key researchers from the university, who had an existing relationship with the partner also attended the meeting.

We found that the canvas provided an effective way of documenting the expectations and scope of work for each of the partners. The meetings provided a friendly context to get to know each other. The canvas document provided a written agreement on the scope of work for each partner in the coming year. We plan also to repeat this exercise each year to review progress and reevaluate goals.

### **3.2 Governance and the strategic advisory board**

The programme is governed by a collaboration agreement that defines common activities to be shared and open. We found that it was a challenge to define a collaborative structure for the partnership that was not commercial or contract research. The partner companies are contributing to research with the aim of creating public goods. We also needed to define rules where intellectual property could be protected while participating in a multi-party collaborative forum.

The consortium agreement, by creating this open space, explicitly states that specific research and innovation activities are each governed by a separate agreement.

Each partner in the programme has a seat on the dSAB – the dScience Strategic Advisory Board. This group meets twice a year to review the progress of the partner programme, advise on the strategy of the dScience centre and approve new partners. The board is led by an external chair, who is a prominent Norwegian business leader and former chief executive of a large company.

### **3.3 Projects and placements: creating a pipeline of projects**

As noted above, the ambitions of the partner programme can only be met if we together define projects that advance the mutual interests of the university and partners and allow mobility of personnel between partners and the university. Our partners also wish to build projects between themselves to address common problems.

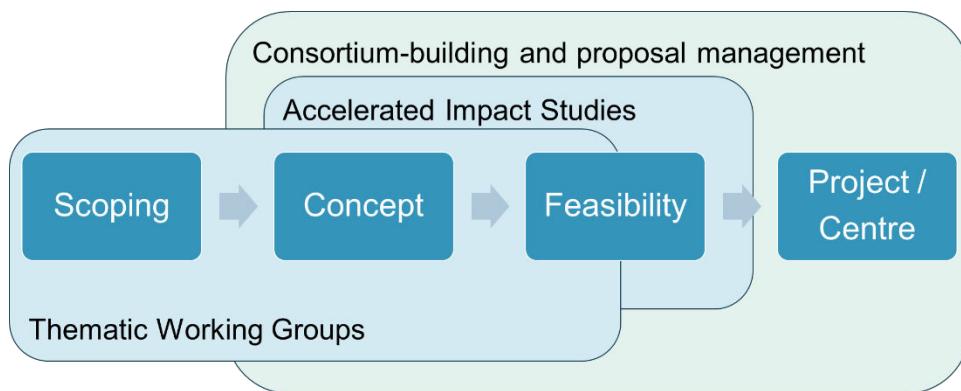


Figure 3: The project lifecycle supported by partner programme mechanisms.

As in the Sirius centre, we have implemented a project pipeline, as shown in Figure 3. Given the many researchers, partners, and wide areas of interest, we need to start project development by scoping work. This builds mutual understanding and allows the generation of ideas for further work. Promising concepts are identified and need to be qualified. If qualified, there is a need to develop the idea to the level of maturity where it can merit a funded project. This pipeline is implemented through three mechanisms: thematic working groups, accelerated impact studies and dedicated resources that work to build consortiums and support the preparation of project proposals.

### 3.4 Boundary spanners: the external engagement advisor

The partner programme is staffed by personnel who have the responsibility of managing the centre's relationship to the partners. This role grew out of the coordination role developed in the Sirius centre and is a new role at the university. We have chosen to give the role the title "External Engagement Advisor." At the time of writing, the centre has four advisors. Three of the advisors have doctoral degrees in engineering or informatics and research experience, whereas the fourth has a doctoral degree in digital entrepreneurship and innovation.

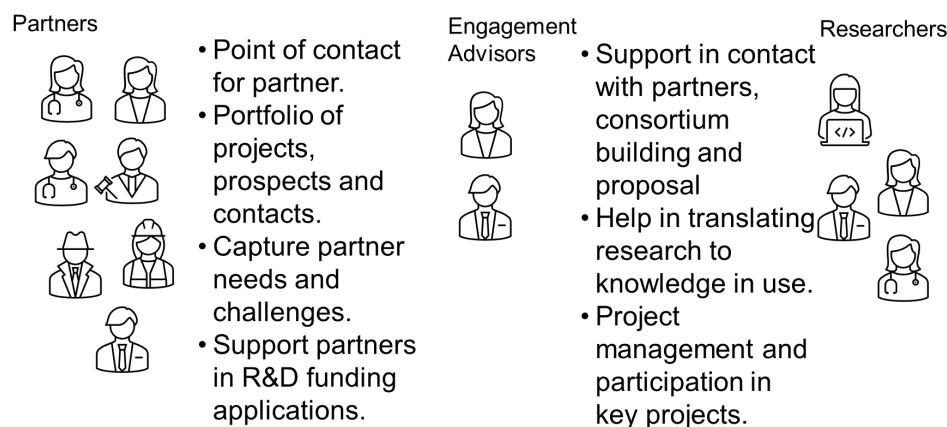


Figure 4. The roles of the engagement advisor between the partner and the researcher.

The engagement advisor has a role like a technical sales executive, specifying complex systems or solutions. (One of the authors has experience from such a role, selling plant simulation systems to the process industries). They act as a broker or translator between the partner, who is focused on practical applications and marketable innovations, and the researcher, who concentrates on advancing the frontiers of scientific knowledge and exploring new technological possibilities. They function as a key account manager for the partner, providing them with a window into the wide range of research possibilities offered by the university. This requires curiosity and the capacity to understand the concepts and motivations of both the researchers and partners. We have found that, as a group, we have needed to challenge misunderstandings of our role. The engagement advisor does not merely fulfil administrative functions. They are active, catalysing participants in the intellectual process of collaborative research.

We owe it to our partners to maintain a portfolio of the interactions between them and the university. Here we need to clarify our relationship to the individual researcher and research group. We do not want to be a bottleneck between the partner and researchers. Nor do we want to infringe the autonomy of a researcher. We have therefore proposed a three-level engagement model for researchers. This is shown in Figure 5.

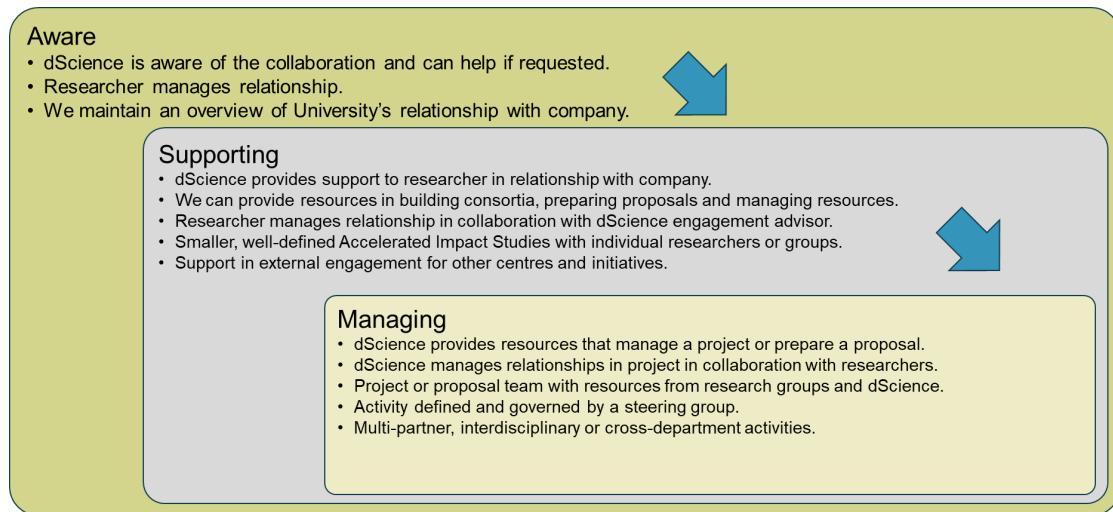


Figure 5. Levels of engagement with researchers.

In the three levels of engagement, we can be aware of, we can support, or we can manage the relationship. In this way we help the partner with their overview of engagement and can identify synergies while respecting the independence of each researcher.

### 3.5 Listening, sharing, teaching: thematic working groups

The scoping process for generating projects requires partners and researchers to meet and discuss. Our partners are curious about our research and work on the assumption that our research could be relevant to their needs. We have therefore set up *thematic*

*working groups (TWG)* as a way of allowing researchers and partners to meet and share knowledge.

A TWG can be either solution-oriented or foundation-oriented. A solution oriented TWG addresses a social and industrial challenge and seeks to apply digital methods to this challenge. A foundation oriented TWG focuses on digital methods that have wide applicability.

A technology working group is built around an existing competence at the university, either a professor, research group, collaborative initiative, or centre. The working group holds workshops and seminars. These often have educational content, as partner representatives present challenges and present solutions, while researchers teach the partners about their area of competence. Seminars are also organized where invited international experts contribute to the discussion. The TWGs also provide a way of mobilising broad participation from partners.

As of April 2024, the centre is organizing the following TWGs.

- Energy transition and optimisation.
- Management of risk, especially climate risk.
- Digital twins for natural systems, especially marine systems.
- Industrial asset modelling and optimization.
- Data science for resource efficiency in healthcare.
- Synthetic data.
- Safety of artificial intelligence.

The aim of each of these TWGs is to scope out well-defined research and innovation programmes that can be funded and executed.

### **3.6 Agile project collaboration: the Accelerated Impact Study**

Digitalisation is a technological area where change is happening quickly. This means that the timescales of fundamental research, built around the three-year doctoral project, can be too long to respond to new opportunities. We therefore proposed the Accelerated Impact Study (AIS) as a collaborative research project that fills the gap between long-term basic research and reactive, short-term contract research. The size and scope of an AIS depends on the specific problem to be addressed. The problem is partner-initiated and co-developed with dScience.

The AIS model is well-suited to the following types of work:

- › Collaborative prototyping and proofs of concept at low technology readiness level.
- › Agile research, where a research programme is planned and executed as a series of smaller, sequential AIS projects.

- › Feasibility studies and generation of complex project, consortium, and centre proposals.

As of April 2024, we have two AIS projects underway. The first is an agile research project. Here a researcher and a programmer are working with a partner to qualify new methods of analysing time-series data. The initial iteration of the project gave promising results. This justified a second phase, where the partner provides real data for analysis. This project is led by the researcher, who has a long-standing close relationship to the partner.

The second AIS is a larger project, with a one-year time limit. The focus of this work is resource efficiency in health care. In this project a partner has financed the university to work with a research institute to examine how digital twins could be used to improve operational efficiency in hospital wards. This work will involve collaborative prototyping. It is also tightly linked to the Resource Efficiency in Health Care TWG. This allows other partners to participate at their own expense to improve the results of the project. A further aim of the project is to produce an evidence-based research agenda for this topic. One of the authors of this paper is the technical lead of the project.

An AIS is governed by a contract that protects intellectual property and defines ownership of results. This agreement also ensures that the work is done in compliance with the requirements of the Norwegian Law on Universities. All data will be handled according to well-defined property rights, GDPR regulations and other relevant ethical guidelines.

Our aim is to run short, intensive projects that deliver results within a short time-period. This means that each AIS has a dedicated project manager to keep the work on-track.

### **3.7 Building skills and transferring competence**

As noted above, one of the key components of the thematic working groups is mutual learning. One of the main elements of the partner programme is the development of skilled personnel in the partner companies. Here we need to develop both the skills of our graduates, who can be recruited by the partner, and the skills of existing employees in the company.

We are working on new ways of building these skills. Our partners have indicated that recent developments in tooling and methods for artificial intelligence and machine learning require changes in the computer science curriculum. Cybersecurity and validation of artificial intelligence are also areas where changes in syllabus are needed.

There is also a need for re-skilling and continuous professional development. For this reason, the dScience centre organised a masters-level course with 4 modules of 2.5 ECTS credits on digitalisation, digital twins, deep learning, and modelling of uncertainty. Here we found a need to write material that did not presuppose bachelor-level competence in mathematics or computer science, while maintaining intellectual

rigour. It is a challenge to teach data science to middle managers who last took mathematics twenty years ago. However, it is essential for our mission that these managers have a rigorous, well-informed understanding of data and computational science. These people do not have to build the models or algorithms, but they do have to make well-informed decisions as purchasers and users.

### **3.8 Benchmarking the profession of external engagement**

The role of external engagement advisor is new at the University of Oslo. However, there are many practitioners with this role at other universities. We have been fortunate in recruiting a candidate (one of the authors) with experience of a similar role at a university in the United Kingdom. She has organized a visit to her former employer. This resulted in a day of fruitful discussions about best practices and methods for building partner relationships and engagement. The authors of this paper all share the experience of having completed their doctoral studies outside Norway. We have found this international experience has been useful in introducing new ways of collaboration and financing, in particular from the United Kingdom and United States.

We have also derived benefit from participation in UIIN activities. We adopted the partner canvas as result of UIIN training. One of the primary benefits of this relationship is the potential to show university management that managing external engagements is a profession of itself, between the researcher and university administrator.

### **3.9 Achieving critical mass: centres and international collaboration**

The dScience Centre does not conduct research and implement innovations itself. Our success is measured by how we can cultivate sustainable research groups at the university that collaborate with our partners to do world-class research with impact. This is not possible without funding. We therefore work hard to channel the results of our project pipeline into the formation of consortia than can win competitions for national and European funding. This critical mass is not possible with just the university and partners. It is only possible through building consortia with research institutes (such as, for example, SINTEF, NR Norwegian Computing Centre, Simula, IFE and NORCE) and non-partner companies that are part of our partners' supply chains. This type of collaboration is also a key component of Oslo Science City.

This consortium building is done by maintaining an active policy of regular contact with relevant research institutes and non-partner companies. This is supported by the adoption of a simple CRM system. This provides a database of contacts that is valuable for building consortia. We are also open to non-partners contributing to thematic working groups where they have a justified interest. In practice, this entails maintaining a network of contacts with varying levels of commitment while prioritising our partners' interests. Figure 6 illustrates this hierarchy of relationships. We anticipate potential

movement within this hierarchy and hope that over time, associated organisations can justify the costs of partnership.

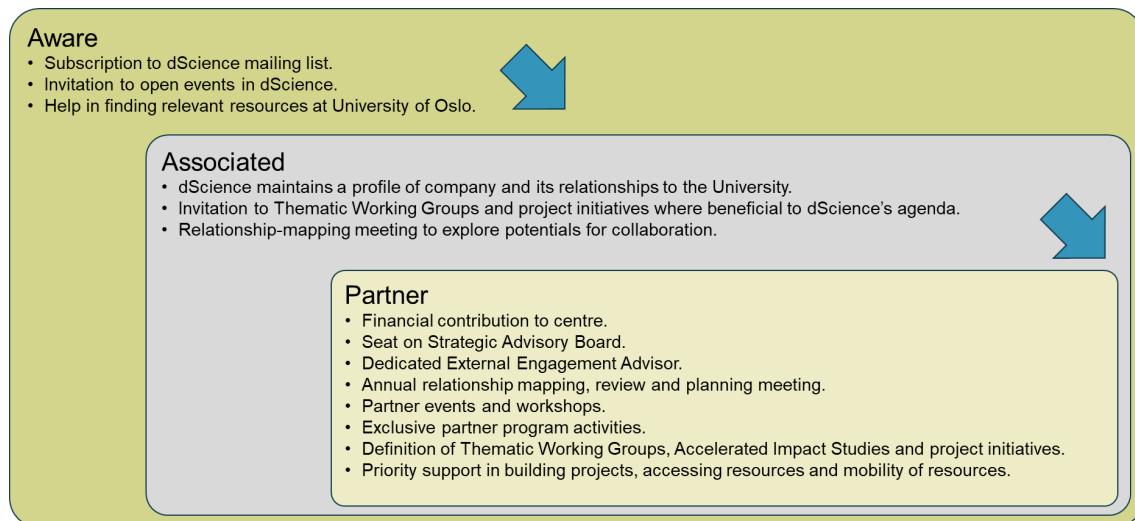


Figure 6. Hierarchy of external relationships for the dScience Centre.

## 4 Conclusions and recommendations

The partner programme was launched in spring 2023 and has been starting up this year. We have built up the engagement advisory team to four engagement staff, supported by two retired senior industrial managers in a part-time role. We are supported by administrative and publicity / social media resources. Thematic working groups (TWGs) have been started and have already resulted in the definition of research and innovation activities. There is a need to build bridges between the partner companies and our academic colleagues' intellectual agenda. The TWGs thus far have different forms, depending on the sector and interest of our partners, but we have seen that every TWG has participation from more than one partner, even given the different businesses they are in. We have also defined and started on smaller collaborative projects as a tool for building well-financed, sustainable collaborative research.

As we build the collaborative relationship, we engage in continual micro-evaluations that are not linked to specific time points or milestones. These small-scale evaluations based on needs include a brief survey, a set of interview questions, and a format for collaborative development of new partnership tools.

The inception phase of the centre has, we believe, generated experiences and identified challenges that are of general interest. We have been met with good will and interest both in our partner companies and in the university. However, clarifying the role of the external engagement advisor, as well as the overall function of the partner programme, has been a significant part of our journey. We've worked actively to overcome these misunderstandings within both the university and company environments. This process

is ongoing, but we are confident that our efforts serve as a testbed for novel approaches at both the university and our partner companies. We can, however, recommend the mechanisms proposed in section 3 as being useful in building similar initiatives in other universities.

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# Developing an open innovation culture in Lund's Innovation District

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## Abstract

Recent years have brought new directionality to university's work with innovation – increasing the focus on addressing societal challenges and contributing to much broader frames for impact. Working with complex challenges, where no one actor can do everything by themselves, requires collaboration across actor groups (private sector, academia, public sector, civil society), industrial sectors, disciplines, geographies – and over long periods of time. It's been 20 years since the Chesbrough launched the concept of open innovation and despite the positive uptake of this new paradigm for organizing innovation processes, it is still not the norm. Particularly in situations that require broader ecosystems of actors to undertake different phases of collaborative action over longer periods of time (as is the case when working with societal challenges), new approaches are necessary to develop an open innovation culture.

## Innovation in a multistakeholder environment

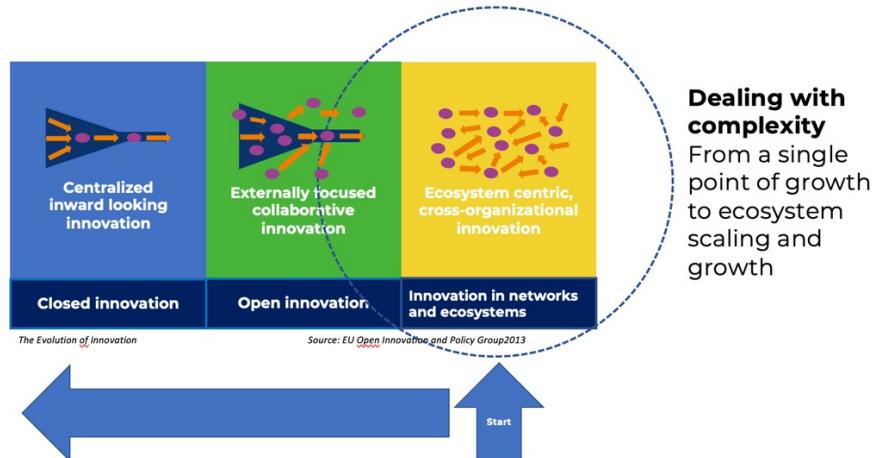


Figure 1. Innovation in a multistakeholder environment – ecosystem scaling and growth.

In an effort to take on a more proactive role in initiating collaborative activities and developing the innovation culture within and for its local innovation ecosystem, Lund University is working together with companies and the municipality in the innovation platform Future by Lund (FBL). FBL works

with creating capacity for innovation, building portfolios, joint infrastructures for test, and in this engaging with Cultural and Creative Industries (CCI) to develop a strong engine with new capacities for the innovation work across sectors. Lund University has taken the lead in the European Cultural and Creative Industries Innovation Policy Platform ([ekip](#)) in order to deliver innovation policy recommendations to the European Commission, using policy as an innovation tool and further develop and spread good support mechanisms for networked and open innovation ecosystems. The ekip platform leverages cultural and creative industries (CCI) as drivers of change and transformation – involving ecosystems of large and small companies, institutions, organisations, researchers, and citizens in processes to develop and try new concepts, attract investors, and get new companies and businesses up and running more quickly.

The local territory where this comes to live is included is the Lund Innovation District (Lund ID) where we can see an expansion of activities in existing innovation portfolios (with new partners and new project investments), the establishment of new infrastructures for testing and demonstration, and the start of new portfolios that leverage expertise across the ecosystem. We also see results of the spread of this proactive, structured support to open innovation processes in several other cities (partners of the ekip Platform). Our practitioner case provides an overview of the support mechanisms used to develop an open innovation culture and build portfolios of action across actors and sectors in Lund. It also highlights lessons learned from the test of these mechanisms in other European cities. Lessons from Lund can provide insights to other universities working proactively to contribute to societal impact.

## **Keywords**

Open Innovation Culture, Collaborative Ecosystems, Innovation Districts, Societal Challenges, Creative and Cultural Industries (CCI), Innovation Portfolio Expansion, Cross-Sector Collaboration, the Zone and LIEPT Models.

## **1 Introduction**

In today's world the need for addressing societal challenges has highlighted the critical role of interdisciplinarity in innovating for best solutions. The innovation ecosystems in this regard are crucial since they serve as incubating contexts that can bring together the cross sectoral knowledge that leads to meaningful innovations. But not all kind of innovation ecosystems bring about the same type of value. Those with dynamics that are promoted by an open culture of sharing and integration have the best possibility to capture the valuable inventions and promote it. Yet, despite the recognized importance, there remains a significant gap in understanding how such cultures are developed and sustained in innovation ecosystems (Autio, Nambisan, Thomas, & Wright, 2018). Which policies and actions work and can there be policies that sustain and cultivate the culture of multidisciplinary collaboration within the innovation ecosystems, are the questions we have little knowledge about (Pocek et al.,

2022). This paper addresses the problem by exploring the process of cultivation of an open innovation culture across an ecosystem of innovation, depicting it with a case of Lund Innovation District (Lund ID), known for its ability to attract, preserve, and leverage knowledge and its spillovers (El Awad et al., 2022; Pocek, 2022).

Indeed, promoting and training how to work in an open innovation culture is vital for the functioning and success of innovation ecosystems (Brown & Mason, 2017).

Policies in charge of promotion must have an in-depth understanding of ecosystem processes, including who needs support and how to balance competition with collaboration in the ecosystem itself (Adner, 2017). Policies and actions able to identify and act upon these gaps within these ecosystems—be it in skills, culture, collaboration, and interconnections, or otherwise—are crucial for understanding how to effectively track and influence ecosystem dynamics so as to be able to enhance an open innovation process. This understanding forms the foundation for capacity building of the ecosystem and its stakeholders to address the significant challenges that lie ahead, challenges that innovation is uniquely positioned to solve.

Against this background, the main goal of this paper is to shed light on the strategies and initiatives that facilitate the development of an open culture within an ecosystem of innovation, emphasizing the collaborative efforts though a concrete case study, the one of Lund Innovation District. We focus our case based on results from application of the FBL Zone Model for open innovation. We focus in particular on the *yellow zone* of the model, which is where open innovation culture is unfolding. Thus, our results portray the process of open innovation crafting and then expand onto the interrelated activities such as expansion of activities within portfolios, the creation of new infrastructures to test innovations. Furthermore, we find that open approaches are expanding beyond Lund ID confines, facilitated by the ekip partners integrating the Cultural and Creative industries as enablers. Finally, we find that open innovation strives for training and ecosystem capacity building. All of these findings are contextualized under the yellow zone of the FBL Zone model and that has been further elaborated also in the use of the OECD OPSI-model.

The paper is structured to first establish a theoretical framework that underpins the concept of open innovation and its significance within entrepreneurship and innovation ecosystems (Chesbrough, 2003; Iansiti & Levien, 2004). Following this, we narrate the evolution of the open innovation culture in the context of our study, Lund ID, highlighting key initiatives and collaborations that have play a pivotal role in this process (Schein, 2010; Harrison & Corley, 2011). We further present the results, culminating in a discussion that synthesizes our findings and offers recommendations for policymakers interested in promoting open innovation cultures within their own ecosystems (Tsai, 2001; Cohen & Levinthal, 1990).

## **2 Theoretical framework**

An open culture is an inherent part of innovation ecosystems which are formed with the very purpose to encourage collaboration, knowledge sharing and cocreation among systems stakeholders (Chesbrough, 2003). On the other hand, the framework of an innovation ecosystem can serve as a context for understanding how open culture can produce innovation that benefits organizations connected within a certain environment (Moore, 1996; Adner, 2017; Munigala et al., 2018). In ecosystems, “the connectedness” between organizations and therefore their collaboration is vital for innovation processes (Iansiti and Levien, 2004; Munigala et al., 2018). An open culture encourages “the connectedness” and sharing of ideas and resources and ultimately, the collective ability to address challenges that are to be solved (Autio and Thomas, 2014, Pocek, 2022). Research also found that from an institutional perspective, trust, and a shared vision and commitment are strong foundations for open culture and foster the positive dynamics of an ecosystem (Tsai, 2001, Pocek, 2022).

Creating an open culture within ecosystems for innovation brings several opportunities. Some of the most prominent effects are increased creativity, faster solving of various tasks, and better outputs in terms of innovation new products and services (West & Bogers, 2014). This means, that open culture ecosystems are capable of attracting more talents, which is beneficial for their human capital (Cohen & Levinthal, 1990). At the same time, the strategies of achieving such culture creation should be elaborated quite thoroughly and managed carefully, since they are not without challenges. According to the recent literature, there are some aspects of an ecosystem, which make an important contribution to its role in promoting an open innovation culture; for instance, the role of the knowledge intermediaries that allow different actors to collaborate more efficiently with each other (Spigel, 2017; Stam & Spigel, 2016). They usually bring up the conversation platforms that allow for an open dialogue and knowledge sharing which, in its turn, promote the common perspective of multiple actors and their cooperation (Mazzucato and Robinson, 2018).

Building upon the established understanding of the importance of an open culture within innovation ecosystems, it is crucial to acknowledge that culture, as an informal institution, evolves gradually over longer period of time (Schein, 2010; Pocek et al., 2022). Cultivating such a culture requires not only immediate actions but also a sustained commitment through policies that support openness over the long term (Harrison & Corley, 2011; Pocek et al., 2022).

Considering the centrality of open culture to the positive dynamics of ecosystems and correspondingly more significant innovations, its fostering as an institution is a rather

complex, time-bound, and context-dependent process. While existing theoretical frameworks for open cultures create an opportunity for understanding the phenomenon itself. The studies of the successful policies and policy formulation examples in the existing ecosystems can help build the knowledge on the lessons to be learnt and applied in other contexts, innovation districts, the effective strategies and understand of the scenarios in which they can be observed (Schein, 2010; Harrison & Corley, 2011).

### 3 Methodology/process

#### 3.1 Context: Lund Innovation District

In this section we introduce the Lund Innovation District and its main stakeholders, as the context of our study. In figure 2 we present the map of Lund Innovation District.

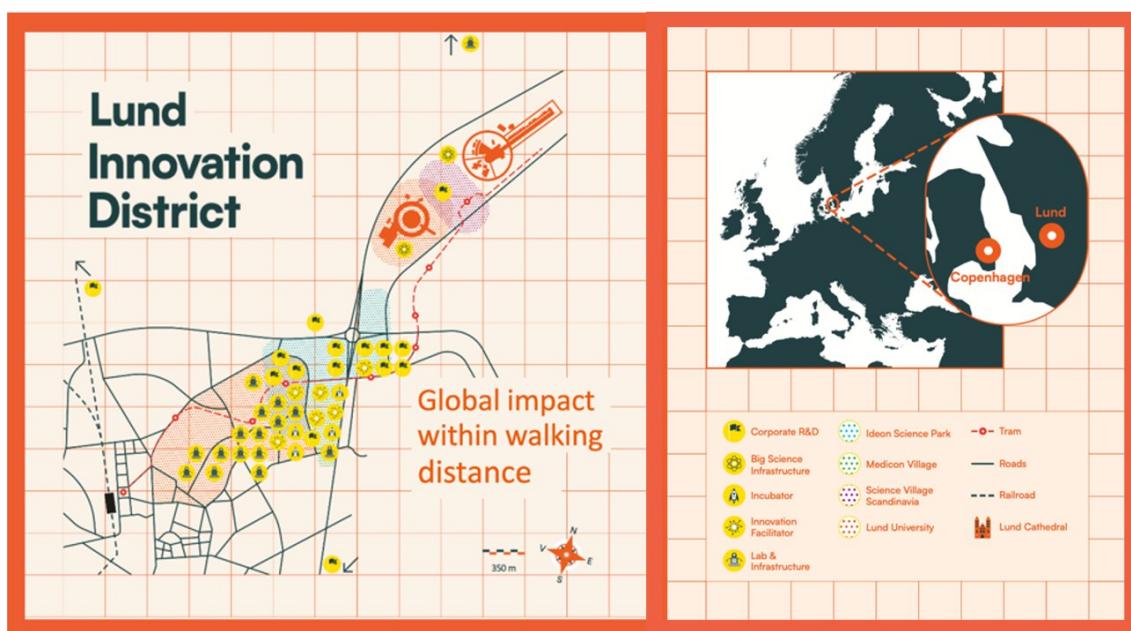


Figure 2. Map of Lund Innovation District, a dense innovation area.

Lund University is an academic powerhouse and human capital generator in the district, investing over 9 billion SEK in education and research every year. At the same time, it is also an innovation powerhouse that connects academics and students with each other and with them private and public sector. Coupled with the system of Lund University's different academic disciplines that are encouraged into interdisciplinary cooperation we can also find cutting-edge laboratories and infrastructures like LTH Open Door, Nano Lab, HumLab, DarkLab, MaxIV.

The district's varied innovation ecosystem is also composed of university faculties, early-stage startups to established multinationals, corporate incubators and accelerators, corporate innovation offices, in the fields of manufacturing of the electronics sector, the technology field, pharmaceuticals, life sciences and the University collaboration office and innovation platform as coordinators among many others. The knowledge spillover possibilities are essential for the district and its vitality, meaning that companies interact with their peers and their surroundings. These indispensable elements help companies grow by being present and active in the district. In addition, the vibrant private sector in proximity to Lund University, facilitates the ability of academic research to be translated immediately into practice and creates a way for it to enter the new markets. A rich infrastructure that supports the ecosystem of innovation is also composed out of incubators, such as corporate incubators embedded in R&D, VentureLab for students, Ideon Innovation and SmiLe Incubator. The different incubators are characterized by different profiles, they can provide a tailored service for startups with different interests in doing business. This also broadens the district's ability of doing innovative work in specialized areas.

As for the spillover, companies benefit from collaboration and the vast innovation landscape the district offers. Notably, the district is home to the Ideon, Medicom Village, and the newly emerged Science Village Scandinavia Science Parks. These support systems operate as incubators in the field of technology and life sciences. The science parks are investment and talent magnets, which also adds to the enrichment of the innovation landscape. Additionally, the district possesses major facilities such as the MAX IV laboratory and the European Spallation Source supplemented by Science Village. In that way, Lund is a major global science hub and the place to be for value creation. Finally, the innovation catalysts such as Future by Lund (FBL) are strategic initiatives having an explicit aim to stimulate an open innovation culture within the district (Wise et al., 2023). This organisation employs a set of actions that open up opportunities for cooperation between the public, private sector, and scientists in order to ensure fast and efficient innovations.

In short, Lund Innovation District takes a systemic approach. It comprises both academic excellence and industrial innovation, and wherever possible also contains social undertakings. The district has a unique feature: "**global impact within walking distance**" which in itself emphasizes the collaborative nature of its ecosystem for innovation. Proximity allows for substantial discoveries and innovations in orbiting around one another to create a dense innovation synergy.

### **3.2 Method**

The methodology is divided into several interrelated links, starting from the moment when Lund University researchers formed a strategic partnership with FBL in 2020. Phase one started with a partnership agreement set between the researchers and FBL, with the focus of the exploration of Lund ID's environment. The main goal was to research innovative district's cultural and dynamic characteristics in order to understand the borders, driving force that shapes its dynamics and barriers for establishing a sound innovation ecosystem. It encompassed creating an extensive interview guide tailored for the variety of stakeholders in this ecosystem. This guide facilitated structured yet open-ended conversations, enabling an understanding of the collaborative dynamics, stakeholder engagement, and the stages of open innovation within Lund ID. This approach was instrumental in capturing the lived experiences of the stakeholders within Lund ID, shedding light on the tacit knowledge, unspoken norms, and the collaborative tendencies that underpin the ecosystem.

Following the completion of the interviews and the preliminary analysis, the research focus shifted towards the application of the insights gained and FBL beginning to experiment with innovation portfolio tracking, developing an ecosystem tracking portfolio, and dialogue with ecosystem stakeholders around these topics. It is important to note that FBL promoted collaboration and dialogue in the ecosystem, and hence open innovation culture, without a direct mandate but out of need of following growth in the ecosystems before the portfolio approach took formal shape. As such the organisation experimented in the open innovation processes within the ecosystem. Following this, the portfolio strategy, once it was formally structured, aimed at systematically capturing the state of the innovation ecosystem, identifying key areas for intervention, and measuring the impact of various initiatives. Today, transformed from a 10-year project (with different phases) to a newly formed NGO in close partnership with Lund University Collaboration Office, the City of Lund and more than 25 companies as members, FBL functions as an orchestrator together with its partners and members to explore and build different cross innovation areas by a portfolio approach. Today the new FBL innovation platform is a backbone of the innovation district, acting as facilitator and kick-starter of portfolios with multistakeholders.

In parallel with the development of portfolio strategy, the story behind Lund ID's development was further enriched by Lund University's leadership in the ekip policy platform supported by FBL. The project is a strategic attempt to use cultural and creative industries for innovation, planting a networked open innovation ecosystem in Lund as well as across Europe. Dealing with complexity when growth starts in an ecosystem and a cross innovation area. Besides its role as coordinator of ekip, LU Collaboration office and FBL are contributing with best practices that were inherited from research and interviews and draws on experiences gained across the spectrum of

academia and industry while facilitating cross-sector collaboration in the ecosystem.

In summary, the methodology adopted for this research narrative is characterized by its phased approach and each phase of the methodology is interconnected, reflecting a coherent journey from understanding to action, underscored by a commitment to fostering open innovation within the Lund ID.

## 4 Results

As we have explored the context of Lund's ID we now attempt to present the tangible outcomes of open innovation dynamics in the district. The results section considers the direct implication of FBL Zone Model, through which open innovation principles on Lund's ecosystem can be observed. We proceed firstly by demonstrating the crafting of collaboration in the *yellow zone*. We then move on to show the extent of what is already happening within the zone, by presenting outcomes of the processes accompanying open innovation, such as:

- An expansion of activities in existing innovation portfolios (with new partners and new project investments),
- The establishment of new infrastructures for testing and demonstration, and the start of new portfolios that leverage expertise across the ecosystem.
- We also see results of the spread of this proactive, structured support to open innovation processes in several other cities (partners of the ekip platform)
- Integration and Impact of Cultural and Creative Industries.
- Training and ecosystem capacity building.

### 4.1 Crafting collaboration in the yellow zone

The yellow zone in the FBL Zone model represents the dynamic space in which open innovation thrives. As demonstrated in Wise et al. (2023) FBL has pioneered a strategy to curate the yellow zone and to catalyze its widespread. Thus, FBL has creatively nurtured the yellow zone, that is the arena where open innovation happens, by identifying and acting upon the opportunities in the ecosystem for innovation and partnership.

## THE ZONE MODEL

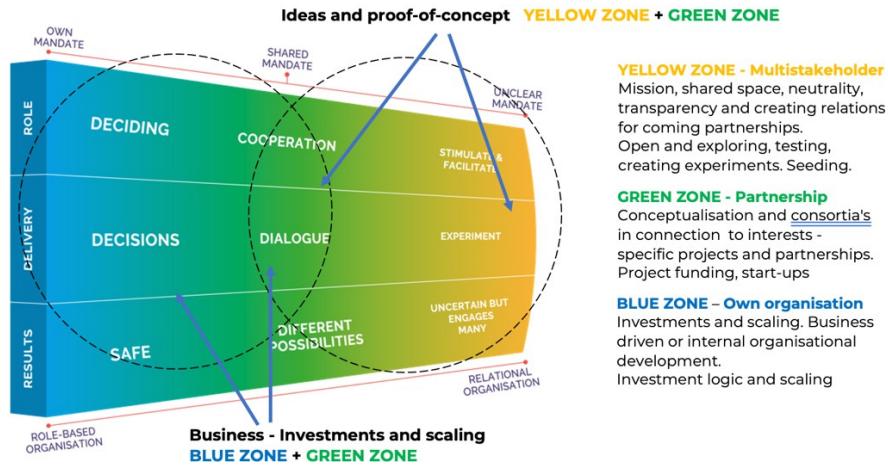


Figure 3. The FBL Zone model

These actions however have had longer tradition in Lund ID. This means that FBL has been acting as an intermediary and the curator of the yellow zone long before the development of the coherent more structured portfolio approach. As such it has acted as a proactive figure in the ecosystem, fostering experimentation and dialogue among the ecosystem stakeholders from across the spectrum, without any predefined structure. Hence the yellow zone existed before the formal portfolio approach took shape. But now, with a more structured approach, we are also able to track the consequences of the analytical approach FBL is pursuing in nurturing an open innovation culture. For example, not only those traditionally related to innovation ecosystems, such as high tech or life science stakeholders collaborate. FBL brings to the table also the CCIs, to diversify and strengthen the set of competences across the ecosystem, in the yellow zone.

More than encouraging and facilitating dialogue in the process of crafting of open innovation, FBL acts also as a representation and connector of dots in the ecosystem dynamics. For example, in the process of preparing the encounters that take place in the yellow zone, FBL surveys and provides a shared language of understanding to foster collaboration spirit. It helps experimentation; for example, the collaboration itself may require representatives to meet several times, have joint explorations and insights making activities, before any sign of a rough idea of being on the same page starts floating.

Finally, the essential character of this innovation culture is its engine: the Lund University Collaboration Office, the City of Lund, the companies, and FBL that in different combinations form the operational unit setting up portfolios, all of them

starting to unfold in the yellow zone. The Collaboration Office is procuring resources for coordination and involving researchers and academics interested in the innovation projects. The city and the companies provides resources and more context and FBL acts as a platform for collaboration facilitating the processes across organisations. Together they bring different stakeholders into the conversation in the yellow zone, stakeholders at place and stakeholders in relationship with the innovation district. Thus, the yellow zone, that is currently in its scale up phase in the ecosystem, is also the context of potential of structured open innovation process.

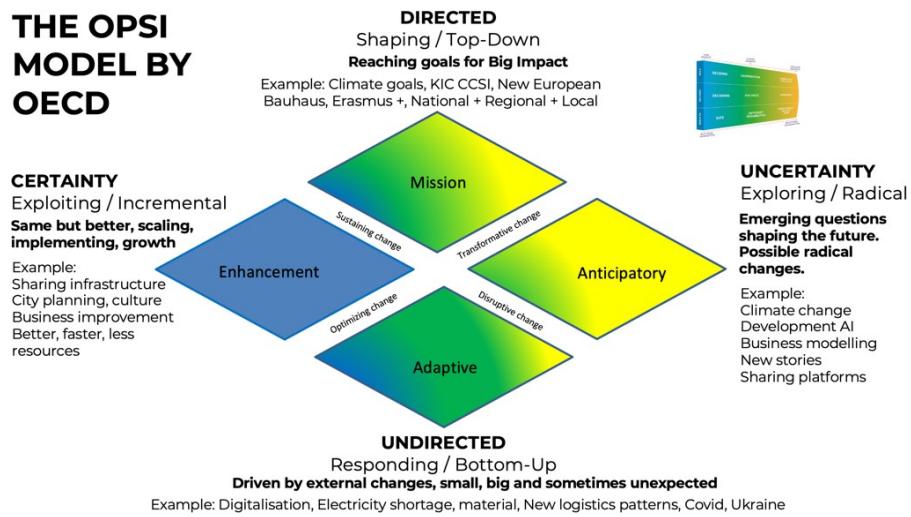


Figure 4. The OECD and FBL developed OPSI Model and the yellow zone model.

## 4.2 Expansion of activities in existing innovation portfolios

Lund ID has achieved significant steps in creating a vibrant open innovation environment through a series of specific measures that match with the goals contained in ekip. This expansion is not simply quantitative; it also involves qualitative evolution through new cross sectoral partnerships and investments.

In order to expand on the portfolios, FBL developed the methodology for understanding the portfolio using different lenses and approaches that takes into account the scope of the portfolios, coordination, institutional factors, the type of stakeholders and resources needed, as presented in figure 2. This process takes place within the yellow zone presented in Figure 5.



Figure 5. Understanding of the Portfolio Approach



Figure 6. The relationship between innovation areas, portfolios, projects, and innovations.

#### 4.3 Establishment of new infrastructures for testing and demonstration, and the start of new portfolios that leverage expertise across the ecosystem

Meanwhile and always within the yellow zone, it is also important to provide new possibilities by infrastructures enabling exploration and testing to leverage development and innovations. In this environment, different ideas can be born, fostered, and realized out of an innovation area and portfolio. Hence, Lund ID is a context for exploration and experimentation of different innovation strategies, from

mission and adaptive innovations to transformative changes, as shown by actions of FBL. For example, the ekip platform, is set to capture the essence of collaborative innovation, bringing together different expertise and skill sets from across the ecosystem. It is this collaborative ecosystem approach to create innovation policy recommendations for the Cultural and Creative Industries, that makes it possible to also use policy as a tool for open innovation.

#### 4.4 Spread of support to open innovation processes in several other cities (partners of the ekip platform)

What's more, Lund ID's open innovation model has brought its influence beyond the boundaries and has started to inspire other cities' open innovation processes. This is especially true for the partners of ekip platform. ekip in this regard is helping with policies for open innovation and but also how to make those policies into tools for innovation. Hence, the district's innovation strategies will have nationwide and Europe-wide implications. This is because ekip represents a network of cities which aim to promote open innovation culture as the basis for productive innovation ecosystems. By engaging with ekip, FBL not only enhances Lund ID's capacity for innovation, but also contributes to a European agenda related to CCI (Figure 7).

### SNAPSHOT TRANSFORMING FASHION AND TEXTILE

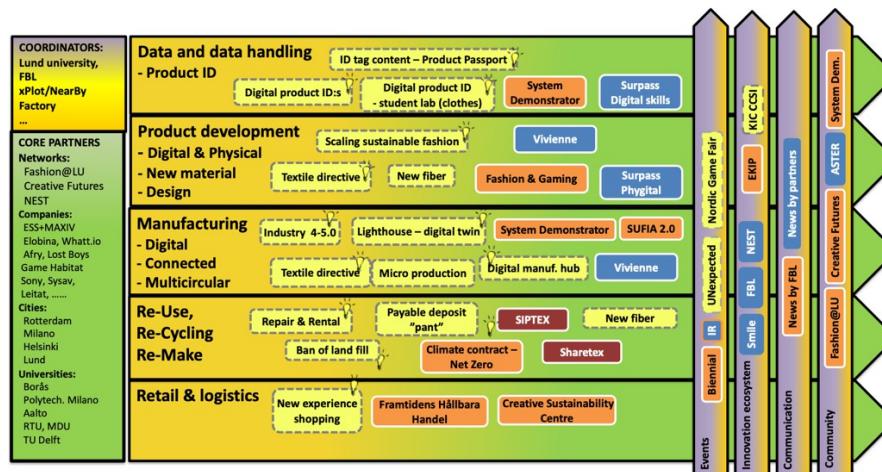


Figure 7. A snapshot of the innovation portfolio “Transforming Fashion & Textile”.

#### 4.5 Integration and Impact of Cultural and Creative Industries

Finally, the results are seen in terms of integration and impact of CCIs within the yellow zone. This is because, Lund ID has strategically leveraged the strengths of the

CCIs to enrich and diversify its innovation ecosystem portfolio. Indeed, this integration has also contributed to collaborations that are atypical in high tech innovation ecosystems, where the predominance of technologic experts often marginalizes creative and artistic potential. On the contrary, thanks to the mission-oriented approach, the use of portfolio thinking and policies as innovation tool the traditional gap in Lund ID between technology, culture and creativity is being overcome, driving forward-thinking innovation, starting from the yellow zone (Figure 3).



Figure 8. The Innovation area Creatives and Changemakers, and innovation portfolios in the making.

#### 4.6 Training and ecosystem capacity building

Training and ecosystem capacity building is a significant portion of what is happening in the yellow zone. For example, FBL has included in its innovative strategy a survey to study the ecosystem of the Lund ID better and inform its open innovation approach. Such a survey is not limited to simple mapping of the current state but is important for defining requirements that should be met and for characterising the ecosystem and its development. It is critical for informing the actions in the yellow zone, since these include explorative and experimental actions which should be undertaken to make the open innovation culture active. For example, the results of the survey data collection process, reveal the imperative for training aimed at understanding the multifaceted district. Another factor that the data collection process reveals as a significant, is the need for greater collaboration. Overall, the results of the survey represent a call for action in developing training and ecosystem capacity-building initiatives that not only build on the existing but also

develop the missing links within an increasingly diverse ecosystem, in the yellow zone.

## 5 Conclusion and discussion

In this paper we argued for inter-sectoral collaboration and a strategic union between CCIs, and we explained how public policies commitment can support the development of a strong open innovation culture in an ecosystem. Lund ID's journey displays how diverse stakeholders can come together over a shared vision and both external and internal ideas can be utilized to solve challenging problems in complex systems of varying scopes, while also being instrumental for human progress. Policy in Lund ID could be compared with what Mazzucato (2018) described as setting big goals for innovation to help society, working in diverse terrains such as education, industry, arts, culture, and crafts. This point is also made by the research when it refers to the importance of public policies in guiding innovation efforts, as Foray (2015) notes. Finally, it is noted by Ansell and Gash (2008) that working together across different sectors is crucial for the mission-oriented agenda. Lund ID is a vivid example of this kind of thinking taking shape. It creates an environment that has value and welcomes an outside cooperation. This approach corresponds to Chesbrough 's (2003) "open innovation" model.

### 5.1 Policy implications

When it comes to implications for policy, our research has shown the necessity of promoting joint operations and adding culture across the industrial structure as methods optimizing innovations for all. Hence an inclusive culture is essential, and policies should ensure diversity as well as fair access to resources in the ecosystem. Furthermore, monitoring the ecosystem's health is important coupled with international cooperation, in order to exchange information and have better results. We also showed how collaborative action in particular with respect to the cultural and creative sector can become an integral part of the ecosystem through its fostering in the yellow zone. We also find that policy platforms for dialogue and innovation such as the one of ekip, contribute to the culture of openness within the district and across its borders. In sum, this paper suggests that the policies promoting open culture in innovation ecosystems should be comprehensive and flexible, promoting social diverseness, experiment, embrace constant learning as well as international cooperation in public and private policy making.

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# **Developing innovative ecosystems: Municipality & innovation assets**

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## **Abstract**

This article explores the complex dynamics and strategies involved in developing innovation ecosystems through collaboration between municipal entities and academic institutions, focusing on the case study of Getafe and its relationship with the Universidad Carlos III de Madrid (UC3M). Based on a comprehensive review of the literature and local resources, this paper aims to provide insights into successful strategies for knowledge and technology transfer, regional development and entrepreneurship support. By analyzing success stories, challenges, and lessons learned, this article provides valuable guidance to practitioners, policymakers, and academics interested in promoting innovation among communities, universities, and businesses.

## **Keywords**

Innovative Ecosystems, Municipal Innovation, Collaboration, Knowledge Transfer, Regional Development, Entrepreneurship, Getafe Innova

## **1 Introduction**

Innovation ecosystems are the cornerstone of economic growth and social progress in today's era, and collaboration between municipal agencies, academic institutions and businesses has proven to be a powerful catalyst in nurturing innovation and promoting regional development. This article embarks on a journey to explore the complex dynamics and strategies of innovation ecosystem development, focusing specifically on the partnership between the Getafe Municipal Government and the Universidad Carlos III de Madrid (UC3M) through its collaboration agreement, Getafe Innova. By delving into the unique context of this collaboration, we aim to uncover the underlying mechanisms driving innovation, knowledge transfer and entrepreneurship in the region. Through a comprehensive review of literature, case studies and local resources, this article aims to provide valuable insights and actionable recommendations to stakeholders interested in promoting innovation among communities, universities and businesses.

The Getafe Innovation Program stems from the shared vision of UC3M and Getafe to leverage their respective strengths to create synergies for economic growth and innovation. UC3M's Leganes Science Park is a vibrant center for research,

entrepreneurship and technology transfer, while Getafe has a rich industrial heritage, with companies such as Airbus contributing to its economic landscape.

The aim of this collaboration is to leverage the academic resources of UC3M and the industrial potential of Getafe to promote innovation, entrepreneurship and knowledge exchange. Through targeted initiatives and partnerships, Getafe Innova aims to position Getafe as a dynamic ecosystem that promotes innovation-driven growth and sustainable development.

## **2 Structure of the full paper**

This paper's detailed framework reflects the complex aspects of the partnership between UC3M and Getafe as part of the Getafe Innova initiative. It starts with a thorough explanation about how and why these partners came together to highlight historical background and critical strategies that are at the heart of their work together. Putting this information in context helps to stress just how important such joint efforts are for tackling big problems faced by society and pushing forward development in the area.

The report then outlines the working methods and main topics that make up the joint framework. It gives an in-depth look at important people involved like schools, government bodies, business allies and local groups underscoring how each of them play their part and add to the team effort network.

This chapter also discusses the governance structure and decision-making process that governs this partnership and sets out the principles of inclusivity, transparency and accountability that support its continued work.

Furthermore, the article explores the key concepts and key concepts that inform collaborative activities and initiatives as part of collaboration. It highlights key points of cooperation, including technology transfer, business support, ecosystem innovation and regional business support. Through a detailed analysis of these concepts, this article aims to provide insight into how collaboration through collaboration can be used to solve many problems and seize the opportunity for social progress.

In addition, the article discusses the main results and achievements of the collaboration, highlighting the highlights, success stories and impact measurements that can be demonstrated. Drawing on empirical evidence and case studies, this chapter provides a comprehensive analysis of the tangible and intangible benefits that collaboration creates in building and sustaining relationships, from creation to generation to knowledge accumulation.

Additionally, the article explores the challenges and limitations encountered during collaboration and provides a critical perspective on the barriers to collaboration and cooperation. It explores issues related to capacity constraints, operational inefficiencies,

management complexity, and stakeholder engagement, disclosure, and processes to overcome these barriers and promote unity.

In addition, the article shows future expectations and important ideas that will pave the way for cooperation in the coming years. It identifies emerging trends, disruptive technologies, and changing societal needs that require effective stakeholder intervention and strategic change. By providing a clear vision and path for the future, this segment aims to empower stakeholders and foster collaboration to achieve common goals and feelings of collaboration.

In summary, the detailed structure of this article provides an overview of collaboration. The UC3M - Getafe collaboration in the Getafe Innovation Program provides information on the origins, operating model, highlights, results, challenges and future prospects of this programme. By highlighting the diversity and transformative potential of collaboration, this article aims to inform academic debates, policy debates and related strategies on its impact in promoting innovation, entrepreneurship and development in the region.

### **3 Strategies for knowledge and technology transfer**

The strategies for knowledge and technology transfer within the UC3M-Getafe collaboration are multifaceted and dynamic, encompassing a range of initiatives aimed at facilitating the seamless flow of ideas, expertise, and innovation between academia and industry. Central to these strategies is the recognition of the complementary strengths and capabilities of both sectors, as well as the imperative of fostering collaborative partnerships and knowledge networks to drive innovation-led economic growth.

One of the primary strategies for knowledge and technology transfer is the establishment of technology transfer programs and industry-academia partnerships aimed at bridging the gap between research and commercialization. These programs facilitate the identification, protection, and commercialization of intellectual property generated through research activities, thereby enabling the translation of scientific discoveries into tangible products, processes, and services with commercial potential. By fostering close collaboration between researchers, technology transfer offices, and industry partners, these programs facilitate the transfer of knowledge, expertise, and technology from academia to industry, driving innovation and competitiveness in the marketplace.

Another key strategy for knowledge and technology transfer is the promotion of open innovation platforms and collaborative ecosystems that facilitate the co-creation and co-development of innovative solutions to complex societal challenges. These platforms, where different uc3m research groups actively participate (cases such as the challenges of the engineering company ACCIONA), bring together diverse stakeholders, including

researchers, entrepreneurs, industry experts, policymakers, and community organizations, to collaborate on interdisciplinary research projects, innovation challenges, and technology development initiatives. By fostering a culture of open collaboration, knowledge sharing, and co-creation, these platforms catalyze the emergence of novel ideas, breakthrough innovations, and transformative solutions that address critical societal needs and create value for stakeholders across the innovation ecosystem.

One of the specific activities that the uc3m's Innovation Entrepreneurship Service has been developing for more than four years is the open publication of challenges from society with different themes and sectors. Thus, the challenges launched in 2023 include technological sovereignty, the quantum revolution, the improvement of human capabilities through exoskeletons, metamaterials and assistive technologies, the science of the metaverse, energy sustainability, security and trust, new cultural industries and innovation in organizations to retain talent.

In this latest edition, 57 researchers took part, 40% of whom are women, belonging to 52 research groups. 56% of the researchers work in the areas of engineering and experimental sciences at the UC3M Leganés campus, while 44% work in the areas and faculties of social and legal sciences, and humanities, communication and documentation at the UC3M Getafe campus. Experts from the 29 Departments of Universidad Carlos III de Madrid have collaborated in the four editions of the project and more than 20 companies from different fields.

Furthermore, capacity-building workshops, training programs, and entrepreneurship support initiatives have played a crucial role in nurturing the skills, competencies, and entrepreneurial mindset required to drive technology transfer and commercialization efforts. These initiatives provide researchers, students, and entrepreneurs with the knowledge, tools, and resources needed to navigate the innovation process, from idea generation and validation to market entry and scaling. By equipping individuals with the skills and capabilities needed to transform ideas into viable businesses and products, these capacity-building initiatives empower them to harness the full potential of academic research and innovation for economic and societal impact.

Moreover, internationalization initiatives such as YUFE, network and alliance of 10 young European universities of which uc3m is a member, makes it possible by leveraging international networks and ecosystems. These initiatives enhance the visibility, credibility, and competitiveness of local innovators and entrepreneurs on the global stage.

In summary, the strategies for knowledge and technology transfer within the UC3M-Getafe collaboration are characterized by a multifaceted approach encompassing technology transfer programs, open innovation platforms, capacity-building initiatives, and internationalization efforts. By fostering collaboration, knowledge exchange, and entrepreneurship, these strategies drive innovation-led economic growth, regional

development, and societal transformation, positioning Getafe as a dynamic and vibrant innovation ecosystem with a global outlook.

## **4 Regional development and entrepreneurial promotion**

The collaboration between UC3M and Getafe aims to revitalize the region by leveraging the expertise and resources of both entities. It emphasizes the importance of nurturing a conducive ecosystem for startups and promoting Getafe as an innovation hub, which aims to stimulate business growth, creation and innovation in the city of Getafe and surrounding regions. Thanks to the collaboration between Universidad Carlos III de Madrid (UC3M) and Getafe Iniciativas, SA (GISA), the program focuses on the use of skills, technological resources and entrepreneurial copy to promote development and prosperity in the region.

An important strategy for regional development is to encourage entrepreneurship and create a supportive ecosystem for start-ups and small businesses. UC3M's Leganes Science Park is responsible for entrepreneurship, providing production facilities, training programs and financing for entrepreneurs. By supporting entrepreneurship and competition, UC3M helps diversify the local economy and create productive jobs.

Getafe Innovation works to identify and promote comparable potential businesses and projects in the region. Using Getafe's industrial heritage and existing strengths in aerospace, manufacturing and technology, the aim is to attract investment, capacity and resources to stimulate the growth of innovation and competitiveness. Collaboration measures such as the Getafe Business 4.0 competition position Getafe as a place for production and innovation by promoting knowledge exchange, technological change and capital creation in key industries.

Getafe Innovation is important for promoting entrepreneurship and economic diversification, as well as strengthening the competitiveness of the region by developing skills, maintaining capital structure and investing in real estate. UC3M is committed to creating a talented workforce equipped with the knowledge and skills needed to succeed in the business world by investing in education, training and research infrastructure. In addition, cooperation with local governments, business organizations and social organizations helps to develop regional development with economic and social goals, ensuring that the plan is integrated, sustainable and will meet the needs of stakeholders in the region.

Promoting entrepreneurship also transcends traditional boundaries to strengthen business relationships and empower community leaders to solve complex problems. By supporting businesses, nonprofits and community projects,

One of the key strategies for regional development and entrepreneurial promotion is the establishment of startup incubation programs and innovation hubs aimed at nurturing

the growth and development of early-stage ventures and technology startups based on the success of the start-up and spin-off incubator that the uc3m has had for over 15 years.

The UC3M Science Park is an environment of innovation and helps to start up and develop entrepreneurial projects. In its relation with society, UC3M acts as a catalyst for the innovative and entrepreneurial ecosystem of its surroundings, positively impacting economic and social development.

The UC3M Incubation and Acceleration Program for Companies has supported and contributed to the creation of more than 150 innovative companies. This program offers different services to guarantee the company's launching and consolidation within the market, including funding, commercialization and internationalization support, strategic assessment and guidance regarding industrial and intellectual property, access to UC3M R+D capabilities and networking. The business community of the Carlos III University of Madrid Science Park is made up of 22 startups and eight spin-offs. Of the latter, 50 percent is owned by UC3M.

The community includes innovation-driven companies and institutions, which collaborate through corporate programs, such as the European Space Agency (ESA), or by promoting innovation laboratories with different University Research Groups, such as Airbus, Telefónica or the Royal Board on Disability dependent on the Ministry of Health, Social Services and Equality. Likewise, more than 70 companies located in Leganés Tecnológico are part of our community.

These programs provide aspiring entrepreneurs with access to mentorship, funding, workspace, and support services, enabling them to transform innovative ideas into viable businesses with high growth potential. By fostering a supportive ecosystem for entrepreneurship, these initiatives stimulate job creation, wealth generation, and economic diversification, thereby contributing to the overall socio-economic development of the region.

Moreover, industry-academia collaboration and technology transfer initiatives play a crucial role in driving regional development and innovation-led growth. By forging strategic partnerships with local industries and research institutions, the collaboration facilitates the co-creation and commercialization of innovative products, processes, and technologies with commercial potential. These collaborations not only foster the transfer of knowledge, expertise, and technology from academia to industry but also stimulate industry-led research and development activities, thereby enhancing the competitiveness and resilience of local industries and fostering a culture of innovation-driven entrepreneurship in the region.

Furthermore, the collaboration supports the development of innovation clusters and value chains in key strategic sectors such as advanced manufacturing, information technology, biotechnology, and renewable energy. By leveraging Getafe's industrial heritage and UC3M's research expertise, the collaboration seeks to capitalize on the

region's comparative advantages and sectoral strengths to drive innovation-led economic growth and job creation. Through targeted investments, infrastructure development, and policy support, the collaboration aims to create a conducive environment for innovation, entrepreneurship, and industrial diversification, thereby enhancing the region's competitiveness and attractiveness as a destination for investment and talent.

Additionally, entrepreneurship education and capacity building measures play an important role in promoting innovation and entrepreneurial culture among the business needs of youth and entrepreneurs in the region. These projects provide training, coaching and mentoring, helping people develop the skills, knowledge and confidence needed to start a business and supporting the business and development of their communities. These measures have laid the foundation for the long-term growth and prosperity of the region by encouraging the thinking and wisdom of the business community.

Additionally, policy advice and support are important to create a conducive environment for business and innovation in the region. The partnership aims to remove access barriers, reduce administrative burdens and create a level playing field for startups and SMEs by advocating for the promotion of laws, regulations and incentives that support entrepreneurship, innovation and investment. By collaborating with policymakers, business stakeholders and community leaders, the partnership is designed to develop policy frameworks and create useful exchanges for innovation-focused businesses in the region.

Proof of this is the initiative by the Getafe City Council to publish the regulatory bases for contracts to help companies for **industrial protection** through patents and also the publication for university-business collaboration with its **Industrial Doctorates**: Four-year grants to companies whose purpose is to promote the implementation of industrial research or experimental development projects, in which a doctoral thesis is included, in order to encourage the employment of research personnel in companies from the beginning of their professional careers, contribute to the employability of these researchers and promote the incorporation of talent in the productive fabric to increase its competitiveness.

Industrial research or experimental development projects may be carried out entirely within the company or in collaboration between the company and another public or private entity.

The aid comprises three concepts: the financing of contracts, aid for stays in R&D entities and aid to finance tuition fees for doctoral studies.

In summary, regional development and business promotion are the main objectives of the cooperation between UC3M and Getafe within the scope of the Getafe Innovation Program, which aims to support innovation-based economic growth, employment creation and health in the region. Through the integration of response plans,

collaboration and capacity building, the partnership is designed to create a joint venture, regeneration and sustainable construction, thus transforming Getafe into a strong and dynamic city of business and innovation.

## 5 Overcoming challenges

The implementation of all these activities for the stimulation of technological innovation through technology transfer, aimed at both the generation of new business fabric and the strengthening of existing companies, is no stranger to various existing challenges.

One such challenge is the ought to overcome organization boundaries and bureaucratic obstacles that will obstruct the smooth usage of joint activities. This incorporates adjusting the targets and needs of UC3M and Getafe, streamlining decision-making processes, and cultivating a culture of collaboration and partnership.

Another challenge is the need to bridge the hole between the scholarly world and industry, guaranteeing that investigate discoveries are viably interpreted into commonsense arrangements with real-world applications. This requires closer collaboration between analysts, business people, and industry experts, as well as the improvement of instruments for innovation exchange and information exchange.

The challenges facing the municipality of Getafe not only in terms of the modernisation of its industry, but also in terms of its R&D strategy and its move towards a knowledge-based business industry are among others:

- Awareness and Sensitization: In spite of endeavors by the open organization in later a long time, expanding mindfulness of the significance of development and the appropriation of troublesome innovations as a portion of the advanced change prepared in nearby businesses remains a challenge.
- Access to Budgetary Assets: One of the most impediments distinguished by companies is to get financing from the Public Administration and some other private investors to carry out advancement ventures and receive progressed innovations. The financial toll taken a toll related to actualizing innovative arrangements and the need of information about accessible state financial help speak to a critical challenge.
- Training and Capacity Building: In spite of the fact that there's a certain level of information about concepts related to Industry 4.0, such as the Internet of Things, Big Data, and Artificial Intelligence, companies recognize the need to make strides in the preparation and capacity building of their staff in these zones. The deficiency of master personnel in developing advances and the need of encounter in executing imaginative arrangements are challenges that ought to be addressed.

- Digitalization and Prepare Robotization: Whereas companies recognize the potential benefits of digitalization and handle robotization, such as expanded proficiency and efficiency, they still face challenges in viable execution due to budgetary imperatives and a need of inner assets to carry out computerized change projects.
- Promotion of Advancement: Getafe ought to advance a culture of advancement and business enterprise among neighborhood businesses by empowering collaboration, information sharing, and organizing inside the commerce environment. This would include creating particular bolster programs, facilitating access to coworking spaces, and advancing university-industry collaboration to drive connected inquiry about and innovation transfer.
- Overcoming Resistance to Alter: In spite of the intrigued communicated by numerous companies in embracing imaginative advances, there's still a few settled in resistance to alter inside organizational culture. Overcoming this resistance requires visionary administration, successful communication, and organizational alter programs including all levels of the company.

In rundown, for Getafe to position itself as a center of development and trade advancement, it is pivotal to address these challenges comprehensively by advancing mindfulness, encouraging get to to budgetary assets, reinforcing preparing and capacity building, incentivizing the appropriation of progressed innovations, advancing collaboration, and overcoming resistance to alter.

Furthermore, the collaboration must explore the energetic nature of the development scene, adjusting to rising patterns, innovations, and advertisement requests. This requires dexterity, adaptability, and a readiness to explore with modern approaches and methodologies to stay significant and impactful in a quickly advancing environment.

Moreover, the supportability of the collaboration depends on securing satisfactory subsidizing and assets to bolster continuous activities and exercises. This requires the improvement of maintainable subsidizing models, the development of vital associations, and the interest of elective income streams to guarantee the long-term reasonability of the collaboration.

Despite these challenges, the UC3M-Getafe collaboration remains committed to overcoming deterrents and realizing its vision of cultivating development, business, and territorial advancement in Getafe and past.

## 6 Future prospects

The Universidad Carlos III de Madrid (UC3M) stands as an urgent player in forming long-term development, not as it were inside Getafe but moreover inside the broader

locale and past. Here are a few key perspectives of its future prospects in cultivating innovation:

**Expansion of Inquire about and Advancement:** The college is balanced to proceed growing its investigation capabilities over different areas, cultivating intrigue collaboration and driving forward innovative breakthroughs. This will contribute essentially to the era of unused information and the advancement of cutting-edge arrangements to societal challenges.

**Strengthening Business Environment:** UC3M's Parque Científico de Leganés serves as a catalyst for cultivating enterprise and sustaining new companies and spin-offs. Moving forward, the college will likely heighten its endeavors to bolster entrepreneurial wanderers by giving framework, mentorship programs, and financing opportunities.

**Enhancing Industry Collaboration:** The university's collaboration with neighborhood businesses, counting those in Getafe, is anticipated to extend, driving to more impactful innovation exchange and commercialization of inquiry about results. This collaborative approach will cultivate innovation-driven associations that advantage both the scholarly world and industry.

**Internationalization and Worldwide Engagement:** UC3M will proceed to fortify its worldwide organizations and collaborations, encouraging information trade and innovation exchange on a worldwide scale. By locks in with driving teach around the world, the college will improve its inquire about environment and broaden its affect on the worldwide advancement landscape.

**Promotion of STEM:** To support the following era of trend-setters and business people, UC3M will center on advancing STEM (Science, Innovation, Building, and Arithmetic) instruction at all levels. By motivating understudies to seek after careers in STEM areas and giving them commonsense learning encounters, the college will contribute to building a talented workforce able of driving development forward.

In the case of the municipality of Getafe moves towards getting to be a center of development and enterprise, a few future prospects develop that will shape its trajectory:

**Diversification of Industrial Base:** Getafe has the opportunity to broaden its industrial base by pulling in inventive companies working in high-tech segments such as aviation, data innovation, and progressed fabrication. By leveraging its vital area and foundation, the region can position itself as an appealing goal for businesses looking for to improve and grow.

**Economic Revitalization:** Through activities like Getafe Innova, the region points to revitalize its economy by cultivating a culture of advancement and knowledge-based business. Future prospects incorporate the creation of modern work openings, the

fascination of venture capital, and the incitement of financial development driven by innovation-driven industries.

**Infrastructure Improvement:** Getafe's future prospects are closely tied to the advancement of advanced framework and strong civilities conducive to advancement and business enterprise. This incorporates the development of coworking spaces, the foundation of development centers, and the improvement of advanced network to encourage collaboration and information exchange.

**Talent Maintenance and Fascination:** counting on the innovation poles that are the uc3m's own ecosystem and the one generated by a company like AIRBUS, to maintain its development as an innovative region, Getafe must center on holding neighborhood ability and drawing in gifted experts from different foundations. By contributing in instruction, preparing, and proficient advancement programs, the district can sustain a skilled workforce able of driving development and competitiveness.

**Community Engagement and Support:** Getafe's future victory as an advancement biological system pivots on the dynamic engagement and cooperation of its community individuals, counting businesses, scholarly teach, government organizations, and inhabitants. Future prospects incorporate the fostering of a collaborative and comprehensive environment where thoughts are traded, associations are shaped, and collective activity drives positive change.

Both, UC3M and the municipality of Getafe hold promising future prospects in progressing advancement, cultivating financial development, and forming the region's improvement direction. By capitalizing on their qualities, cultivating collaboration, and grasping a forward-thinking mentality, they can open modern openings and make a flourishing biological system conducive to advancement and thriving.

And in the relationship between the two entities, looking ahead, the UC3M-Getafe collaboration holds tremendous potential for advance development and affect. As the organization proceeds to develop, there are a few openings for extension and enhancement of activities.

One such opportunity is the scaling up of effective activities and programs to reach a broader group of onlookers and accomplish more prominent affect. This incorporates extending the reach of workshops, preparing programs, and hatching administrations to draw in more members and back a bigger number of new businesses and entrepreneurs.

Moreover, the collaboration can investigate unused roads for development and business enterprise, such as developing advances, supportability activities, and social affect ventures. By remaining side by side of patterns and showcase requests, UC3M and Getafe can recognize unused zones of opportunity and create focused on programs to address them.

Furthermore, the collaboration can fortify its universal associations and systems to cultivate more prominent cross-border collaboration and information trade. By locking

in with worldwide partners, UC3M and Getafe can use worldwide ability, assets, and showcase openings to drive advancement and development within the region.

Overall, long run prospects of the UC3M-Getafe collaboration are shinning, with sufficient openings for proceeded development, affect, and victory. By remaining dexterous, versatile, and collaborative, UC3M and Getafe can open unused conceivable outcomes and make enduring esteem for the community.

## 7 Conclusion

In conclusion and focusing on the relationship between the university and the municipality as agents with a clear innovative vocation, marks a critical step towards cultivating inquire about and advancement (R&D) activities and advancing development inside the locale. Getafe, generally known for its mechanical ability, is experiencing a change towards getting to be a center of innovative development and enterprise. This move presents both challenges and openings for the region because it looks for to use its mechanical legacy to drive financial development and adjust to the requests of the knowledge-based economy.

For UC3M, Getafe speaks to a vital accomplice in its mission to advance innovative exchange and drive development. By building up collaborative systems with nearby businesses, counting mammoths like Airbus, UC3M can tap into Getafe's mechanical mastery and assets to support its investigate exercises and upgrade its affect on society. Through activities like Getafe Innova and the Parque Científico de Leganés, UC3M is well-positioned to contribute to Getafe's R&D environment by giving ability, framework, and back for new businesses, spin-offs, and inquire about initiatives.

From Getafe's viewpoint, the collaboration with UC3M presents an opportunity to revitalize its mechanical scene and grasp the move towards a knowledge-driven economy. By leveraging UC3M's scholarly brilliance and investigate capabilities, Getafe can pull in speculation, ability, and advancement to fuel its financial improvement. Activities such as industry-academia associations, innovation exchange programs, and development center points can encourage the integration of cutting-edge inquire about into Getafe's mechanical forms, hence upgrading competitiveness and cultivating economical growth.

However, Getafe too faces challenges on its way to getting to be a center of development. These challenges incorporate overcoming bequest mechanical structures, cultivating a culture of advancement, tending to aptitudes crevices, and securing satisfactory financing for R&D activities. Also, guaranteeing evenhanded get to to openings and advancing inclusivity in development are fundamental contemplations for Getafe's advancement strategy.

In conclusion, the collaboration between UC3M and Getafe holds gigantic potential for driving inquire about, innovation, and financial improvement within the locale. By working together, UC3M and Getafe can use their complementary qualities to make a dynamic biological system of R&D, enterprise, and mechanical advancement. As they explore the complexities of the present day economy, UC3M and Getafe have the opportunity to fashion a way towards a future characterized by thriving, supportability, and comprehensive development.

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# **Establishing local innovation ecosystems through global partnerships**

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## **Abstract**

Universities, with their extensive international collaborations, play pivotal roles in connecting business and education within innovation ecosystems. However, challenges hinder their ability to fully realize these opportunities. This case study examines the establishment of the Education Innovation Lab (EIL) in Latvia to address these challenges and become a central component of the Latvian innovation ecosystem. The aim is to utilize the global network of partners from Riga Technical University and Riga Business School to foster an innovation ecosystem that is both inward and outward looking. The paper documents the experience of launching the lab's inaugural project in collaboration with the Massachusetts Institute of Technology (MIT), which convened 100 educators and industry experts to brainstorm innovation ideas and formulate implementation plans.

## **Keywords**

Education innovation, innovation ecosystem, global partnerships

## **1 Introduction**

Universities through their international collaboration and broad networks are uniquely positioned to act as keystones in innovation ecosystems that connect business and education. However, universities need help in realizing these opportunities due to existing processes and the need to form extensive local and global cooperation. In this case study, we document the experience of creating a dedicated unit for filling these functions - the Education Innovation Lab (EIL) in Latvia, which was established to be the keystone of the Latvian innovation ecosystem.

The goal of the lab is to leverage the existing network of global partners of Riga Technical University and Riga Business School to help develop an innovation ecosystem that is both inward and outward-looking. In collaboration with the Massachusetts Institute of Technology (MIT), the EIL launched its first project which gathered 100 educators and industry experts to help them workshop innovation ideas and develop implementation plans.

In this article, we report on the work of the EIL in its first years of operation and the successes and challenges encountered along the way. We then conclude with recommendations for other organizations that wish to pursue similar approaches to developing innovation.

## **2 Structure of the full paper**

The paper comprises an introduction to the theoretical framework of innovation, followed by an analysis of the innovation ecosystem in Latvia. The program process is delineated in the chapter titled "What We Did," wherein we expound on the programs implemented, the role of our international partner MIT J-WEL, and the constituent elements of the program.

The key insights and best practices are encapsulated in the chapter titled "What Worked and What Didn't," which evaluates each phase of the program, commencing with stakeholder management to secure buy-in for the initiative, and culminating in gathering participant feedback on their program experience. The outcomes of the launched program are detailed in the chapter titled "Main Results."

The Conclusions and Next Steps section summarizes the experience of establishing local innovation ecosystems through global partnerships in Latvia.

### **3    What is innovation?**

The purpose of creating an education innovation ecosystem in Latvia is to align the education practice with the necessity of the country's economic transformation to meet the opportunities and challenges provided by technology development in the last decades. Technology has altered the tools utilized, lifestyle habits, and work practices of people, therefore innovative approaches are required to provide high-quality education.

Innovation, as defined by O'Sullivan and Dooley (2008), encompasses a spectrum of changes, ranging from incremental to radical, across products, processes, and services. It involves not only the generation of new ideas but crucially their implementation and the resultant outcomes, distinguishing it from mere creativity or invention. While disruptive innovation garners significant attention, incremental innovation, which entails refining existing practices, is equally impactful and prevalent (Richter et.al, 2017; Hunsaker & Knowles, 2021).

Serdyukov (2017) underscores the importance of gauging innovation's impact, categorizing it into three levels: process adjustment, process modification, and system transformation. Moreover, innovation can manifest in both generation and adoption, signifying the creation of entirely new concepts or the integration of existing ones into new contexts (Damanpour, 2017). Innovation extends beyond product realms, influencing strategies, processes, and approaches, reflecting its multifaceted nature (Shelton, 2011).

The complexity of innovation lies in its multidimensionality, necessitating a visionary outlook and concerted actions (Hord, et.al, 2006). Large-scale innovations often require a confluence of multiple innovations, further accentuating its intricate nature (van den Berg, 1999). Modern discourse surrounding innovation increasingly incorporates

notions of values, community, and accountability (George, et.al, 2006). Kahn (2018) identifies outcome, process, and mindset as pivotal elements of innovation, highlighting its holistic nature.

Despite its societal encouragement, innovation is not devoid of risks, with success being far from guaranteed (Damanpour, 2017). Organizations must carefully define their innovation goals and reasons to mitigate these risks (Hunsaker & Knowles, 2021). Innovation, when diverging from existing competencies, can even be competence-destroying (Tushman & Anderson, 1986). Ultimately, at the heart of innovation lies the aspiration to enhance lives (Jiang, 2015).

During the implementation of our program, we have adhered to the aforementioned knowledge of innovations, with a particular emphasis on stimulating the generation of innovative ideas within their immediate environment by exposing participants to the MIT approach. Furthermore, we have equipped participants with robust management tools to define goals, identify risks and opportunities, and facilitated community building.

## 4 Innovation ecosystems in Latvia

In defining innovation ecosystems, we used a framework developed by the MIT D-Lab (Hoefcker, 2019), wherein they define local innovation ecosystems as “place-based communities of interacting actors engaged in producing innovation and supporting processes of innovation, along with the infrastructure, resources, and enabling environment that allows them to create, adopt, and spread more effective ways of doing things” (p. 4). Thus, innovation ecosystems exist to support innovation in an outcome, process, and mindset sense, with the key aspect being the interconnected network of actors, infrastructure, and resources.

An innovation ecosystem at a macro level is composed of three important attributes - the purpose; its actors and elements; and the relationships and interconnections between actors and elements (Hoefcker, 2019).

Through the interplay of these core building blocks, innovation ecosystems can be of different sizes and levels of integration, ranging from small ecosystems of tightly knit organizations focusing on one specific industry or topic to broad loosely coupled ecosystems of organizations addressing a range of macro problems.

Acknowledging that there has been extensive work by other organizations and individuals in creating innovation ecosystems in Latvia, we conducted a mapping of the existing innovation ecosystem in Latvia. We documented all organizations that have worked to increase collaboration between government, industry, and/or educational institutions and mapped the degree to which they were action-oriented and the industries that they collaborated with.

We defined action-oriented organizations as ones that were actively working to provide education and training opportunities, mentoring, as well as funding and support for the members of their innovation ecosystem. At the other end of the spectrum, network-oriented organizations were mostly oriented toward creating opportunities for innovation ecosystem participants to meet and mingle and learn from each other.

What we found through our mapping of the Latvian ecosystem was that the numbers of organizations were roughly evenly split between being more action-oriented or network-oriented. At the same time, we found that most of the organizations working in the Latvian innovation ecosystem are narrowly focused, working on specific topics and industries such as 5g technologies or financial services.

Based on our mapping, we identified a niche for EIL wherein we would focus on being an action-oriented organization that would use the tools and opportunities provided by education to assist a broad range of industries beyond just educational institutions. This was also reflected in how the work of the EIL was structured and conducted.

## 5 What we did

As one of the first steps to enhance innovation within Latvia's higher education ecosystem during 2023, EIL run three programs:

- (1) **The Strategic Innovation Project Support Program** (6 project teams): The goal of this program was to lead and support teams from the four different science-based universities in Latvia as they went from identifying an issue in their institution through research, testing, and development all the way to creating an implementation plan for the innovative initiative that was presented to the leadership of their institution. The process consisted of a broad range of support – a) providing research support, b) mentoring, c) training & consulting, and d) documenting & reporting on team progress and successes e) a field visit to MIT
- (2) **The Ecosystem Innovation Project Management Program** (17 leaders): This program aimed to empower individual leaders with the know-how of innovation policy-making and innovation project management. It ran parallel to the project support program and consisted of a) an EdX course, b) workshops, and c) a field visit to MIT
- (3) **The Strategic Ecosystem Management Program** (35 top-level education and policymaking leaders and managers): This program was designed for the policymakers and decision-makers within the higher education system, governmental bodies, and the industry and included a) workshops and b) a field visit to MIT.

## **5.1 The role of international partners - MIT J-WEL**

The MIT Jameel World Education Lab (MIT J-WEL) works with educators across the world through a mix of ambitious projects for wide-scale transformation, innovative research efforts, and ongoing global interactions. MIT J-WEL tackles challenges in education by building on MIT's strengths, leveraging real-world experience and an evidence-based approach.

Education Innovation Laboratory decided to collaborate with MIT J-WEL because of several reasons:

- (1) Through MIT J-WEL Education Innovation Lab gained access to the world's best experiences;
- (2) MIT J-WEL has an existing partner network around the world, so they are acquainted with various education systems.

The programs were launched and closed with conferences in Riga, to facilitate networking between participants and stakeholders, help develop the project advocacy skills of participants, and strengthen the innovation ecosystem.

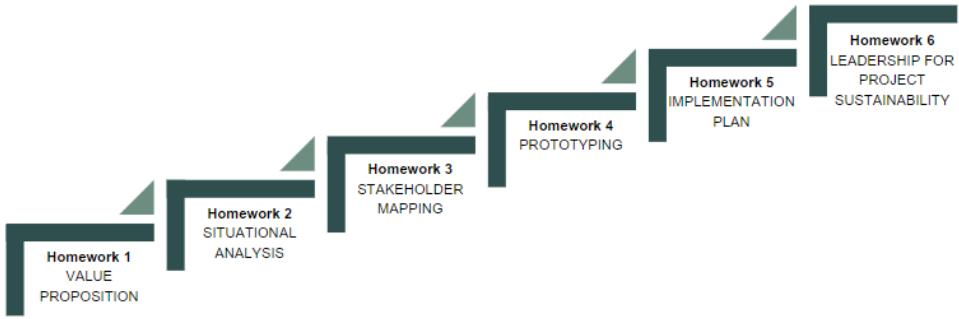
Candidates for the program were expected to hold leadership roles within Latvia's government, business, or educational institutions and have specific plans and commitments to support Latvia's higher education system through innovation either as individuals or working in a team.

## **5.2 Program design**

The Strategic Education Innovation Project Support Program was designed to lead teams through the innovation development process. The program consisted of two parallel streams:

1. Innovation Project Management Framework
2. Mentoring

The goal of the project management streams was to provide the teams with a clear step-by-step process to develop the project's idea into a feasible implementation plan.



*Fig. 1: Project Management Process*

Project management occurred through six steps that were meant to help guide the participants in thinking through the main aspects of their project and set them up for success.

- (1) **Value Proposition:** The goal was to define the value proposition of the project and test it with the beneficiaries. The requirement for the first homework was to define the value proposition of the project and run it with at least two beneficiaries. The majority of the participants adjusted their ideas after. The goal of the activity – verify one's assumptions on the value and feasibility of the project with end users.
- (2) **Current Situation Analysis:** Participants analyzed and described the current situation, applying the PESTLE model and 7S model. The PESTLE model evaluates the existing external context based on political, economic, socio-demographic, technological, legal, and environmental factors. It's often used to structure the data of external environment factors. The EIL Research team created a general review of external environmental factors affecting the education sector in Latvia. Participants were invited to ask for specific data related to their innovation project ideas.
- (3) **Stakeholder Mapping:** We asked participants to draw the initial project implementation plan to see the different stages the project will be going through. The stakeholders and their impact on the project's success had to be identified, developing a communication strategy with them. The goal of the activity was to identify stakeholders and make sure they were engaged in the project timely.
- (4) **Prototyping:** The goal of this activity was to create a “hands-on” experience by creating and learning from a prototype of their project. This would help to show the potential “gaps” in the project that they were developing and help them approach the issue from various angles.

**(5) Implementation Plan:** We asked participants to develop a detailed project implementation plan step by step. The goal of this activity is to make participants thoroughly rethink their project implementation ensuring that the sequence of the steps is sequential and logical, as well as to formulate the next steps that need to be done so that the innovation initiative would be put into place in their institution.

**(6) Leadership for Project Sustainability:** The goal was to invite participants to evaluate their leadership potential and succession to secure the sustainability of their innovation.

Participants defined the value proposition of their innovation idea, created an analysis of the current situation, mapped stakeholders, made prototypes, created developments, and thought through the leadership aspects to secure the sustainability of their project.

To ensure that participants have a clear framework of how their innovation might have an impact and also to ensure greater validity of their approach, we tasked the participants with developing theories of change.

To guide, encourage, and challenge each team's efforts, we designed a mentoring program that paired each team with two mentors throughout the project. The goal of the mentoring sessions was not didactic—we were not instructing—but advisory and responsive. We asked: How has the project developed this week? What obstacles are looming today? Where do we think the team might usefully direct its attention next? We imagined mentoring as a vehicle for advancing each project team's work and as a device to support both accountability and momentum. Naturally, it also served as a learning mechanism and a space for coordinating the team itself.

At the start, mentors reviewed and discussed incoming project proposals, providing the EIL team with a preview of the ideas for each project. These early discussions also flagged potential weaknesses and challenges for specific projects, bringing the attention of mentors to key details in the projects that will need additional support.

Mentors chose projects that matched their interests, and we launched a regular cadence of calibration meetings (hour-long structured meetings with all mentors and the rest of the enabling team) as well as mentor-project team meetings (also an hour). Mentor-project team meetings took place every other week, and there were a total of 4 calibration meetings throughout the program providing the program with a rhythm to drive regular progress.

Calibration meetings were built around a quick review of each team's progress. Mentors and both the EIL and MIT J-WEL teams shared ideas and materials likely to be valuable to one or more teams. The meetings provided the team with a space for discussing questions, concerns, small wins, and surprises. Mentors had a curated set of readings that they used to share with project teams, allowing more specific support to teams in

various situations and giving academic and research support as the teams developed their projects while balancing their jobs and other commitments.

Mentor-team meetings tackled emerging questions from teams and provided an important means for probing and advancing their thinking and action planning. The philosophy behind the mentoring approach was that the project work would provide the required learning opportunities for the teams, which the mentor would help navigate and learn from.

During the mentoring process, some teams required more hands-on support. Deviations from the initial outlined schedules were the norm to sufficiently support the needs of these teams and to ensure quality development that would continue even outside of the program's structured schedule.

The key observations were towards workload expectations (teams were not prepared to contribute the time required by the program), understanding mentoring (there was a sense that the mentor is the one leading the process not the team itself), team dynamics (there were a couple of well-established teams while some teams were adjusting their size and participants throughout the program). All of these factors led to rises and falls in the teams' motivation, and at times their efficiency.

The goal of providing teams with research support was to promote evidence-based action by providing reviews and evidence of existing solutions and their evaluations. For all project teams, a literature review on the respective topic was provided by default, with it being available for leaders who requested one. The literature review was based on the project proposal that the participants submitted and was meant to be a stand-alone document that provided a quick overview of the project, the key results, and an extensive review of similar solutions and their efficacy if it was available.

The research support was also available on an ad-hoc basis, providing summaries and reviews of solutions and evidence that pertained to the solution but were not about the solution itself. Examples of such ad-hoc reviews include partnership agreements between universities and the use of AI in public service.

The project pitch training was added to the program ad-hoc after the training need was identified during the visit to MIT. The feedback received from those who were involved in the pitch training was overwhelmingly positive. We saw that this pushed the teams to be able to concisely present their project to an audience engagingly and efficiently. This was a two-step process, as they first gained general knowledge and training, and in the second part, they were forced to give a live pitch in front of the EIL team and the pitch training expert. They were then provided with immediate feedback and support so that they could adjust and prepare for the recording that took place at Delfi studios, as well as the live pitches that they would be giving at the program closing conference. These videos were then used for the teams to be able to use in their future endeavors, as well as to have for EIL to commemorate the work that was done in the 2023 year program.

The workflow was designed assuming the largest share of the work to be done by the teams independently. The mentoring sessions and workshops were planned regularly and interwoven throughout the entirety of the program. During workshops, the next project step was introduced. The following mentoring session could address the challenges people address working on it. The Strategic Education Innovation Project Support Program was as follows:

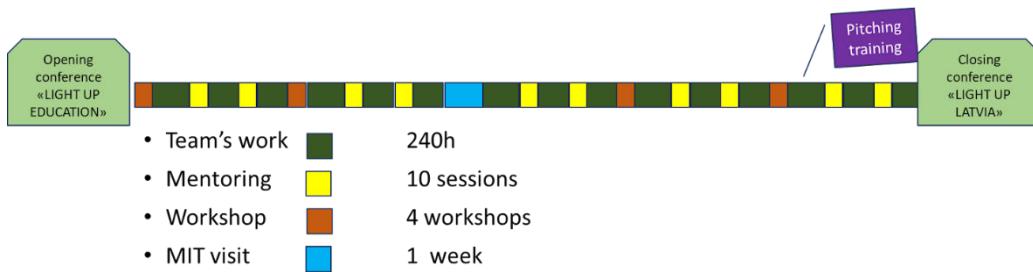


Fig. 2: Workflow for the Strategic Education Innovation Project Support Program

The goal of the overall program setup was to provide wraparound support to participants while at the same time being elastic enough to permit them to meet their other commitments. Thus, the setup included regular research support and feedback, with a more intensive course during the summer.

## 6 What worked, what didn't

One of the greatest successes was establishing an open and collaborative framework wherein the EIL collaborated with the four largest universities in Latvia, which altogether represented more than half of all students enrolled in higher education in the country. The successful collaboration allowed us to engage 84 highly committed participants and we hope that we will be able to have a systemic impact through our work.

The recruitment process, while successful, faced challenges due to incomplete program details at the outset. Consequently, communication from the EIL was occasionally unclear. A more meticulous recruitment process could have better-aligned content, learning tools, and techniques.

Initially, the program aimed to address specific participant needs by dividing them into three streams. However, this approach inadvertently added unnecessary complexity and confusion. Notably, the Strategic Innovation Project Support Program and the Ecosystem Innovation Project Management Program progressed simultaneously, causing overlap. Future projects will consolidate into a single program, enhancing

clarity and promoting collaboration across hierarchical levels within educational institutions.

Challenges arose during the program. The stream focused on strategic innovation leaders faced time constraints for interaction and idea sharing. Some leaders demonstrated a lack of discipline by not fully engaging in lectures and events during the MIT visit. Across all streams, timely submission of interim assignments proved challenging, impacting workload planning and project proposal quality.

The Ecosystem Innovation Project Management Program required participants to maintain weekly reflection reports. Unfortunately, compliance was low, possibly due to a perceived lack of value, time constraints, or insufficient reflection skills. In contrast, participants in the Strategic Ecosystem Management Program felt that the allocated time for reflection and idea discussion was insufficient.

Despite challenges, core principles such as goal-oriented project management, evidence-based decision-making, and mentoring were agreed upon. The program flow was dynamically constructed, leading to some frustrations between the EIL and MIT teams. Future planning phases should receive more attention to align activities effectively.

Participants in the Strategic Innovation Project Support Program highly valued mentoring. Diverse mentor teams (including both Latvian and MIT mentors) provided valuable insights. “Calibration meetings” allowed mentors to collaborate and enhance support strategies.

We discovered that the project management process steps offered a valuable framework throughout the program, affording participants structure and a clear sense of progress. This enabled them to navigate the process more effectively and gain project management skills.

The participants also appreciated the support of EIL’s research team, which provided them with literature and evidence reviews based on their proposed projects. This provided participants with important data on the potential outcomes of their projects.

The records have been made for each meeting and training thus providing a vast material for the deeper research on how to progress the innovation projects in education.

In every people skills development program, soliciting feedback from participants is a crucial aspect. Following the visit to MIT, participants were requested to provide detailed feedback, not only in terms of rating their experience but also by elaborating on it with a few sentences. However, upon the program’s conclusion two months later, only a few participants completed the entire program evaluation. We attribute this low response rate to participants feeling overwhelmed by time constraints.

The visit to MIT in Boston constituted a fundamental component of the program, contributing to its objectives in two key ways. Primarily, participants had the opportunity to engage with and glean insights from leading experts in their respective fields. Additionally, the visit facilitated a bonding experience amongst participants, establishing the groundwork for the education innovation ecosystem community in Latvia. Given its demonstrable value, such study and experiential trips will be integrated into subsequent programs as an integral and highly beneficial aspect.

A tangible proof that the program worked well is that all 6 projects initiated and developed throughout the program were accepted for implementation by the management of the respective universities.

## 7 Main results

Three programs resulted in 100 program participants having received certificates of completion from this program, representing 28 different institutions from 4 different stakeholder groups were represented in the program participants. Participants generated over 300 submissions of learnings, development, and progress as they developed the innovation project in their institutions.

The project attracted the attention of the President of Republic of Latvia, the ambassador of the USA to Latvia and had significant social media coverage.

All teams delivered the developed innovation implementation plans approved and supported by the management of their respective university. The collaboration capacity within teams and between teams has been improved significantly setting grounds for the education innovation ecosystem community in Latvia. The participants highly valued the knowledge and experience obtained.

## 8 Conclusion and next steps

The necessity to innovate education is there primarily defined by technology development which changed the patterns of how people access and process information, and how people build relationships with each other. Education is both - information (knowledge) and people relations. Having them both changed it's important to review the education systems, at all levels defined by Serdyukov (2017): adjustment or upgrading the process, modification of the process, and transformation of systems.

Achieving a breakthrough in mindset necessitates collaborative efforts. The decision to engage MIT as a partner in our program yielded significant returns. MIT's accumulated expertise and experience, coupled with its work ethos, proved to be an invaluable source of inspiration, simultaneously affording a necessary detachment from daily routines.

Travelling as a cohesive group and undergoing shared learning experiences further fostered community development.

Acar et al. (2018) defined that innovation happens in three steps - idea, implementation, and outcome that produce change. The idea to modernize the education system so far has been implemented by establishing the Education Innovation Laboratory which leads this program. The outcome of the program is the emerging education innovation ecosystem community in Latvia, the impact of which is still on the way.

Innovation is an action. This is what we are striving towards throughout the program - moving participants and ourselves from ideas and discussions to action. The steps we propose to undertake to build solid innovation projects, but that might not be enough. One of the conclusions we came to is that following Kahn (2018) the mindset change might be the greatest innovation we could achieve while innovating education.

Working on the next steps we do focus on three areas:

1. Nurturing the education innovation ecosystem community by securing regular communication in LinkedIn, organizing workshops, and “business after hours”;
2. Working with key stakeholders to secure financing for the next Ecosystem Innovation Project Management Program to re-apply all our learnings and best practices, and strengthen the capacity of the education innovation ecosystem to innovate,
3. Developing a global network of change-makers in education by participating in European and global events organizing ones in Latvia and continuing to learn from the best.

The paper sought to delineate the local innovation ecosystem building through global partnerships. It is limited to one year of experience, one global partner, and one country's boundaries. We're looking forward to expanding our experience by broadening and deepening global partnerships as well as looking forward to learning from experiences in other countries.

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# **FAU and UofL's community-based innovation and industry engagement initiatives: Expanding outreach to underserved entrepreneurs and businesses**

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## **Abstract**

This paper examines the community-based innovation and industry engagement initiatives at Florida Atlantic University (FAU) and the University of Louisville (UofL). Both universities serve diverse communities, including Hispanic populations in South Florida and rural populations in Kentucky. Both are recognized for their multi-disciplinary research with successful tech transfer outcomes. The authors, members of the Committee for Economic and Community Engagement at the U.S. Association of Public and Land Grant Universities (APLU), conducted site visits and engaged in academic discussions to compare each university's approach to supporting underserved communities in accessing technology innovation. The findings highlight the universities' efforts to facilitate access by integrating community engagement into their entrepreneurship programs and collaborating with industry partners to expand resources for underserved entrepreneurs and businesses. The research enterprises at both institutions actively promote economic development by adapting their initiatives to meet the unique needs of their communities while maintaining the high-level requirements of university-led programs. This paper concludes with insights on the parallels between FAU and UofL's community and industry engagement strategies, emphasizing the importance of tailored outreach and support for underserved populations in driving inclusive innovation and economic growth.

## **Keywords**

Community engagement, industry partnerships, innovation, entrepreneurship, underserved communities

## **1 Introduction**

Florida Atlantic University (FAU) and the University of Louisville (UofL) are research universities committed to fostering innovation and economic development in their respective regions. Both institutions recognize the importance of engaging with diverse communities, particularly underserved populations, to ensure equitable access to entrepreneurship resources and technology transfer opportunities. This paper explores the parallels between FAU and UofL's community-based innovation and industry engagement initiatives, highlighting their efforts to expand outreach to underserved entrepreneurs and businesses.

## **2 Structure of the full paper**

## **2.1 Industry Engagement and Innovation at UofL**

For the University of Louisville, being a metropolitan research university goes beyond simply being in a city; it means being an integral part of the community, a living, breathing entity that is deeply intertwined with the urban fabric. It's about more than just sharing a geographic space, it's about forging connections, engaging in dialogue, and actively participating in the growth and development of the city and its people. UofL is not merely a university in the city, but a university of the city, a beacon of knowledge and progress that illuminates the path forward, leveraging research capabilities, resources, and partnerships to develop innovative solutions to complex societal problems.

In 1990, the University of Louisville made a clear commitment to this mission by signing the Declaration of Metropolitan Universities. Since then, UofL has focused on leveraging its research capabilities and interdisciplinary partnerships to address pressing metropolitan problems, from access to healthcare to renewable energy. With this pledge, UofL has grown to be one of only 35 universities in the U.S. to be recognized by the Carnegie R1 Classification, the Carnegie Community Engagement Classification, and the APLU Innovation and Economic Prosperity Designation.

These designations are a recognition that the University of Louisville is uniquely positioned to develop new knowledge and deliver impactful solutions. These capabilities include the Commonwealth's largest engineering school and the Kentucky Manufacturing Extension Partnership, which support the manufacturing community and promotes economic vitality. With these fundamental strengths and more, UofL has established a strong focus on industry engagement, aiming to foster collaborations with businesses, particularly in research and innovation. UofL's Office of Research and Innovation houses the Director of Industry Partnerships position, which facilitates connections between the university and companies for various activities, including sponsored research, service contracts, material transfer agreements, clinical trials, and intellectual property licensing.

This structure emphasizes UofL's commitment to working closely with industry partners to address real-world problems. Innovation and the translation of research into commercial products and services is a part of UofL's legacy. The university's established expertise in this area is supported by prestigious awards such as the Coulter Translational Partnership, National Science Foundation I-Corps, and National Institutes of Health REACH (Research Evaluation And Commercialization Hub). These programs have helped UofL foster strong connections to national and global innovation networks while solidifying its position as a leader in lab-to-market research.

UofL achieves this success through a multi-pronged approach to coordinate research alliances, IP protection and licensing, and new venture creation. No one element alone allows UofL to become a leader in moving discoveries from campus out into the world where they can be put to good use improving lives. Combined they work in synchrony

amplifying the total positive outcome for society. The success of this approach can be quantitatively measure through the success of programs such as the Kentucky Manufacturing Extension Partnership (KY-MEP) housed under the Office of Research and Innovation. Over the past five years, the KY-MEP has had the economic impact of \$642.4 million on the Commonwealth of Kentucky, including \$77.1 million in total cost savings for small and medium sized manufacturers and 7,367 total jobs created or retained.

## **2.2 The Grassroots Program at FAU**

This community-based program led by the Fau Division of Research was created in response to the need to level-up communities to access specialized technical assistance services provided by the division of research that hosts the Small Business Development Center. Providing direct technical assistance to small businesses is the primary and long-lasting activity of the Florida SBDC at FAU. The Florida SBDC at FAU consists of 30 full-time staff. Between 70%-80% of staff provide technical assistance based on their certified area of expertise. Between 20%-30% of staff provide community outreach.

Economic impact data collected and analyzided every year showed the need of increasing confidence and capacity within underserved communities to establish businesses leveraging technological advancements was crucial. To address this, we employed a social innovation approach, leveraging technical assistance to enhance operational efficiencies in existing businesses. Additionally, we introduced consulting-based training to expedite access to FAU's economic and community engagement resources.

Many communities lack awareness or readiness to access capital and financial literacy, which is compounded by the fact that there are limited resources available to pre-qualify applicants who understand and are ready to utilize funding to their benefit. What is more, once funding is granted, there is often a disconnect between the community and the impact these loans produce. The SBDC is closing this gap by adding a level-up approach to their consulting services. By simplifying, translating, and leveraging existing tools to assess and pre-qualify potential applicants while establishing new systems to support post-funding data collection and tracking at the community level. If constituents and stakeholders have data on the degree to which access to capital and financial literacy affects intensive social and economic growth, communities will have invaluable information on how best to promote and educate businesses on the benefits of these resources and, ultimately, improve the quality of life in our region.

Within 5-10 years, low-income communities expect to increase financial literacy, self-sufficiency and sustainability, create a robust rebate of return, and fuel the larger economy by changing the community culture toward enhanced prosperity. That will be possible due to the intervention of the Grassroots at FAU program providing resources

to elevate knowledge and confidence to use micro and small businesses to increase their opportunities to obtain new revenue for their families. Specifically, impact metrics has been established with partnering organizations in targeted communities. For instance, we obtained a baseline of employment rates of individuals seeking to start a business, and review periodically the level of command of skills for increasing employability and for business creation and expansion. In simultaneous, with the business created and incorporated, the Grassroots program tracks access to capital while provides services in education, financial wellness, assisted living, vocational training, health and wellness, transitional support, among others. These businesses have been identified based on the needs of their communities and how technology can be leveraged to increase their quality of life.

### **2.3 Parallels in Community and Industry Engagement**

FAU and UofL approach community and industry engagement in similar ways, both serving diverse populations and with a focus on support for underserved communities. Both have strategic geographic locations with accessibility by air, road, rail, or water. FAU is in vibrant metropolitan south Florida and Louisville is within a single-day drive of 65% of the U.S. population.

UofL has a dedicated Office of Industry Engagement, which focuses on partnerships with industry for the mutual exchange of knowledge and resources. This office promotes transformative experiences for faculty, staff, and students through engaged research, scholarship, outreach, and service, addressing community issues in Louisville, across the region, and around the world. This engagement is part of UofL's mission to share the benefits of its research and knowledge for the public good, with a focus on areas such as educational attainment, economic development, health & quality of life, and social & human services. UofL's approach to industry engagement is about collaborative efforts and partnerships with the region, explicitly utilizing industry clusters as a strategy for economic development.

Similar to UofL, FAU also engages in industry outreach and partnerships through the Florida Small Business Development Center (SBDC) at FAU has launched a grassroots initiative to expand its outreach to underserved communities and underserved regions in Broward and Palm Beach counties. This initiative, called Grassroots, aims to provide specialized technical assistance and resources to six business entities. The program is designed to offer support in various areas such as business plans, group training, funding support, and tools for growth and entrepreneurship.

The Grassroots initiative has obtained imvestment from the the Small Business Administration, the Coronavirus Aid, Relief, and Economic Security Act, and other private partners. It is part of the broader efforts of the Florida SBDC at FAU to help small and medium-sized businesses in South Florida by providing them with resources

and assistance. The program also offers no-cost, confidential, one-on-one consulting services, either virtually or in-person, to help businesses navigate challenges and achieve success. The approach to supporting small to medium-sized business is comparable to the approach taken by the KY-MEP. As part of the Manufacturing Extension Partnership (MEP) National Network, KY-MEP is the official representative of this network in Kentucky, which spans all 50 states and Puerto Rico. KY-MEP leverages the expertise and capacity of the University of Louisville to provide research, business development, access to talent, and other supports to Kentucky manufacturers. The organization aims to solve problems for Kentucky manufacturers through operational efficiency, developing leaders, and igniting innovative growth. By becoming an ally and a connection to resources at the University of Louisville and their statewide partners, KY-MEP makes reliable resources accessible to Kentucky businesses. This team-based approach ensures immediate and long-term solutions that increase top-line growth, reduce bottom-line cost, and sustain improvements in manufacturing plants.

Similar to the KY-MEP, the Florida SBDC at FAU is known for its high-level consulting and training services, leveraging robust databases, business research resources, and knowledgeable expert consultants. It caters to businesses in various stages of development, from pre-venture to established companies. The program has been recognized for its excellence, having received the prestigious “NASBITE International 2023 Program Excellence Award”, two time the center of the year in Florida SBDC Network and the Small Business Administration for its work in developing and promoting international trade as well as assist underserved communities accessing specialized business assistance services.

These approaches build on the regional strengths and address challenges inherent to the places where FAU and UofL exist. As a major hub for UPS and Amazon, Kentucky has attracted businesses due to its strong logistics and distribution capabilities, while the region where Florida Atlantic University (FAU) offers transformational experiences through partnerships with leading research organizations like the Max Planck Florida Institute for Neuroscience and The Scripps Research Institute. These efforts demonstrate FAU's dedication to translating research into products, policy, and technology that improve daily life.

Moreover, FAU supports economic engagement under its anchors SBDC and the APEX Accelerator. Feeders of those programs are innovation initiatives such as the FAU Wave, an undergraduate research and entrepreneurial competition, and the Research Park at Florida Atlantic, which provides a supportive environment for companies engaged in research and development. These programs help to drive innovation, create jobs, and build wealth in the region.

Despite these strengths, South Florida and Kentucky face challenges related to economic opportunities, environmental quality, and educational access. Addressing

these challenges requires a comprehensive and collaborative approach involving various stakeholders, including government, business, academia, and the community. Both universities serve diverse populations, including Hispanic communities in South Florida and a rural population in Kentucky. Demographically, Louisville is an excellent match to the sociodemographic, economic, and health-related characteristics of the U.S. as a whole. It is also important to recognize that the regions served by FAU and UofL are not homogenous. There are stark contrasts in some respects. For example, Jefferson County, where Louisville is located, is urban and home to about 25% of the state's residents, whereas the surrounding state is rural with much lower population densities. Even within individual counties there can be significant disparities in prosperity and health, such as those seen between east and west Jefferson County.

In summary, programs at both FAU and UofL are designed to build on regional strengths and opportunities to address some of the unmet needs and disparities that exist in communities. Both universities are universally recognized for their multi-disciplinary research with successful tech transfer outcomes in health, manufacturing, and natural resources while the research enterprises at both institutions actively promote economic development by adapting their initiatives to meet the unique needs of their communities while also producing world class scholarship. FAU's SBDC grassroots initiatives and UofL's industry partnership programs, including the KY-MEP, demonstrate their commitment to expanding access to innovation and entrepreneurship resources for underserved populations, both urban and rural.

### **3 Conclusions and recommendations**

The comparative analysis of FAU and UofL's community-based innovation and industry engagement initiatives reveals the importance of tailored outreach and support for underserved entrepreneurs and businesses. By integrating community engagement into their entrepreneurship programs and collaborating with industry partners, both universities are driving inclusive innovation and economic growth in their regions.

As members of the Committee for Economic and Community Engagement at the U.S. Association of Public and Land Grant Universities, the authors' site visits and academic discussions provide valuable insights into the parallels between FAU and UofL's strategies for supporting diverse communities and economic development. These findings emphasize the crucial role that research universities play in fostering equitable access to technology transfer and entrepreneurship opportunities, ultimately contributing to the economic development of their regions.

A compelling comparative analysis of FAU's SBDC grassroots initiative and UofL's KY-MEP reveals their pivotal role in driving inclusive innovation and economic growth in their respective regions. As both institutions deliver community-based initiatives and

industry engagement strategies that emphasize the importance of tailored outreach and support for underserved entrepreneurs and businesses.

FAU's SBDC grassroots initiative aims to provide specialized technical assistance and resources business entities owned by individuals in low-to-moderate income or serving underserved regions. By integrating community engagement into their entrepreneurship programs, FAU is fostering equitable access to technology transfer and entrepreneurship opportunities, contributing to the economic development of their region. Similarly, UofL's KY-MEP leverages university expertise and capacity to provide research, business development, access to talent, and other supports to Kentucky manufacturers. A partnership between UofL and the Kentucky Minority Business Development Agency (MBDA) further emphasizes the importance of inclusive innovation and capacity building for minority-owned manufacturing businesses in the state.

The site visits and academic discussions conducted by the leaders of the APLU Committee on Economic and Community Engagement uncovered the parallels between FAU and UofL's strategies for supporting diverse communities. These findings underscore the critical role that research universities play in bridging the gap between academia and industry, ensuring that entrepreneurs and businesses in underserved areas have access to the resources and support needed to thrive in today's economy.

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# **From prototype to perfection: A journey of improvement in HANGAR Campus Innovation Program**

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## **Abstract**

Open innovation is a concept and approach that cannot be ignored today. In particular, it stands out as a method where institutions meet their demands by working with external resources instead of allocating additional human and infrastructure resources for side demands arising from the main products and roles within the company. Many institutions in Turkey, as well as globally, provide both material and moral support to the ideas developed here through open innovation, and these ideas meet the needs of the institution. With the examination and analysis of success measurements in open innovation (OECD/Eurostat 2018), programs developed with different content and target audiences are observed. This article aims to convey the content, importance and services of the open innovation program prepared for students by Turkish Aerospace (TA), one of Turkey's leading industry leaders.

## **Keywords**

Aerospace and defense, Sustainability, Innovation culture, Campus, Open innovation, University students, MVP.

## **1 Introduction**

Turkish Aerospace (TA) is an aviation and space industry. TA is a high-tech company. R&D and innovation is in its DNA. R&D approach of TA is to provide vision and strategy; integrating technologies with its internal and external R&D activities. TA have position innovation and technology as the main leverage of its strategic targets such as its policy, mission, vision and core activities.

All intrapreneurship and innovation activities and process are under the Head of Entrepreneurship and Innovation Management. There are four main points; entrepreneurship, open innovation, innovation culture and supporting activities.

HANGAR Campus Program, developed by Turkish Aerospace, is an open innovation program that provides comprehensive support to undergraduate, master's and doctoral students in transforming their innovative business ideas on the given focus topic into a commercialized business model. HANGAR Campus, which is open to applications from all universities in Turkey, regardless of department or class, enables the development of business model innovations regarding Turkish Aerospace Industry products and processes, provides students with entrepreneurial competencies and aims to provide entrepreneurial graduates to the ecosystem (Özdemir, Deliormanlı, 2013).

Hangar Campus is the first open innovation program in TA focuses different fields and related minor subjects at each round.

It aims to provide infrastructure, training and mentoring support to young entrepreneurs in the commercialization process by transforming innovative business ideas into business models (Özbebek Tunç, Zincir, 2019).

## 2 Structure of the full paper

Program design is set up by examining best practice benefits. The HANGAR CAMPUS Innovation Program is designed to be open to the applications of associate degree, undergraduate, graduate and doctoral students from all universities in Turkey. Students, between the age of 18 and 30, will be able to apply to the HANGAR Campus Innovation Program in teams of 2 to 5 people.

While designing the program, open innovation models in Turkey and the world were examined. Particularly in Turkey, research has been conducted on the management of open innovation concepts and practices. The Hangar Campus Program was created based on the good practice examples and sectoral needs (Akin, 2002; Özbebek Tunç, Zincir, 2019).

The first term of HANGAR Campus focused on innovation and entrepreneurship, is expected to last approximately 4 months. A Demo Day is held at the end of the program. During the program, it is aimed to provide training, mentoring, IP writing support, investment opportunities, being hired and internship opportunities, having chance to gain privileges in other related TA programs, infrastructure support, commercialization and networking support, budget support for MVP (Minimum Viable Product), PoC opportunity at our facilities. Additionally, there is cash award to the teams who successfully complete the program. HANGAR Campus has been designed end-to-end as a multi-stakeholder and highly prestigious program where maximum added value will be created with minimum cost and has been prepared for implementation.

Hangar Campus;

- motivation is raising entrepreneurial graduates who can commercialize innovative business ideas and transform them into viable business models,
- target is the all level of university students in Turkey,
- focused area is carbon reduction in aviation and related minor subjects.

Hangar Campus' points that differ from other programs are innovation camp, mentoring sessions, demo day and all these done without any consultancy service.

It is supplied inhouse technical mentoring sessions, demo day ceremony including the company representatives and sector leaders.

Moreover, there are training headings of the innovation camp; entrepreneurship concept, sustainability, business plan, MVP and branding process, laws and effective presentations.

Innovative projects applying to HANGAR Campus is evaluated based on the following criteria, and these elements are expected to be included in the ideas to be presented (Knapp, Zeratsky, Kowitz 2016; Hartmann, Mainka, Stock 2017):

- Innovation
  - The idea contains innovation elements
  - The idea is new and approaches that stand out in the field
  - The idea is a brand-new product, service or business model
  - The idea is an incremental, semi-radical or radical innovation
  - The idea contains creative features that differentiate it from traditional solutions
- Compliance with Call Scoop
  - Suitability of the idea with the theme of carbon reduction in aviation
  - Compliance of the idea with the content of the call text
- Value Proposition
  - The value proposition offered for the idea; Clear, easy to understand, clearly explaining its difference from competitors
  - The value proposition offered for the idea; Providing concrete reasons for the customer to purchase and use the relevant product or service
  - The idea improves customer loyalty and experience
  - The idea contains superiority or originality over competitors
- Technical Feasibility
  - Applicability of the idea in line with existing technical possibilities and the requirements of the relevant field (standards, etc.)
  - The feasibility of the idea with the competencies of the team members
  - Awareness of the team about technical challenges and the methods to overcome them
  - The synergy of the team
- Commercialization Potential.
  - Potential to be purchased by customers if the idea becomes commercialized.
  - Market entry strategy of the product or service
  - Soundness of the revenue model and revenue growth strategies
  - Attraction of the potential size and growth opportunities in the market

In the first period of the program, in 2023, the focus was determined as "Carbon Reduction in Aviation"(TA Sustainability Report 2021). The reasons of the choice are listed as being one of the focus subjects in our Company, being a demand of our Sustainability Committee, being supported by our product groups, and being studied in

terms of its target audience, and being worked similar studies worked in other good practice examples in the sector.

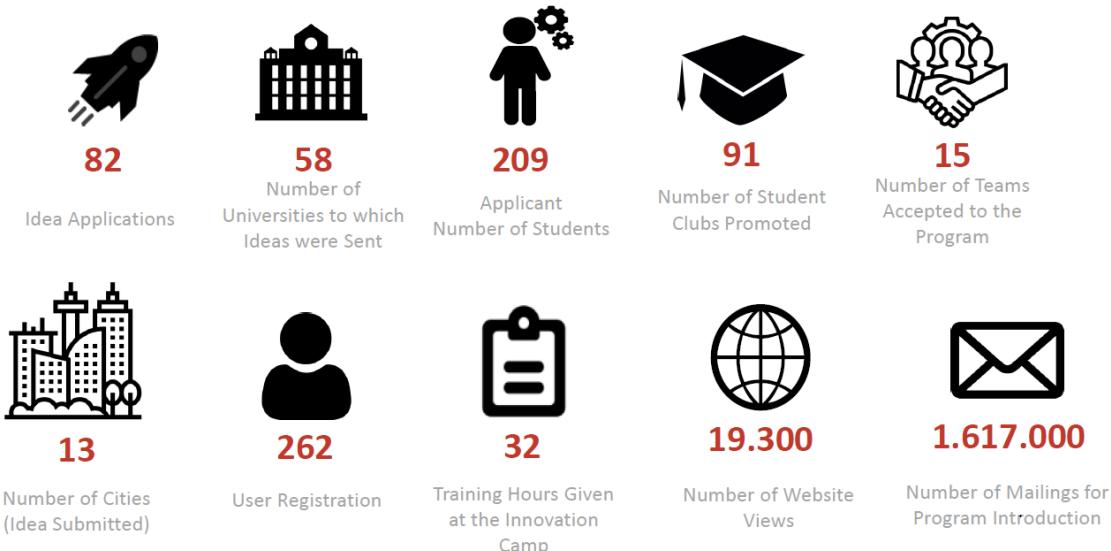


Fig. 1: The Numbers of First Round of HANGAR Campus

Hangar Campus got 82 accepted ideas, involving 209 students, from different 58 universities at the first round.

In the first evaluation carried out in terms of compliance with the acceptance criteria, a total of 69 ideas out of 82 were determined to be suitable for the application criteria. As a result of the preliminary evaluation carried out by the Internal Entrepreneurship and Innovation Management Department based on the criteria of Innovation, Compliance with the Call Scope, Value Proposition, Feasibility/Applicability and Commercialization Potential, 15 teams (45 students in total) were accepted to the program, which will last approximately 4 months.

Within the scope of the Innovation Camp, which is the first part of the HANGAR Campus Innovation Program, the teams were taken to a 3-week intensive training program held online. During the Innovation Camp, field experts consisting of our company's employees and external stakeholders provided participating students with comprehensive training designed to develop many different competency sets, from sustainability practices in aviation to the use of entrepreneurship tools and methodologies.

Two different mentors, one a business development mentor and the other a technical mentor, were assigned to each of the teams that successfully completed the Innovation Camp. At this stage, teams worked on transforming their business ideas into commercializable and technically feasible business models by meeting with their mentors and conducting customer interviews. Additionally, all teams were provided

with effective entrepreneur presentation training. Following the training, the teams worked on their presentations to be made in front of the final jury at Demo Day. Executive team's directorate conducts one-on-one presentation feedback sessions with each team and worked to make the presentations suitable for Demo Day.

Provided Facilities (Özdemir, Deliormanlı, 2013)

1. Mentoring: Business model mentoring and technical mentoring support from field experts throughout the program
2. Entrepreneurship Training: Comprehensive entrepreneurship training will be provided to participants in the Innovation Camp to be held within the scope of the program, in which participants will be equipped with all the competency sets required in the process of transforming a business idea into a commercializable business model.
3. Possibility of Implementing PoC (Proof of Concept): Possibility to test the solution in the field by applying PoC in our facilities for relevant projects
4. MVP (Minimum Viable Product) Budget Support: Providing financial support to support teams in realizing their MVP, which is a demo of the solution they have developed.
5. Patent Writing Support: Expert support provided by TA patent engineers during the patent writing process of patent applications and the opportunity to cover the relevant application expenses.
6. Sector-Specific Information and Experience Sharing: One-on-one experience transfer from Turkey's best engineers throughout the process, especially in aviation and space

Privileges (provided /continue to provide within the possibilities)

1. Priority Evaluation in Other Related TA Programs: Keeping the successful teams in the database and granting them privileges in other talent programs carried out by TA, if possible.
2. Networking and Commercialization Support (after POC): The chance to be associated with TA stakeholders and support in entering the market within the possibilities
3. Infrastructure Support: Machinery-equipment, consumables, software, laboratory use, etc. needed for the projects. Getting support whenever possible
4. Chance of Getting Investment (not early stage): Chance to meet relevant ecosystem investors and receive investment at Demo Day
5. Job and Internship Opportunities: The privilege of being employed as an employee/intern at TA, within the possibilities; As a HANGAR Campus graduate, realizing your idea as an intrapreneur.

Since this is the first applied term of Campus there were some problems listed from both the participants and the organizers.

Positive and negative parts of the whole program are categorized under four headings;

- What helped us moved forward?
  - Efficient and enjoyable training was received from experts in the field of theme-oriented entrepreneurship,
  - Successful presentations were made thanks to the one-on-one preparations made with the teams before the Demo Day,
  - Sustainability of communication and cooperation with teams after the program,
  - A fair, agile and transparent evaluation process
  - Being a program that meets the needs of TA in the field of innovation and entrepreneurship
- What held us back?
  - Failure to use social media effectively in promotional activities,
  - The fact that all participation was online reduced the efficiency of participation,
  - Organizing innovation camp trainings one after another,
  - Having difficulties in reaching technical mentors,
  - Program awards have not been announced in advance.
- How could we do things differently?
  - Scheduling a face-to-face kick-off meeting
  - Determination of criteria that will bring additional points in Demo Day based on students' performances
  - Involving external mentor stakeholders in the process
  - Innovation camp application courses are a little longer and spaced apart from each other
- What should we do next?
  - Determining performance metrics and targets
  - Planning promotional activities that bring successful universities in the field of entrepreneurship to our target audience
  - Receive a commitment to technical mentoring and technical evaluation from the sponsoring department

After this recovery process the second term of Campus has run at the beginning of 2024 with a new subject: "Artificial Intelligence and Machine Learning in Aviation and Space".

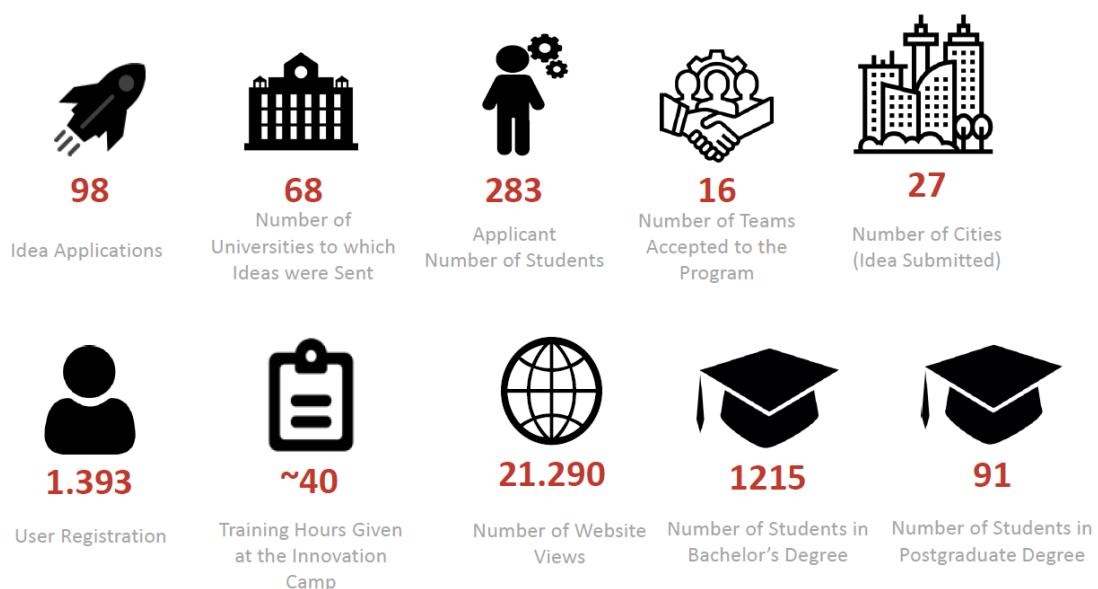


Fig. 2: The Numbers of First Round of HANGAR Campus

The figures for the second program are higher than those for the first program, which shows that the program has achieved the expected success and has gained an important place in the sector.

In details got 98 applications, involving 283 students, from different 68 universities. 16 projects with 51 students were selected to the program.

This round will drive around 6 months with longer mentoring sessions than the first round.

Facilities, are given below will be provided as the previous program;

1. Mentoring Sessions – business development (inside of TA)
2. Mentoring Sessions – business development (outside of TA)
3. Mentoring Sessions – technical development (inside of TA)
4. Entrepreneurship Training
5. Technical Seminars
6. Possibility of Implementing PoC (Proof of Concept)
7. MVP (Minimum Viable Product) Budget Support
8. Patent Writing Support
9. Sector-Specific Information and Experience Sharing

Privileges, are given below will be provided within the possibilities as the previous program:

1. Priority Evaluation in Other Related TA Programs
2. Networking and Commercialization Support (after POC)

3. Infrastructure Support
4. Chance of Getting Investment (not early stage)
5. Job and Internship Opportunities

After the evaluation of the previous program negative and positive parts were listed. Within the scope of the feedback received in the first round, the following features were highlighted in this program:

- The teams to be selected for the program also went through technical elimination. Thus, the feasibility dimension of the idea was also evaluated from a technical perspective.
- Since working together with the technical team during the elimination process, each team's technical mentor was determined before the start of the program.
- The first meeting event will be held face to face, allowing the teams to meet and bond with each other and the executive team at the beginning of the program.
- The awards were determined before the program and announced to all candidates during the program promotions.
- External business development mentors are listed to be connected in advance.

### **3. Conclusions and recommendations**

The purpose of this study is to convey the process of establishing an open innovation program in the defense industry sector and to determine actions for the feedback obtained during implementation.

As a company with pioneering practices in many technological fields such as aviation and space, it is planned to take the added value we provide for the future one step further and evaluate the innovative ideas of young entrepreneurs with our Innovation Programs. It is aimed for Hangar Campus and similar Innovation Programs to make significant contributions to TA and the industry.

Negotiations with internal and external stakeholders within the scope of program preparations will be continued in 2025 and the following rounds.

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# **How universities can leverage business partnerships to strengthen student entrepreneurship incubators**

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"Alone, we can do so little; together, we can do so much."

— Helen Keller - Author, disability rights advocate, political activist, lecturer

"I can do things you cannot, you can do things I cannot; together, we can do great things."

— Mother Teresa - Albanian-Indian Catholic nun, founder of Missionaries of Charity

## **Abstract**

Entrepreneurship has become a prominent educational path for university students from all backgrounds and disciplines. This has led to a rise in university-operated entrepreneurial courses and student incubator programs. University incubator programs, through deep business partnerships, can significantly improve the student experiences and outcomes. However, while the importance of recruiting, engaging, and harnessing these business partnerships is recognized, there is limited knowledge regarding the specific strategies, tactics, and ideas to achieve this. Drawing from a qualitative pilot study encompassing five ecosystems, university incubator Entrepreneur Support Programs (ESP) are approached as the central component of a local entrepreneurial ecosystem. With a focus on the synergy of its actors, factors, and crucial stakeholder alignment, this paper delves into the prospects for enhanced business partnerships. It outlines eleven benefits and provides five practical suggestions for initiating and fostering these crucial relationships. An end-to-end process flowchart is provided to help navigate the steps of engaging local businesses in university entrepreneurship programs. Also included is a detailed twenty-one-component ESP design canvas, with three essential elements identified and explained. The paper closes with sixteen actionable insights, strategies, and tactics to improve student incubator ESP design and operations.

## **Keywords**

Business partnerships, student incubator, entrepreneurship, stakeholder alignment, entrepreneur support processes, entrepreneurial ecosystem

## **1 Introduction**

In recent years, entrepreneurship has emerged as a viable employment alternative not only for individuals with considerable skills and experience but also for university students and recent graduates (Belitski and Heron, 2017; Jones et al., 2021). This trend is confirmed by the escalating rate of new venture launches by students, particularly in the

Science, Technology, Engineering, and Mathematics (STEM) domains. Concurrently, there has been an elevated demand for entrepreneurial educational courses and support infrastructures, such as student incubator programs, within global academic institutions (Agarwal et al., 2007; Fiet, 2001; Mele et al., 2022; Peterman and Kennedy, 2003). This interest in entrepreneurship training is also derived from the fact that students in all academic tracks, including the arts, medical, and social sciences, are increasingly demanding access to the knowledge needed to become entrepreneurs (Wu et al., 2022). The competencies cultivated in university entrepreneurship programs equip graduates not only for entrepreneurial ventures but also provides them with the skills and experience that engender flexible, opportunistic, and creative problem-solving capabilities. Additionally, these programs foster the customer-centric thought processes that are highly sought after by corporations intent on identifying dynamic employees and promoting innovation within the company (Kwong et al., 2012; Robinson and Stubberud, 2014; Stuetzer et al., 2013). As student entrepreneurship continues to gain prominence in universities throughout the world, it becomes imperative for academics to not only teach business fundamentals through coursework but also to leverage local businesses when designing and implementing experiential components, such as incubators, essential to developing and reinforcing skills and mindsets (Hausberg and Korreck, 2020). These university-business collaborations are crucial in devising relevant and engaging methodologies, curricula, and structures that adequately equip students for a competitive, dynamic, and demanding entrepreneurial future.

## **2 How student entrepreneurship incubators can be designed to leverage business partnerships**

This paper explores the conceptualization, design, operation, and optimization of student Entrepreneurial Support Processes (ESP)s by tailoring the program to student passions, tapping into the distinct character of the community, and strategic utilization of community assets, with a particular emphasis on leveraging local business partnerships. This student ESP will form the core of a unique Entrepreneurial Ecosystem (EE) needed to initiate and support entrepreneurial ventures. First, the foundational actors and factors of the entrepreneurial ecosystem are clarified and detailed, with an emphasis on the critical financial sustainability concept of downward causality, namely the Ecosystem Flywheel. Next, the discussion focuses on the essential objective of aligning the goals of all key ecosystem stakeholders, including the university, its students, and local business partners. Included is a list of eleven possible benefits businesses can offer to the university ESP, along with five actionable ideas for initiating and engaging business partners. Grounded in a pilot investigation involving seventeen stakeholders across five ESP-centric EEs, a holistic ESP design approach is presented as the cornerstone of the incubator and its resultant ecosystem. To facilitate this design process, a twenty-one-component ESP design canvas is furnished, and three

essential components are elaborated upon. Finally, sixteen strategies, tactics, and ideas for exceptional student incubator ESP design, operation, and improvement are provided.

### **3 Ecosystem actors and factors: fuel for student incubators**

Your student incubator and Entrepreneur Support Process (ESP) are not standalone entities. They comprise the core of every university-centered entrepreneurial ecosystem. The Entrepreneurial Ecosystem (EE) is an approach to understanding and theorizing the context and contributing components leading to business establishment and productive entrepreneurship (Amezcuia et al., 2020; Antony et al., 2017; Fernandes and Ferreira, 2022; Hakala et al., 2020; Spigel, 2020). Previous studies have shown that EEs consist of interdependent actors and factors, often managed by organizational sponsorship and/or orchestration actors (Isenberg, 2011; Leendertse et al., 2021; Nambisan and Baron, 2013; Pauwels et al., 2016; Stam, 2015; Stam and van de Ven, 2021). With student incubators, the educational institution is the organization sponsor. Previous research has shown that functioning EEs can be essential to new business creation (O'Connor et al., 2018; Stam, 2018; Stam and van de Ven, 2021). Lines of academic inquiry have focused on small business development activities within operating EEs—whether called business incubators, startup/innovation accelerators, clusters, studios, networks, captive corporate accelerators, academic spinoff initiatives, social enterprise incubators, or by many other names—that guide entrepreneurs from initial idea-search/sensing to business launch/operation referred to as productive entrepreneurship (Bhave, 1994; Brown and Mawson, 2019; Cohen, 2013; Levie and Lichtenstein, 2010). Productive entrepreneurship refers to "any entrepreneurial activity that contributes directly or indirectly to the net output of the economy or to the capacity to produce additional output" (Baumol, 1993, p.30) and can be interpreted as entrepreneurial activity that creates aggregate financial increases in the community.

As part of a broader entrepreneurial community viewpoint, Van De Ven (1993) argued that individual entrepreneurs could not manage all the required resources, institutions, markets, and business functions necessary to develop and commercialize their new entrepreneurial ventures. Instead, it requires both an internal team and a variety of external actors and factors to build and sustain businesses. The Entrepreneurial Ecosystem is the formal or informal structure that facilitates new company formation. Several loosely defined definitions exist for EEs within academic research, but this one is well accepted: Entrepreneurial Ecosystems (EE)s consist of all the interdependent actors and factors within a particular geographic location that are managed and governed formally or informally in such a way as to enable and/or obstruct productive entrepreneurship (Stam, 2015; Stam and van de Ven, 2021).

The Stam/Van de Ven (2021) ten-element EE model is one example of a theoretical foundation in this study area. See Figure 1 below from Stam (2018). Successful and

sustainable small businesses are a necessary fuel for the essential downward causation or "EE Flywheel" where they feed experience, contacts, mentors, funding, and more back into the EE (Aldrich and Yang, 2014; Mason and Harrison, 2006; Spigel and Vinodrai, 2021). This statement from Spigel and Harrison (2018, p.164) further illustrates the "EE Flywheel" effect, shown in Figure 1, which is essential to the functional and financial sustainability of Entrepreneurial Ecosystems:

*Rather, (an) EE can be seen as ongoing processes through which resources develop within an ecosystem, flow between entrepreneurs and other actors, and create or attract more resources over time, changing the overall structure of the ecosystem. We predict that ecosystems rich in entrepreneurial resources (strong) and with a structure that facilitates the flow of these resources (well-functioning) will see higher rates of innovative, growth-oriented entrepreneurship that will contribute to resilient economic growth.*

I propose that a positive outcome for a university-initiated student enterprise EE would be the full activation of an "EE Flywheel" where student-led businesses can develop and grow even when the university reduces or eliminates its direct financial support. The EE Flywheel may not seem important for a shorter-term education incubator with a clear beginning and end, but there are two cases to consider: (1) The EE is what exists when the incubator ESP program has completed and students may want to continue their business within the EE, and (2) For the student incubator to operate and deliver maximum benefit it will rely on actors from the larger ecosystem such as specialist like lawyers and accountants, angel investors, successful entrepreneurs, and local businesses. Just because a university starts an incubator does not mean it will continue indefinitely (Nicholls-Nixon et al., 2021). It will be the efforts and time of these, mostly volunteer, actors that will help the student incubator operate and sustain. The Flywheel represents their efforts, along with those of students who have completed the incubator and returned to help new students navigate the process.

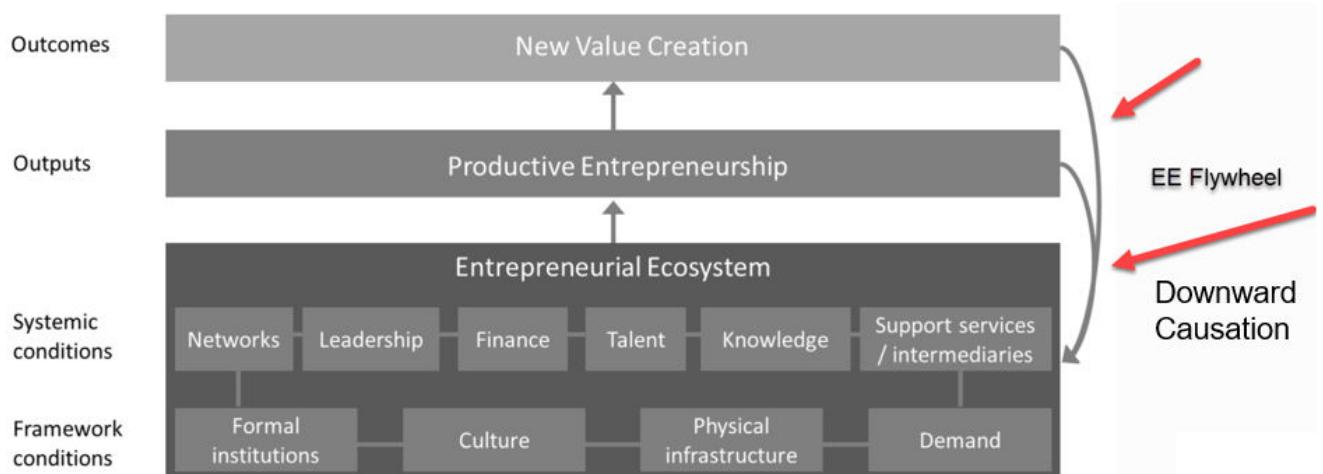


Figure 1. Key elements, outputs, and outcomes of the Entrepreneurial Ecosystem (Stam, 2018)

## 4 Alignment: managing actor conflicting goals and objectives

While Stam and van de Ven (2018, 2021) focus on visible/measurable EE elements and ecosystem conditions, Adner (2017) adds the additional concept of actor alignment, which takes an activity-centric view of interdependence, with the actor-centric "ecosystem-as-affiliation" approach (Adner, 2017, p. 40):

*By starting with a clear definition of "ecosystem"—the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize—I am able to be explicit about its implications, its boundaries, and its relationship with alternative perspectives.*

Partner alignment of activities, actions, positions, and links within the EE is a critical strategic challenge. This alignment of all stakeholders—even limited alignment—is essential to a productive EE with the potential ability to reach Flywheel, downward causation, and financial sustainability. In other words, the university-initiated EE consists of various stakeholders who can opt to participate in, disregard, or oppose EE activities. When the majority actively participates at some level, it creates the potential for remarkable synergies. In this paper, along with detailed steps for implementation, I will illustrate how this interaction of EE elements and alignment can be essential to EE design and strategies for attaining better alignment, especially with business entities in the university's region.

### 4.1 University, student, community, and business incubator goals

Reaching alignment between EE stakeholders hinges on the systematic identification, cross-communication, and management of the diverse and sometimes conflicting vision, objectives, requirements, and priorities inherent to each stakeholder group. The incubator lead person, or team guided by this person, should devote time to talking with all stakeholders to understand their priorities better. Interviews from a Pilot study involving seventeen stakeholders in five EEs indicate that when formulating an ESP vision, engaging, and aligning a broad base of stakeholders can make the difference between a sustaining synergistic and a collapsed effort. Table 1 below summarizes elements of that pilot study (Schiller, 2023).

Informants	Organization	Location	Status
8	Community Investment Collaborative (CIC)	Virginia, USA	Self Sustaining - Thriving
5	EU Funded VCs, startup founders, & government	Bulgaria	Mostly Non-sustaining - Collapsed
2	Bulgarian American Enterprise Fund	Bulgaria	2011 Exit with a10x return.
1	Devitaki Plateau EE	Bulgaria	Sustainable - Thriving
1	Alive Ventures/SCAN Foundation	California, USA	Collapsed

*Table 1. Pilot study – Entrepreneurial Ecosystem Alignment and Design* (Schiller, 2023)

For university-based entrepreneurial incubator initiatives, there may be four primary stakeholder categories to consider, along with unique and sometimes conflicting visions, sets of objectives, requirements, and priorities.

- (1) **The university:** Offers a limited-duration entrepreneurship experience that provides students with an immersive experiential learning activity that brings in components taught in formal classroom sessions. The experience should provide a space for students to navigate challenges, make mistakes, build and collaborate effectively within teams, explore and expand professional networks, and engage with mentors. At the end of the effort, there should be a quantifiable outcome to facilitate assessment and grading.
- (2) **The student:** Looks for a way to experience a limited entrepreneurship journey while leveraging university resources and the relative comfort of a university "safety net." The student should benefit from an enriched professional network and acquire knowledge beyond traditional classroom boundaries through mentorship and improving their soft skills. This should add the experience of researching, innovating, building, and starting a business to their limited resume. Meeting the university assessment requirements should generate a grade at the end of the effort.
- (3) **The community:** Comprised of members from both the overarching university sphere as well as individuals from the adjoining non-academic region, this may include retired professionals eager to contribute through mentorship. Furthermore, this segment includes service providers—legal practitioners, accountants, and consultants—interested in presenting their expertise at no charge to student startup groups, thereby fostering entrepreneurship and establishing a foundation for future prospective professional engagements. Local non-profit organizations can also be integrated within this category by offering potential start-up concepts or posing challenges to be addressed with student-driven solutions.
- (4) **The business community:** Businesses surrounding university campuses often vary in scale from sole proprietorships to multinational corporations employing vast numbers. Integrating these "real world" stakeholders into student incubator programs presents many advantages for student participants. Businesses might be motivated to participate for various reasons: continued engagement by university alums, talent acquisition for future staffing, a source of innovative ideas for their business, or to meet Corporate Social Responsibility (CSR) objectives.

## 5 What can businesses do for student incubators, and why are they essential?

Including stakeholders from local businesses in the student incubator operation framework and processes can provide many services and benefits to both students and the educational institution. No matter where a university is located there will be businesses within easy reach with much to offer student entrepreneur programs. There are many benefits to partnering with businesses, but here are eleven possibilities.

- (1) **Mentors:** Business managers and their employees can bridge the gap between entrepreneurial classwork and practice. A well-designed structured mentoring program can help students better initiate and operate their new businesses. Often, these mentors also glean insights from students, which can subsequently be integrated into their own professional endeavors.
- (2) **Program legitimacy:** When individuals from businesses are part of the incubator process, it can add legitimacy to the program for the university and its students. In some cases, businesses may even provide program funding through sponsorship.
- (3) **University incubator advisory board:** An advisory board comprised of executives from local businesses can help formulate strategies, improve incubator processes, expand networks, add more practitioner point-of-view elements, and provide introductions to new potential business partnerships.
- (4) **Lecturing:** The students may have had numerous lectures as part of the regular curriculum, but bringing in a seasoned practitioner for a one or two-hour lecture can be beneficial. Subjects could cover the basics of intellectual property law, entrepreneurial tax concerns, product/service branding, technology pitfalls and how to avoid them, working with marketing and ad agencies, company vision, staffing, how to talk to investors, building business networks, and why exiting a business needs to be designed from day one.
- (5) **Workshops:** These multi-day interactive sessions could cover business essentials like using design thinking for product/service planning, pitching a business, hands-on digital marketing tips and tricks, and improving team dynamics.
- (6) **Networking:** This helps student entrepreneurs build their business networks for the future, either as entrepreneurs or working for others.
- (7) **Challenges:** Students may not have solid ideas for the company they want to explore within the incubator. Local businesses can offer challenges for students based on the business's needs. These could be opportunities to create a product or service the business may use, or the business may be looking for innovative new offerings for their company to add to their product/service line.

- (8) **Co-creation:** If a student's company idea provides a valuable product/service to a local business, a great way to develop that business is through co-creation with the business as a potential first customer.
- (9) **Student company boards:** Employees of local companies may be excellent advisory board members for student companies. This is less intensive than a mentoring commitment, but instead, it provides occasional guidance, balance, and vision at periodic intervals. Having an advisory board will also prepare students for future positions either as entrepreneurs or regular company employees.
- (10) **Judging:** Individuals from the business can serve as judges for final project pitches. They can access, score, and provide constructive ideas for improvement.
- (11) **Financing:** Although the program's goal may not be to actually fund and launch a business, if a student decides to try launching and running their new enterprise, a local business may provide that funding.

## **6 Strategies and tactics for engaging businesses in student incubators**

With the importance of partnerships between student entrepreneurship incubators and businesses presented along with various methods to capitalize on these collaborations, now let's address pragmatic strategies and tactics for establishing and building these relationships with businesses. This discussion will guide academics and other university affiliates in forging crucial alliances with businesses and involving them in the incubation process.

These items are shown in Figure 2 flowchart and fall into four categories related to each phase of the University ESP development process:

**Conceptualization/Initial Research:** The initial vision and goals for the university incubator.

Note: Even if you have had a student incubator operating for many years, it is worth going through this process from beginning to end to be sure your incubator is relevant to you, your educators, fellow students, the community, and local businesses.

- (1) **Identify initial incubator vision and goals:** Work with a small set of educators and students within the university to identify the initial vision and goals for the student incubator. The deliverable from this will be an eight-word maximum description of the incubator that will clearly state the unique position of the incubator program. This description will appear under the name of your

incubator and will be the "hook" to engage stakeholders. Some examples might be:

- The regional innovation engine
- The launchpad for tomorrow's leaders and innovators
- Igniting creativity to start businesses with impact
- The University bridge to the global marketplace
- Transforming fresh ideas into the next big startup
- Where student vision evolves into innovative realities
- Where ideas meet execution and dreams take flight
- Nurturing, empowering, and developing innovators, one startup at a time
- Empowering young change-makers for global impact
- Bridging community needs with entrepreneurial spirit
- Community transformation, one startup at a time
- University-led innovation for an improved local community

(2) **Review and align with a larger stakeholder group:** Now that you have a basic idea of the vision, goals, and description for your student incubator, test it on a larger set of stakeholders. Approximately twenty, but be sure to include people from several categories. The deliverable from this step is a more precise vision and description that resonates with more stakeholders. If they are not excited about this, then keep iterating until they are excited. The final deliverable from this is a job description and list of requirements for your incubator leader. *More on this position in number (3) below.*

**Pre-Launch:** At this point, the key is to engage a larger audience with your vision, goals, and priorities. Listen to what they say and be ready to pivot so your student incubator concept resonates with the largest number of stakeholders possible, including existing and possible local business partners.

(3) **Assign and engage an incubator leader:** Assign one person on the university team to oversee and manage the ESP program and building the university business network. This person will act as the “connector” between the student incubation participants and individuals from business. Keep a live scorecard of some kind to illustrate the network’s growth progress. Something as simple as a closed LinkedIn group can serve this purpose.

(4) **Create a "dream list":** The student incubator team should work together to create a list of companies and individuals to target for this network-building effort. Then, along with company and individual names, reach out to others in the university to assess if there is any current connection to the university or if someone exists who can make an introduction. All vendors who sell to the

university and its alumni should be on this list and will be the first to contact. The key information element that the outreach connector needs to be included in this list is the answer to this question: "What do they care about?" Once this is added to the individual's contact info, it will be the key to getting them to engage.

- (5) **Manage the ask:** When you contact people, they will be expecting an ask of some type. You need a reason to call them. Keep the initial ask small. Asking them to commit to a time-consuming mentoring engagement or sponsoring a pitch day prize before building a relationship will most likely be ineffective. Start with something like:

"We are trying to learn more about the local entrepreneurial ecosystem, and I have three questions for you. It should not take more than seven minutes. (1) How have you interacted with the university in the past, if at all? (2) If there is one thing the University could do for your Business, what would it be? (3) What do you worry about most regarding your business?

This initial contact will be the basis of the relationship going forward. The information from these three questions should help curate future engagement with this business. Classify each businessperson as a possible candidate for one or more of the ten items in the "What Businesses Can Do for Student Incubators" section above. Also, open the conversation with your incubator vision and description statement. Be sure to ask for feedback on what this means to them.

- (6) **Iterate the incubator Vision statement, goals, and message:** The remaining steps to this Pre-Launch Phase should be used to get feedback from your stakeholders and business partners on your incubator vision, goals, and messaging. This is another iterative process of trying out concepts on people and modifying them until you get to something that resonates and inspires as many stakeholders as possible. The deliverable from this phase is a final Vision, eight-word description, goals, priorities, and messaging.

**Launch:** With an incubator leader in place, along with a completed stakeholder-aligned vision, description, goals, and priorities, it's time to launch your student incubator. The business partnership activities below occur in tandem with the operation of your student incubator.

- (7) **Create a series of engagement events:** Consider a series of periodic business events. Give businesspeople a reason to visit your university and incubator. Using what has been learned from the three questions, categorize them, then create a talk by an academic on the subject or a panel of other businesspeople to engage and explore the issue. Maybe ask the contact to chair or be on the panel.

Reverse pitching by businesspeople can always be interesting. This is where the businessperson has 15 minutes to describe their company and how it offers value, and they can ask for something like students who are about to graduate to apply for jobs, university academics to help with a problem, or for people in the audience to brainstorm some innovation ideas for the company.

- (8) **Hold monthly ecosystem-wide meetings:** Regular monthly ecosystem stakeholder meetings are the best way to consistently break down barriers, build networks, and promote a more inclusive ecosystem. A great example of this is "Entrepreneurs + Espresso" ("Entrepreneurs & Espresso," 2023) a monthly gathering open to all entrepreneurs in the region that includes networking, an experienced entrepreneur's "near business death—Crash & Learn" experience story, a new entrepreneur's pitch, and a business founder who has been in operation for a year or more and who presents their business along with a problem they are currently facing to generate crowd-suggested solutions. This event has been going on for over ten years at the University of Virginia and has helped build a large and resilient network.
- (9) **Business Partner incubator involvement:** These are the ongoing activities your business partners will be involved in, including mentoring, providing access to markets, investing capital in student startups, and joining student business advisory boards. Another activity could be in the category of internships, but this can go in both directions: 1) Typical internships in which students may join a local business as an intern for a set time to learn needed aspects of operating a business, and 2) Reverse internships, wherein a local business may provide an employee to the student business on a part-time or full-time basis to fill a need.

**Post-Program:** At the formal conclusion of your student incubator program, there are several activities to foster continued engagement with business partners. These can include:

- (10) **Future employment:** New networks established through incubator program business partners can help students find future employment opportunities.
- (11) **Acquisition:** A business partner acting as a mentor or advisor to a student business may acquire that business at some point in the future. This can be the case when students create an innovative product or service complementary to the business partner.
- (12) **Future Startup Involvement:** After graduation, the student may decide to pursue a different startup, and the business partner network will provide valuable access to resources and advice.

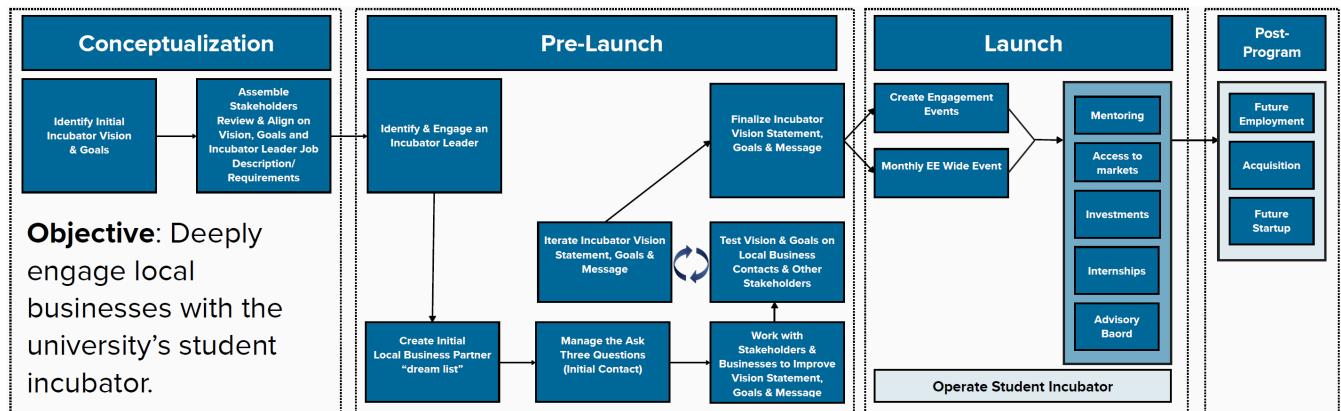


Figure 2. Business Community Engagement Task Flowchart

## 7 Three essential student incubator ESP design elements

Having presented a strategy and process for expanded stakeholder engagement, including the university's improved business entity network, this section provides insights into enhancing the functionality and outcomes of your incubator's Entrepreneur Support Process (ESP) as well as the resultant wider university-led entrepreneurial ecosystem. Without a well-designed and functioning ESP, the potential for establishing sustainable new business partnerships may be compromised.

Your university student entrepreneurship incubator may be a new initiative, or perhaps it has been operating for decades, and you are looking for ways to improve it. Building or improving an Entrepreneur Support Process (ESP) program and associated Entrepreneurial Ecosystem is a complicated task. There are hundreds of process elements available, and there is no one-size-fits-all solution (Amezcua et al., 2020; Audretsch and Belitski, 2017; Cohen et al., 2019a; Liguori et al., 2019; Lingens et al., 2021). As far back as the 1980s, Ecosystem entrepreneur support processes were identified as a puzzle to be solved. (Bhave, 1994).

Appendix 1, “ESP Development Strategies, Processes, and Procedures” (available at <https://bit.ly/APP1EDSPP>), illustrates ESP development resources, tools, and processes identified in past research (Cohen, 2013; Cohen et al., 2019b; Hallen et al., 2020; Schiller, 2023). No table could adequately summarize everything included in all ESP development processes, but the three Amezcua *et al.* (2020) fundamental mechanisms—buffering, bridging, and curating—provide a way to classify the majority of elements used to help new nascent entrepreneurs to launch and grow their businesses.

A well-formulated student incubator ESP design, tailored to the university and community entrepreneurial ecosystem and executed with aligned community

stakeholders—including the use of business partnerships—can contribute to a consistent, productive student entrepreneurship experience and new business development (Busch and Barkema, 2022; Guerrero and Martínez-Chávez, 2020).

Providing stakeholders have a clear, concise, step-by-step, measurable ESP and all actors are aligned, confusion and misdirected resources can be kept to a minimum. In addition, a clear, concise ESP will instill confidence in aspiring, motivated student entrepreneurs (Obschonka and Stuetzer, 2017; Stam et al., 2012; Van Gelderen et al., 2006).

When entrepreneurs design companies, products, or services, they may use a tool like the Lean Startup Canvas or Minimum Viable Product Canvas to focus and communicate their research and decision-making (Shepherd and Gruber, 2021). Like these valuable canvas tools, the Minimum Viable Entrepreneurial Ecosystem (MVEE) Design Canvas (<https://bit.ly/MVEE2023>) can help work through the details of designing or redesigning an ESP. The key to this canvas is to focus on the “Must Have!” items because without these three items, even if your ESP has everything else, it will most likely fall short of your expectations. These three “Must Have!” ESP components are shown below.

- (1) **Matched Mentors:** Experienced professionals with skills, talents, and abilities matched to the entrepreneur’s startup business requirements. This is the most important thing a University-Business partnership can provide to entrepreneurship students. These mentors will make a big difference in the learning experience and the business outcomes if used correctly. This is the most important thing a University-Business partnership can provide to entrepreneurship students. These mentors will make a big difference for the learning experience and the business outcomes if used correctly (Assenova, 2020; Miller et al., 2023; St-Jean and Tremblay, 2020). This is a TED Talk from Susan Cohen provides some interesting insights on effective mentorship: <https://www.youtube.com/watch?v=sVDgOLLL66o>
- (2) **Motivated Entrepreneurs:** At the core of any student ESP initiative is the student’s level of motivation. If they are motivated, persistent, curious, and flexible, they should adapt to the entrepreneurial requirements. Before starting the university-led ESP, the student’s motivation level should be assessed, and, if needed, remedial workshops or boot camps should be recommended, similar to a student lacking in math or reading skills may attend remedial classes to get up to speed. One way to get a sense of a student’s readiness for the rigors of an ESP experience is to ask a few questions like those below. Simply asking if they want to be an entrepreneur or learn entrepreneurial skills is not enough since the definition and requirements may not be consistent with the actual requirements. So, questions like these may be a better way to gauge motivation level:

- a. How do you feel about working eighteen-hour days seven days a week on your venture?
  - b. How do you feel about not having a vacation for a few years?
  - c. How do you feel about putting all your money and borrowing from friends and family to raise seed capital for your venture?
  - d. What can you do in the first few months to help sell your company in a few years? (It might not be obvious, but it is primarily by selling the company that investors can profit from their investment. If the entrepreneur is not planning for this, then outside investor money should not be used.)
- (3) **Markets:** Access to markets for the potential product or service considered for development by the student entrepreneur. If there is limited or no potential market available—someone who will find value in the offering and pay money for that value—then the student entrepreneur should continue searching for other ideas. The best case is when a customer can be identified early in the process, and the student entrepreneur works with that customer to co-create the product or service. A way to find this initial customer is to identify local business partners who have needs—a pain point—for some type of product or service.

## 8 Final strategies, tactics, and ideas for exceptional student incubators

The target outcomes for student incubators can range from learning how to develop a basic financial business plan to building, pitching, securing seed funding, and launching a viable business. No matter the desired outcome, here are some strategies, tactics, and ideas that, along with a strong connection to local business partners, could help make a student incubator exceptional.

- (1) **Pre-incubator hackathons:** Well before the incubator program starts, run quick one- or two-day hackathons to give students a chance to use creative problem-solving techniques and get to know other students in the entrepreneurship community. Consider bringing in local non-profits looking for solutions to problems they may have.
- (2) **Field trips to local startups:** The best way to experience entrepreneurship is to see it in action. A visit to a small local company could be a great way to see how companies operate and meet people running the firm. A question-and-answer session would be great. Consider doing this very early in the entrepreneurship

curriculum so students can build networks for potential summer internships. A student who spends the summer in an operational small business before joining the university ESP will start with a more developed knowledge base.

- (3) **Pre-incubator student networking:** In the months just preceding the incubator's start, run a series of university events for students to get to know each other, brainstorm ideas, and build networks. Students can pitch early general business ideas and tell other students what team members they need.
- (4) **Tailor the experience:** Be sure to tailor the ESP experience to the students' needs and expectations. It will be a different program if they are just doing it for fun or curiosity, to get a grade, or to be a better large company employee. To give all students the same experience when the needs differ will cause ESP misalignments.
- (5) **Consider themes:** It will always be best if the student entrepreneurs generate their own business ideas. This will assure personal commitment and connection with the effort. However, if students are struggling to formulate ideas, consider a brainstorming session where business categories can be generated. This activity alone may inspire some unique business ideas. Example themes include, "What is old that could be new again?" "What trends could reshape consumer behavior in the next five or ten years?" What would we *never* do (that make for good business)?" Examples for the last question are to offer free delivery and returns for online ordered products (Amazon), offer unlimited day use for rental videos without late fees (Netflix), allow strangers to stay in my home (AirBnB), and ride in a stranger's car (Uber).
- (6) **Don't forget social ventures:** If your ESP is focused on for-profit ventures, consider a few social enterprises as long as the student entrepreneurs can show a plan to cover their expenses with donations, grants, or selling some type of product or service.
- (7) **A perpetual program:** Allow student entrepreneurs to remain connected to the incubator in some way, even after the final evaluation and grade. It might be good to set some constraints, such as the need to have at least one active mentor and an advisory board, the need to spend at least fifteen hours a week on the venture, and set some reasonable quarterly milestones to show progress.
- (8) **Local participants:** Consider allowing local non-student participants to be either part of the team or the entire team. This can add some interesting energy to the incubator. While most of the participants are there to get a grade and learn more about entrepreneurship, these local participants may have very different and more urgent goals.
- (9) **University innovation commercialization:** If academics within your institution, neighboring universities, research centers, or the like possess

innovations, inventions, patented technologies, or nascent ideas with potential as a foundation for a new enterprise, encourage these scholars to present their concepts to student entrepreneurs for potential commercialization. This is known as reverse pitching.

- (10) **Business partner commercialization:** Similar to the reverse pitching by academics above, regional business partners would pitch student entrepreneurs on particular pain points they would like addressed, e.g., product ideas or technology the company owns that could be commercialized.
- (11) **Test pitch sessions:** Leading up to the final pitch of their business, be sure to have frequent small group pitch sessions for student entrepreneurs to test their pitches. They should actively listen to feedback and look for non-verbal hints as to what is working and what is not working.
- (12) **Diverse teams:** More diverse startup teams will bring multiple points of view and perspectives to the student startup. Teams made up of people from different backgrounds, economic levels, political leanings, and more will have more critical discussions and result in products and services that can serve a larger target market.
- (13) **Non-student entrepreneurial team members:** Open student startup team spots for non-entrepreneurship students who may add to the team. If your university has an anthropology, music, or foreign language curriculum, someone from those areas can add much to the team dynamic and final product or service offering.
- (14) **Pivoting:** Students should be encouraged to pivot their company concepts if testing is not proving out with their target customers or if some other significant problem arises. Pivoting is part of building a company, but a date should be set when no more pivoting is allowed. Perpetual pivoting will stand in the way of fully launching a company.
- (15) **Downstream Pitching:** The pitch used to communicate the company to investors is very important. This is called an upstream pitch. A different pitch will be required for pitching to recruit team members, partners, vendors, and mentors. This pitch will be heavier on the inspiration and lighter on the financial aspects. If the student entrepreneur can't inspire people to join, partner, or help with the business, it will not be easy to launch the enterprise. When the student entrepreneur does this pitch successfully, the listener will say, "I need to be part of this company!"
- (16) **Timing of ESP elements:** In addition to the three "Must Have!" MVEE canvas elements—Matched Mentors, Motivated Entrepreneurs, and Markets—the timing and temporal aspects of the ESP are important. Take care to be sure the ESP process is executed in an order designed to optimize the experience for the

students. Two examples: (1) conduct entrepreneur mindset improvement workshops before throwing the students into the full ESP, and (2) create a deep list of matched, qualified, and ready-to-engage mentors before the ESP program begins. Taking time and attention to do these tasks after the ESP launch can confuse and disrupt the student experience.

There is no one-size-fits-all formula for an instant ESP program. There are too many variables and too many things that can unexpectedly drift. It will take time and partnerships for the ESP to evolve to its maximum potential. The right engaged Business partnerships can make all the difference.

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# **Innovating Deep Tech and Research Valorisation in Sarawak Universities**

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## **Abstract**

Sarawak's higher education landscape, encompassing five strategically located universities, reflects a diverse demographic interwoven with local socio-economic dynamics. Aligned with Sarawak's Digital Economy Blueprint 2030 and Post Covid-19 Development Strategy, a directive emerges to cultivate a vibrant digital economy ecosystem, fostering innovation and entrepreneurship, particularly for digital startups. This innovation drive emphasizes nurturing research and development (R&D) capabilities, with a focus on commercial applications aligned with digital advancements. However, the absence of designated Technology Transfer Offices in some universities underscores a gap in research valorisation support. To bridge this, talent development among researchers, particularly engaged in translational research projects (TRG), is prioritized. The paper highlights the role of SDEC's Research and Product Development Department and its initiatives in undertaking research valorisation including a highlight on its flagship program, the SDEC Technology Accelerator (STAcc), which empowers researchers to commercialize their work, reshaping Minimum Viable Products for market fit and early adoption.

## **Keywords**

Deep tech startups, research valorisation, Sarawak universities, intellectual property, commercialisation.

## **1 Introduction**

In Malaysia, the sprawling state of Sarawak, boasts a diverse higher education landscape, encompassing at least five universities strategically positioned across its major cities. Each university caters to a varied demographic, intricately intertwined with the social and economic dynamics of its respective community.

In line with Sarawak's forward-thinking Digital Economy Blueprint 2030 and Post Covid-19 Development Strategy (Economic Planning Unit Sarawak, 2020), there exists a compelling directive to cultivate a robust digital economy ecosystem. This ecosystem aims to catalyse digital innovation and entrepreneurship, particularly to cater towards the proliferation of digital startups. The focus of this innovation extends to nurturing research and development (R&D) capabilities, with an emphasis of commercial applications aligned with digital advancements.

However, critical observation reveals that not all universities in Sarawak have a designated Technology Transfer Office or are adequately supported by research commercialisation experts. To address this gap, the limited support to enable research valorisation necessitated a focus on talent development amongst the researchers, in

particular those whose translational research projects (TRG) funded by SDEC required assistance to expedite the commercialisation of the research project outcomes.

The Research and Product Development Department (RPD) in SDEC leads research valorisation efforts in Sarawak through targeted pathways beginning with targeted research grants to innovation accelerators. The SDEC Technology Accelerator (STAcc) program, which equips research teams with essential skills, support, and guidance for crafting highly innovative technology solutions (MVP) tailored for the market (PMF). This comprehensive program ensures a transformative journey towards technological excellence, complemented by bespoke mentoring and product development pathways to reshape the Minimum Viable Product from research output to find its Product Market Fit and its way to early adoption in the market.

This paper aims to highlight the gap in research commercialisation based on Sarawak's landscape, the efforts by SDEC to culminate a comprehensive research valorisation support system for the researchers, as well as the outcomes of our collaborative effort with our researchers.

The main goal is to highlight the importance of bridging this gap and the impact of our initiatives on fostering innovation and economic growth. The paper begins with a horizontal scanning of R&D and innovation in Sarawak, followed by an exploration of research valorisation efforts, the outcomes of our collaborative endeavours, and concludes with recommendations for future directions.

## **2 Catalysing R&D and innovation in Sarawak**

The Sarawak Digital and Innovation Ecosystem (Sarawak Digital) is one of the Catalytic Initiatives developed by Sarawak Digital Economy Corporation (SDEC) as part of Sarawak's Post Covid-19 Development Strategy 2030 and in further support of the Sarawak Digital Economy Blueprint 2030. Abbreviated as Sarawak Digital, it is an ecosystem established in 2020 and has since provided services and opportunities for digital talents and startups including co-working spaces, development programs, funding and investment opportunities, events, technology partners, research and development platforms as well as international market access.

## THE ECOSYSTEM AT A GLANCE

Unlocking digital and innovation opportunities for all Sarawakians

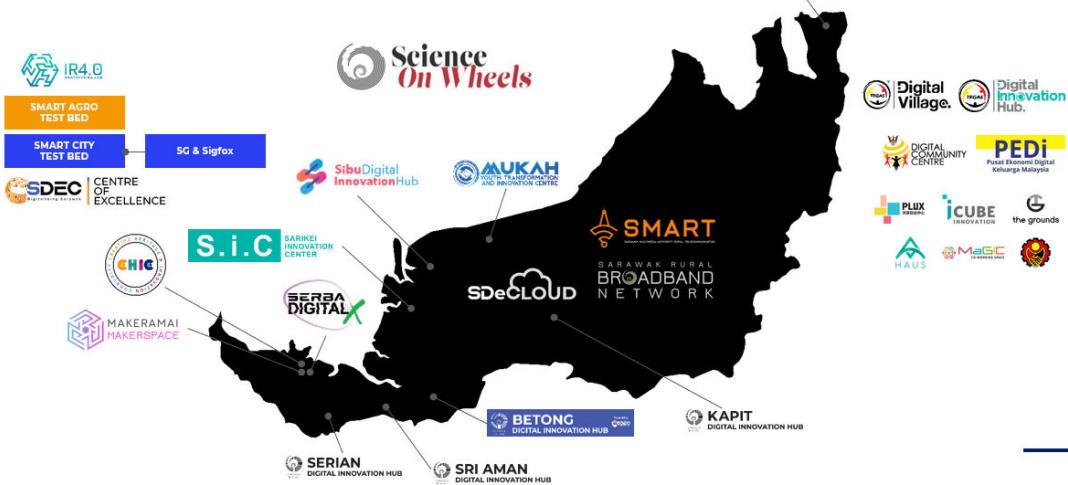


Fig. 1: Sarawak Digital & Innovation Ecosystem

Sarawak Digital bridges facilities and initiatives under SDEC's purview as well as its ecosystem partners including both federal and state agencies, along with local universities through the Centre of Excellence for Digital Economy (CoE) partnership.

The CoE was established with a primary objective of conducting impactful research and development activities in collaboration with strategic partners. It serves as a pivotal platform, offering distinguished leadership, exceptional research support, and professional consultancy in alignment with the Sarawak Digital Economy sectors and associated enablers.

At the core of its mission, the CoE engages in collaborative Research, Development & Innovation endeavours, with a specific focus on Digital Technologies aimed at addressing industry challenges. Aspiring to be a recognized leader in the field, the CoE leads a dedicated consortium dedicated to advancing, applying, and facilitating critical components within Sarawak's digital economy landscape.

With a strong commitment to pursue research excellence in Sarawak, the CoE is based on cooperative research partnerships with six local universities and esteemed research-intensive institutions like National University of Singapore (NUS) and Universiti Malaya and a number of technology companies including IBM, Keysight and Huawei.

Identified collaborative research areas span from Big Data to IoT to Social Business and Innovation. The CoE's collaborative research framework is designed to bring together industry, government, and research institutions to effectively address key challenges and seize opportunities across various sectors.

As a State-level agency, SDEC has been entrusted to lead the implementation of Sarawak Digital Economy initiatives and holds a position as the Secretariat of the Steering Committee for the CoE. SDEC handles the coordination and administration

activities of the mobilization aspects of the CoE including strategic cooperative research partnerships with universities, industry and relevant agencies.

### 3 Research valorisation efforts

In delineating the Sarawak Digital and Innovation Ecosystem Pathway, we successfully defined a distinct pathway tailored for university researchers and innovators, known as the Digital Research and Development Track.

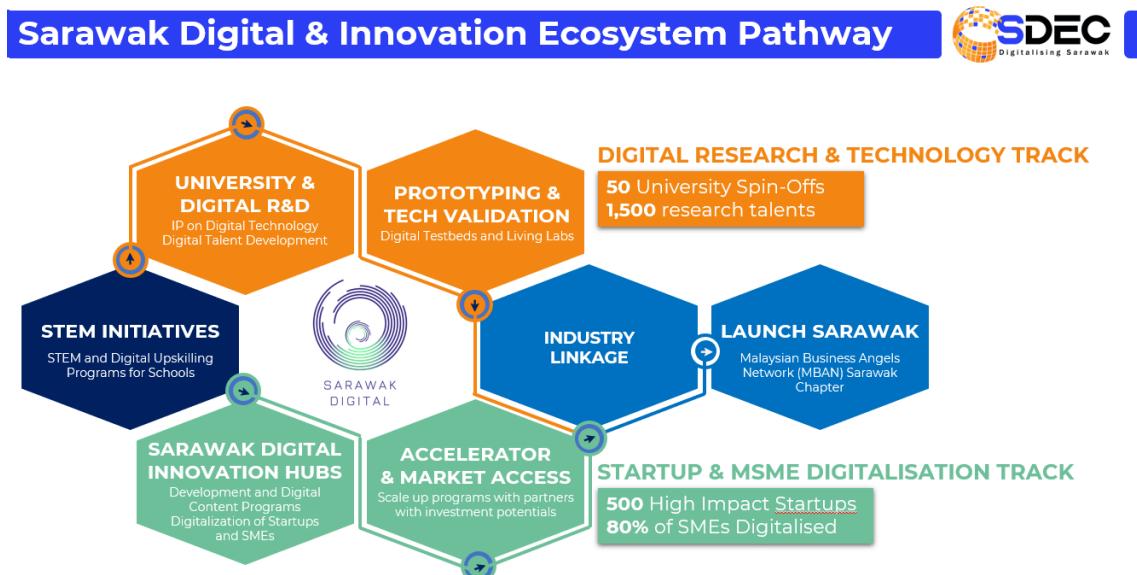


Fig. 2: Sarawak Digital & Innovation Ecosystem Pathway

Within the Digital Research and Technology Development Track, significant emphasis is placed on the involvement of the six local universities, collectively known as CoE University Partners. This strategy also focuses on the development of digital talent driving deep tech companies cultivating cutting-edge solutions grounded in novel intellectual property.

The pathway for Prototyping and Tech Validation emphasizes strategizing the journey of technology developed from Digital Research to market readiness. This collaboration ensures that research outcomes are aligned with market needs and industry trends, fostering innovation and competitiveness.

#### Research and Development

Recognizing the absence of focused research on innovation and the application of digital technologies in key economic sectors in Sarawak, SDEC launched its TRG scheme in 2021. This initiative aims to catalyze R&D activities within its CoE University Partner institutions, with a specific focus on translational research in the digital economy aligned with the State's strategies. Furthermore, it seeks to expedite the translation and

commercialisation of research outputs to bolster the new economy by fostering the creation of deep tech companies in Sarawak.

In facilitating talent and technology transfer between universities and industry, this involves identifying promising technologies and innovations developed within academia and transferring them to industry for commercialisation. To this end, each TRG research project undergoes monitoring from inception through to completion. This includes regular reporting of R&D progress and milestones, as well as maintaining open communication channels beyond standard reporting schedules.

By analyzing data from progress reports, recommendations from STAcc pathway reports, and communication updates, we take the lead in identifying Intellectual Property (IP) within each TRG research project. Subsequently, we initiate the process of adequately protecting research outputs, with a priority given to filing for IP rights such as patents, utility innovations, and industrial designs. This ensures sufficient protection is established before public disclosure, including the publication of research outcomes. The Principal Investigator of each TRG project is designated to facilitate the invention disclosure process.

### Research Commercialisation

Our dedication to nurturing deep tech innovations is manifested in the SDEC Technology Accelerator (STAcc) program. This accelerator initiative serves as a linchpin, empowering research teams with vital skills, support, and personalized mentoring. The program facilitates the crafting of highly innovative technology solution finely tuned for the market.

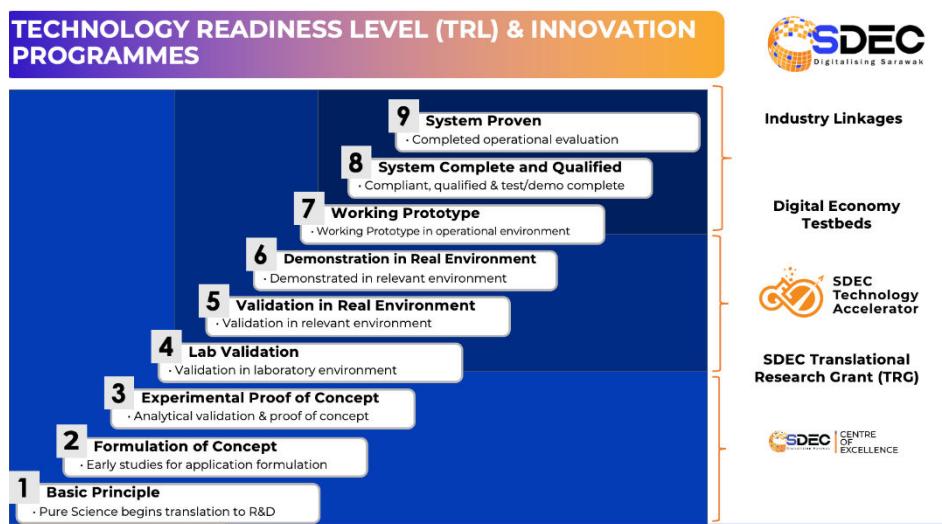


Fig. 3: Technology Readiness Level & Innovation Programs to Support Researchers

The concept of research valorisation and commercialisation is not novel, and numerous individuals have implemented this framework in various settings and countries. The challenge lies in adapting the framework to suit the needs of the specific group, which is

influenced by numerous internal and external factors such as openness to commercialisation, university support, industry support, and so forth. STAcc comprises three phases: (i) Phase 1 - Innovation & Commercialisation Bootcamp (ICB), followed by (ii) Phase 2 - Market & Tech Viability for MVP (MTV-MVP), and finally (iii) Phase 3 - PMF Trial (PMF-T).

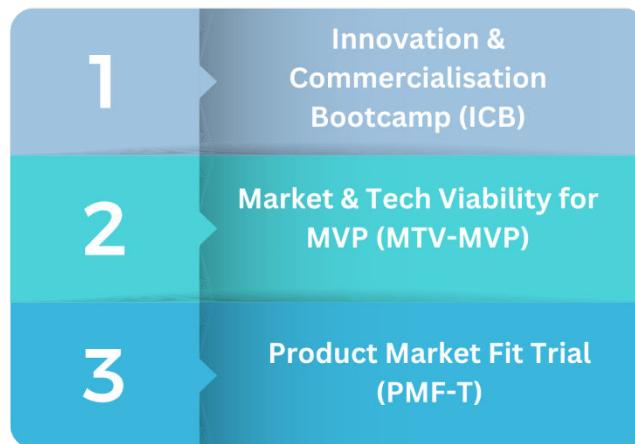


Fig. 4: SDEC Technology Accelerator (STAcc) Phases

In STAcc, various tools and frameworks were selected based on both academic and startup perspectives. This decision was made because the objective of this initiative was to translate research into commercialisation, which also entailed transitioning researchers into startups or involving them in the commercialisation process.

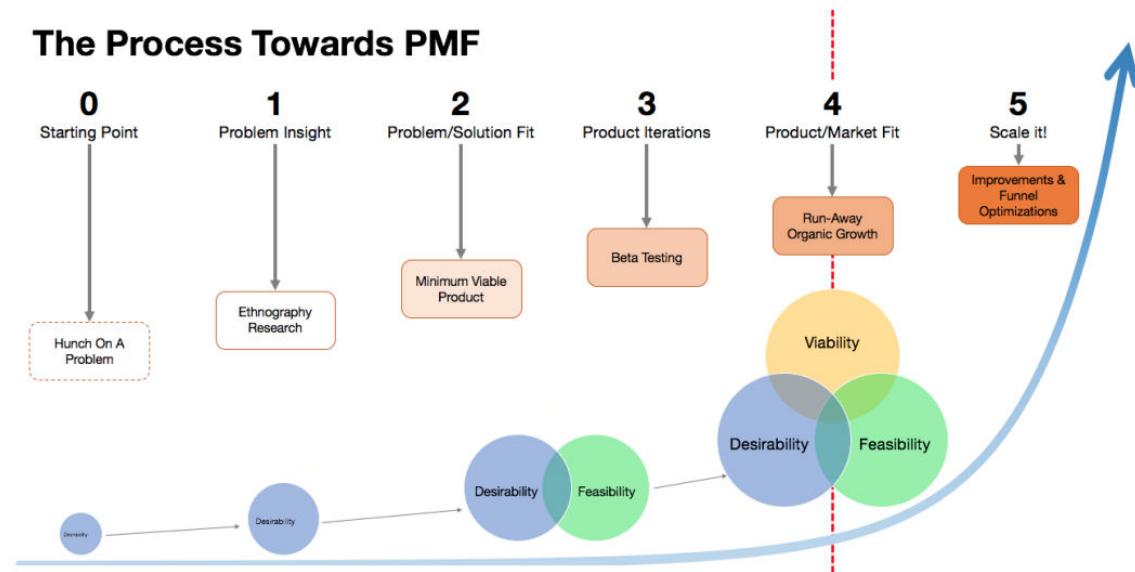


Fig. 5: From Ideation (Research) to Finding the PMF (The Venture City, 2019)

Effectively, STAcc acts as the continuity of TRG to identify the product market fit through a series of market & tech validation exercises to improve the Minimum Viable Product created from TRG and subsequently making its way to the market. The MVP undergoes development until it evolves into a scalable product that meets the requirements of its users or clients, essentially achieving Product/Market Fit (PMF). Identifying desirability, feasibility and viability leads to the answer to scale the PMF or to go back to the drawing board to improve the BMC to pivot the solution rather than scale it.

There are 3 main framework/tools which are proven to guide the transition:

1. Business Model Canvas (BMC) (Osterwalder, Pigneur, 2010) & Value Proposition Canvas (VP) (Osterwalder et al. (2014))
2. Need Analysis & Strategic Pathway
3. Technology Readiness Level which later evolve to the usage of KTH Innovation & Readiness Level (KTH Innovation, 2022)

#### Business Model Canvas & Value Proposition Canvas

The simultaneous development of core technology in TRG and its business use cases in STAcc compels researchers to assess which components of the core technology are prepared for early technological and market testing. These tools were an integral part of Phase 1 – ICB. The bootcamp underscored the importance of BMC & VP, equipping researchers with assumptions about customer segments and aiding in the creation of the value proposition, channels, and customer relationships for the business. The Value Proposition canvas complements the Business Model Canvas by providing deeper insights into the value proposition and customer segments. In Phase 2 – FT MVP, the execution of early technological and market testing relies on the identification of customer and value proposition segments, as these offer guidance to researchers entering validation activities confidently and well-prepared. To manage researchers' expectations, an initial BMC was proposed alongside the proposal submission to assess the scalability and viability of the research output from a business perspective, while feasibility was mostly assessed through conventional literature review methods.

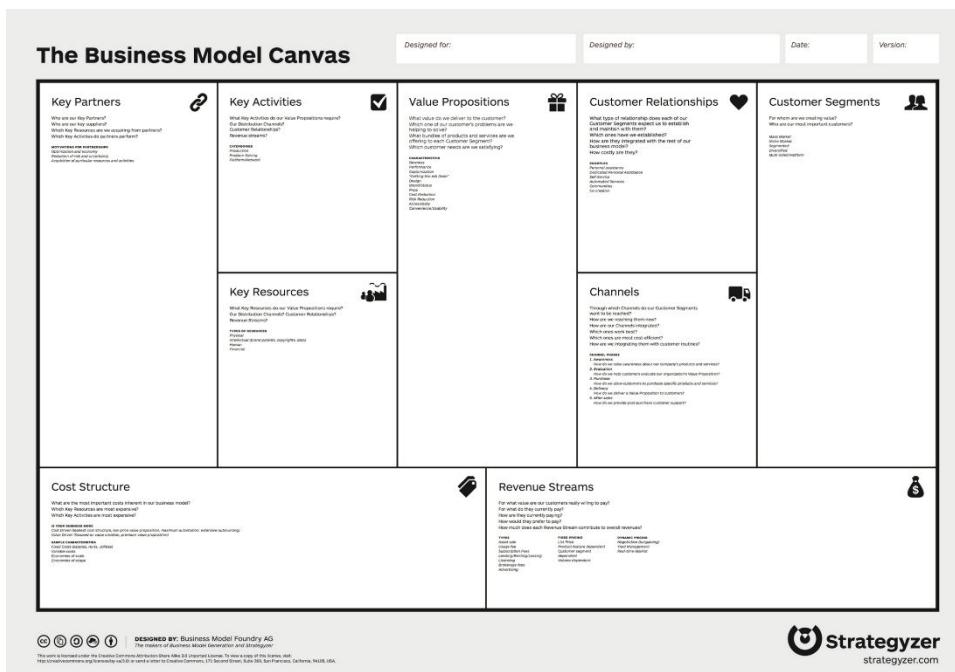


Fig. 6: Business Model Canvas (Osterwalder, Pigneur, 2010)

### Need Analysis & Strategic Pathway Plan

An analysis of needs was conducted to assess the strengths and gaps of the envisioned final product or services resulting from the research, to understand its strengths and weaknesses. Following this, a strategic pathway plan was formulated based on three major matrices: (i) Business Development, (ii) Product Development, and (iii) Technical Development. These tools were implemented in the initial stages of Phase 2, and the strategic plan was curated accordingly to provide guidance for researchers as they navigated through Phase 2.

### Readiness Level

The initial readiness level was assessed solely based on the Technology Readiness Level (TRL), a widely used tool in Malaysia, particularly by the Ministry of Science, Technology & Innovation (MOSTI). During the research proposal submission stage, the TRL for the research was determined by the research team, and validation of the TRL was confirmed in Phase 1 – ICB. As validation activities were conducted in Phase 2 – MTV-MVP, ample information was gathered from the industry and key partners, enabling the utilization of KTH Innovations & Readiness Level (KTH Innovation, 2022).

The KTH model assesses the advancement of idea development across six critical aspects of innovation, graded on a scale from 1 to 9. Each area is defined precisely at various levels, accompanied by associated milestones and necessary activities to progress to each level. This model functions as a valuable tool for teams involved in

idea development, as well as coaches or managers assisting in the process, enabling them to effectively measure progress and current status. The readiness level encompasses six matrices crucial to innovation development, including

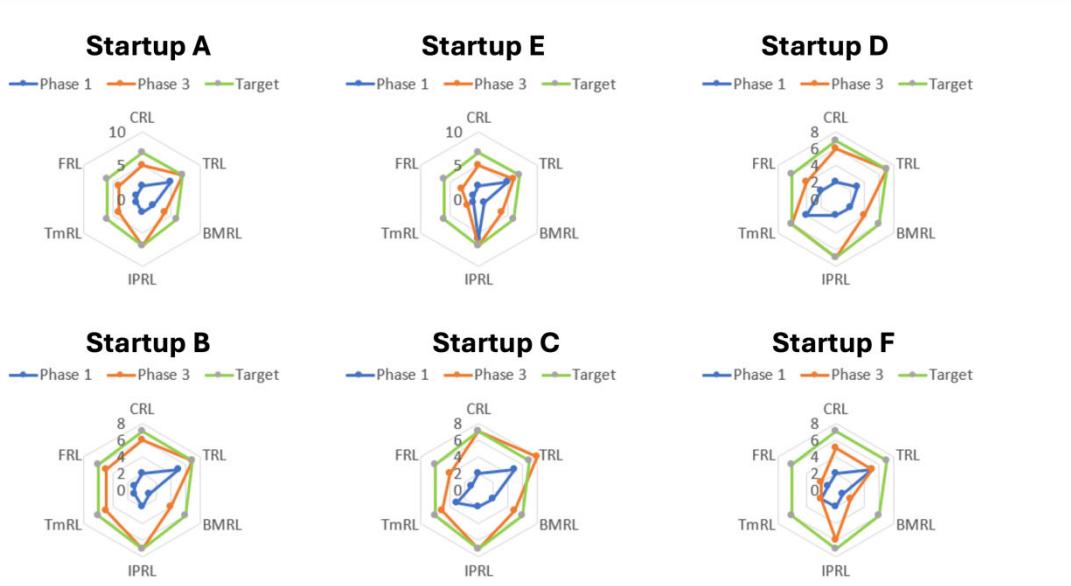
- (i) Technology Readiness Level (TRL),
- (ii) Business Model Readiness Level (BRL),
- (iii) IP Readiness Level (IPRL)
- (iv) Team Readiness Level (TmRL),
- (v) Funding Readiness Level (FRL)
- (vi) Customer Readiness Level (CRL)

## 4 Findings

For a comprehensive analysis, only the analysis of Cohort 1 is included in this paper, as Cohort 2 is currently in the initial stage of Phase 3 at the time of writing.

The analysis aimed to assess the progress of each team and cohort based on the tangible and intangible outcomes achieved throughout Phases 1 to 3.

The chart and table below illustrate the growth of each startup and team by quantitatively comparing Phase 1 and Phase 3.



*Fig. 7: Growth of Startups and Team in Cohort 1 of STAcc*

Figure 8 illustrates the growth comparison of each team, with Startup B exhibiting the highest overall growth. The parameters used to measure this growth since Phase 1 in 2021 are six commercialisation readiness levels (RL), including Customer Readiness Level (CRL), Technology Readiness Level (TRL), Business Model Readiness Level (BMRL), Intellectual Property Readiness Level (IPRL), Team Readiness Level (TMRL), and Funding Readiness Level (FRL). The individual commercialisation readiness scores and percentile ranks for each team, calculated using the percentile rank method, are presented in Table 1.

TEAM	COMMERCIALIZATION READINESS SCORE			PERCENTILE RANK
	PHASE 1	PHASE 3	GROWTH	
<b>Startup B</b>	12	34	22	83%
<b>Startup C</b>	15	36	21	67%
<b>Startup A</b>	13	30	17	50%
<b>Startup D</b>	17	33	16	33%
<b>Startup E</b>	16	27	13	17%
<b>Startup F</b>	13	22	10	0

Table 1: Commercialisation Readiness Score

## 5 Outcomes and Impact

These initiatives have been instrumental in fostering the emergence of new technological innovations among local technopreneurs in Sarawak. By expediting the translation of digital technology into implementable use-cases and facilitating the commercialisation of research outputs, the focus on deep-tech companies has spurred the development of cutting-edge solutions deeply rooted in novel intellectual property.

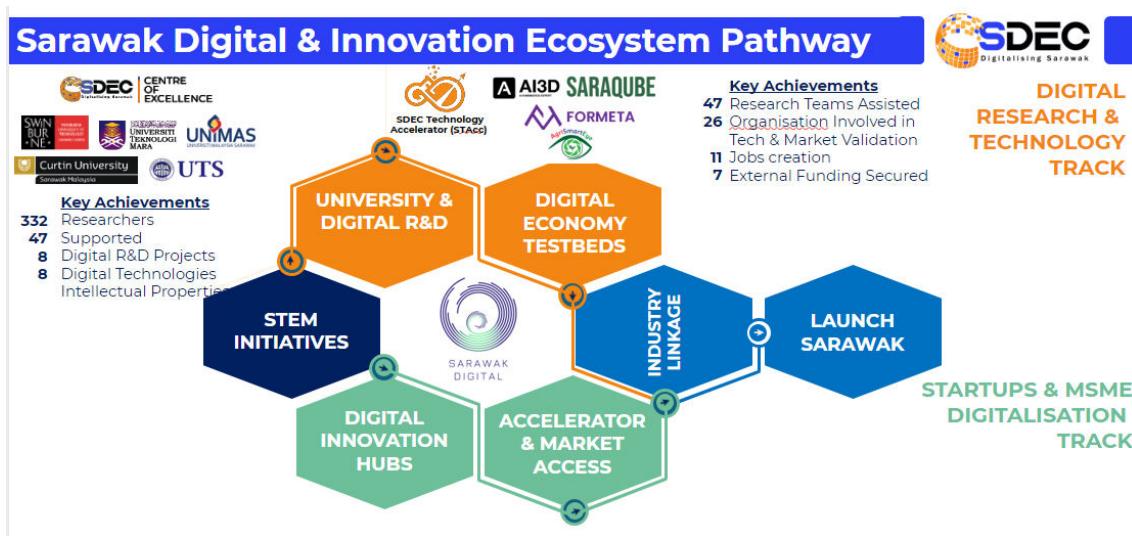


Fig. 8: Impact and Achievements in Digital Research & Technology Track

Funding from the Translational Research Grant Scheme has supported 332 researchers from 5 Sarawak universities (i.e. Curtin University Malaysia, Swinburne University of Technology Sarawak Campus, Universiti Teknologi Mara (UiTM) Sarawak, University of Technology Sarawak, and Universiti Malaysia Sarawak (UNIMAS)) under the CoE across 47 projects, delving into eight digital technologies. This comprehensive pathway extends beyond the research activity, fostering the capacity building of 49 Masters and PhD graduates and research outputs include a portfolio of 8 IPs comprising of patents, utility innovations and copyrights.

Noteworthy digital core technology inventions include:

University	Invention	Intellectual Property Right
University of Technology Sarawak	Adaptive flight duration and battery consumption estimation model	Patent
	Flying path similarity comparison model	Patent
Curtin University Malaysia	Product quality monitoring and origin tracing system of Sarawak ground black pepper using intelligent image processing	Utility Innovation
	3D model using deep learning for gait analysis in the field of rehabilitation	Utility Innovation

Swinburne University of Technology Sarawak Campus	Land use and land cover classification using machine learning classification model	Utility Innovation
	Adaptive system for detecting anomaly in data stream	Utility Innovation

Table 2. Digital core technology inventions from STAcc Cohort 1

Across three phases, the STAcc program has supported 47 research teams comprising 305 participants. From the first cohort, technologies developed by six research teams progressed to TRL 6, demonstrating their viability in real environments. Four research teams have proceeded to forming their spin-offs<sup>#</sup> to enable them to provide their services and expertise to the industry.

Under the STAcc program, SDEC also provides mentoring, coaching and other ancillary support to the spin-offs formed through STAcc via complimentary hot-desking at SDEC's CoE facility, fundraising advisory support and access to our Sarawak Digital ecosystem's program and networks.

These statistics from Cohort 1 of STAcc further highlight the impact of this initiative:

- › Technologies developed by six research teams progressed to a Technology Readiness Level 6, demonstrating their viability in real environments.
- › Additionally, the creation of four deep tech and research-driven spin-offs from three universities showcases tangible outcomes.
- › Eligibility for the National Technology and Innovation Sandbox (NTIS) green lane further positions these innovations for broader recognition and impact

Details of the four deep tech spin offs are provided in Table 2.

University	Creation of Spin Off	Product/Technology Solution resulting from research-driven IP	Notable Achievements
Curtin University Malaysia	AgriSmartEye PLT	AgriSmartEye - A technology that enables detection of the authenticity and geographical origin of ground agriculture product by	Won Curtin University's prestigious Curtinnovation Award (International Category) Australia 2021

		image analysis in under three (3) minutes.	
Curtin University Malaysia	AI3D PLT	AI3DCAMS - A marker less biomechanical analysis system using a single depth sensor. The system can perform AI 3D motion data acquisition for biomechanical analysis and 3D human model reconstruction.	Secured NTIS Sandbox 1 Funding for further technology validation
Swinburne University of Technology Sarawak Campus	Saraqube PLT	Sarawak Data Cube - multi-dimensional satellite data and machine learning to provide accurate and verifiable data which can help to unlock access and uptake of carbon and other green projects.	Top 3 for CSIRO - Australia-South East Asia Climate Smart Innovation Hack 2022
University of Technology Sarawak	Formeta PLT	Unmanned Aircraft System (UAS) Traffic Management - Air traffic control and monitoring to classify and visualize airspace, building height, safety distance on map and rescue mission.	Collaboration with Sarawak Forestry Corporation on the application of drone tech in their operations

Table 3. Details of spin offs

Furthermore, the intellectual property commercialisation resulting in external funding opportunities valued at RM1.17mil underscores the success in translating research efforts into commercially viable ventures. Post-program, these spin-offs are continuously providing their services and expertise to organisations including as Sarawak Forestry Corporation, CSIRO, and WWF.

Additionally, in Cohort 2 of STAcc, four teams out of 21 teams have signed their MoUs with industry partner with the objective to execute market & technology validation

activities in different economic sectors. In 2024, top 10 teams will continue their journey in Phase 3 – Product & Market Testing to test their product and execute market testing in live environment.

In Table 4, we highlight significant spillover opportunities for our researchers and postgraduates as they engage deeply in their fields of research. This spillover effect enriches their academic pursuits, fosters collaborations, and drives societal progress.

<b>TRG Research Project</b>	<b>University</b>	<b>Spillover Opportunities</b>
Development of Digital Platforms for a Rapid, Cost-Effective and User-Friendly Detector and Estimator of Adulterants in Ground Sarawak Black Pepper	Curtin University Malaysia	PhD postgraduate has been appointed as the Chief Technology Officer (CTO) of the spin-off company.
Stereo Vision Computer Aided-Monitoring System (SV-CAMS) for the Field of Rehabilitation	Curtin University Malaysia	Principal Investigator of the research team has been entrusted to lead the newly established Advanced Visualisation Lab in the university.  Employing postgraduates from the initial research team as full-time staff in the spin-off company.
Remote Sensing Of Local Economically-Important Plant Species	Swinburne University of Technology Sarawak Campus	Employing postgraduates from the initial research team as staff in the spin-off company
The Study of Using Automatic Dependent Surveillance-Broadcast Technology for Managing the Traffic of Unmanned	University of Technology Sarawak	Employing postgraduates from the initial research team as full-time staff in the spin-off company.

Aerial Vehicles for Sarawak Airspace		
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*Table 4: Impactful Spillover Opportunities*

## 6 Conclusions and Recommendations

Reflecting on our initiatives, it has been a transformative journey of learning and skill development. Engaging 332 researchers across interdisciplinary fields of research has enriched their expertise. Capacity building for the postgraduate students showcases our commitment to talent development.

Structured models within STAcc cover crucial aspects like commercialisation workshops, Business Model Canvas, Intellectual Property Management, Market and Technology Validation, and more. Additionally, teams benefit from tailored mentoring and product development plans, aligning with each team's unique commercialisation pathway. This holistic approach ensures not only the acceleration of technological innovation but also the seamless integration of research into the market.

As we envision the future, the success stories of six research teams reaching TRL 6 and the emergence of four deep tech and research-driven spin offs underscore the real-world applicability of our endeavours. Simultaneously, we recognize that not all researchers aspire to become deep tech startups, let alone lead one. Hence, exploring alternative avenues to empower research translation is crucial.

In conclusion, our collaborative journey with 47 research teams has not only propelled technological innovation but has also paved the way for tangible societal and economic impact. As we celebrate these accomplishments, we acknowledge the diversity of researcher aspirations and commit to exploring varied avenues to empower research translation in our ever-evolving digital landscape.

#Note that the terms startups and spin-offs are used interchangeably where both refer to deep tech companies originating from universities.

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# **Knowledge valorisation embracing entrepreneurship and resilient growth**

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## **Abstract**

Green, digital and just transition are the key challenges for Europe. To make the most out of them, it is crucial to collectively engage and empower all the players of innovation ecosystems. The knowledge valorisation policies recently highlighted by the European Commission (EC) emphasise the importance of microenterprises in creating value from the latest research results.

In this paper, we address specifically the valorisation process between universities, innovators, academic spin-off and start-ups, focusing on cases regarding smart and green city logistics. We introduce an agile and efficient knowledge valorisation process for micro-scale business entities. The basis of the approach are the EC EntreComp and DigSoc frameworks combined with a hands-on Living Lab community harnessed to leverage the impact of knowledge valorisation process.

To achieve our objectives in a holistic way, entrepreneurial capacities are complemented with simultaneous offering of hands-on testing and experimentation in real-life contexts. The Living Lab approach provides the innovators and microenterprises with additional features of user engagement, open innovation, and value chain involvement. This facilitates evolvement and growth in a transformative and resilient manner.

Start-ups often require practical guidance, concrete support and special environments. Integrated with Living Lab tools, this has led to excellent examples regarding academic spin-offs and start-ups' growth paths. Our practical cases demonstrate the benefits of our approach combining entrepreneurial and digital skills with real-life experimentation to support the growth of innovative start-ups and other microenterprises.

Research results emphasising the significance of entrepreneurial competences must be translated into concrete and agile value creation for start-ups. We will apply this concept in sustainable logistics, where excellent product and service ideas initiating from start-ups are waiting to be tested, deployed and scaled up by cities and businesses. Making value of these will facilitate the way towards the ambitious carbon-neutrality targets.

## **Keywords**

Knowledge valorisation, entrepreneurial competences, digital competences, growth companies, innovation green logistics

## **1 Introduction**

## **1.1 Main problem addressed**

Green, digital and just transition are the key challenges for Europe. To make the most out of them, it is crucial to collectively engage and empower all the players of innovation ecosystems. The knowledge valorisation policies recently highlighted by the European Commission (EC) emphasise the importance of microenterprises in creating value from the latest research results.

In this paper, we address specifically the knowledge valorisation process between universities, innovators, academic spin-offs and start-ups. It has been acknowledged that a specific gap exists within this valorisation process especially as concerns the transfer of research results from universities to micro-scale business entities in terms of awareness, capacity building, and sometimes also respect. Hence, in order for the universities to play a more active role in innovation valorisation expedition, new tools and measures must be taken. This paper introduces a pathway on how universities can better contribute to entrepreneurs' knowledge valorisation based on the entrepreneurial and digital skills advancement frameworks and applying their learnings and outcomes to a specific case on smart and green city logistics.

Typically, mega and large-size companies are enjoying good service levels and support from universities. Recently, also SMEs are getting focus (Puurtinen & Pohjola, 2023), but a certain lack of interest and measures has been nominating as concerns entrepreneurs and start-ups. We believe there is an important gap that needs to be bridged. Therefore, we introduce a knowledge valorisation concept for micro-scale business entities. The basis of the concept is formed by the EC EntreComp and DigComp frameworks combined with a hands-on Living Lab community harnessed to leverage the impact of knowledge valorisation process.

## **1.2 Main goals of the paper**

In this paper, we describe the required knowledge valorisation process. Simultaneously, we emphasise the significance of entrepreneurial competences and how those must be translated into concrete and agile value creation for start-ups and innovators. This, in turn, will enable their resilient growth. The paper offers insights into enhancement and promotion of entrepreneurial and digital skills for student and academic start-up's as well within the common EU EntreComp and DigComp frameworks, respectively.

Furthermore, we describe a knowledge valorisation concept with three main pillars for micro-scale business entities. As a practical case study, we apply this approach one to the specific field of smart and green city logistics, where tremendous possibilities for microenterprises exist to bring their contribution to reach the carbon-neutrality targets.

Furthermore, as wider objective, this introduced effort is part of Tampere University of Applied Sciences' (TAMK) development work towards our vision to be the fourth generation university. Fourth generation university is a new concept of higher education institutions that aims to co-create a sustainable future with its stakeholders. It goes

beyond the traditional missions of teaching, research, and regional development, and engages all parties in collaborative problem-solving and innovation for the common good. A fourth-generation university is responsive to the environmental, social, and economic challenges of our time, and seeks to create public value and positive impact.

The objectives of TAMK's knowledge valorisation process for increasing the business opportunities and technology abilities of entrepreneurs and microenterprises include the following:

- › To bridge the gap between research and microenterprises more effectively and efficiently and hence strengthen and speed up the knowledge valorisation process.
- › To increase microenterprises' competitiveness by accelerating the uptake of new knowledge created by universities.
- › To strengthen entrepreneurial mindset among microenterprises and start-ups and hence support their resilient growth.
- › To test and apply our knowledge valorisation framework to suit various sectors, such as green and sustainable logistics, needing innovative solutions from all sizes of business entities.

In this practitioner paper, we elaborate the importance of the knowledge valorisation process specifically in the frameworks of entrepreneurial and digital skills development. The goal is to intensify university-industry collaboration focusing on the special needs and requirements of microenterprises and start-ups, which often are underrated and hence excluded as sovereign inventors and key players in innovation ecosystems.

### **1.3 Structure of the paper**

The structure of this paper is as follows. In Section 1 Introduction, we present the main features of the problem addressed as well as the main goals and objectives of the present paper. Section 2 Setting the Scene provides the reader with a wider framework to be investigated, presenting the background for current context of knowledge valorisation, EntreComp framework and Living Labs which constitute the bigger picture to which we bring our practical contribution. In Section 3, we introduce TAMK's approach to support academia-microenterprise collaboration in the knowledge valorisation process. Furthermore, we explain the main features for its adaption in applying it to a case study in the field of green and responsible logistics. Section 4 Implications presents a short evaluation and assessment of the process so far. In Section 5 Conclusion, we point out potential utilisation aspects and opportunities for wider investigation and deployment and further development. In addition, we present some risks concerning the framework and its applicability.

## **2 Setting the scene**

### **2.1 EU valorisation policy**

As a response to the major global challenges of today, the European Commission has established remarkable policy level strategies and recommendations such as Green and Digital Transformation and European Research Area (COM(2021) 350 final).

Nevertheless, despite the ambitious goals set by the high-level policies, the gap between research and innovation is often profound and difficult to be bridged at practical level.

To accelerate the uptake of research and innovation results by society, the EU knowledge valorisation policy has been introduced in 2020 (COM(2022) 315 final). It aims to involve all the players in the process to transform these results into sustainable products, processes and services that bring added value and sustainable impact for the society at all dimensions, namely economically, environmentally, and socially.

Recently, the knowledge valorisation policy has been supplemented by Guiding Principles for Knowledge Valorisation accompanied by several Codes of Practice co-created by communities of practice formed by key experts of the focus areas. One of these, Code of practice on industry-academia co-creation for knowledge valorisation providing practical guidance and tools for research and innovation actors. The recommendation document emphasises the importance of entrepreneurial skills and practices while simultaneously fostering the joint facilities and digital platforms for improved knowledge sharing and consecutive valorisation process. (Council recommendation (EU) 2022/2415; Commission recommendation (EU) 2024/774)

### **2.2 European entrepreneurship competence framework - EntreComp**

The European Commission has developed the European Entrepreneurship Competence Framework, commonly known by its acronym EntreComp, as a reference framework to explain what is meant by an entrepreneurial mindset which is needed for citizens in every aspect of life. EntreComp offers a comprehensive description of the knowledge, skills and attitudes that people need to be entrepreneurial and create financial, cultural or social value for others. EntreComp is a common reference framework that identifies 15 competences in three key areas that describe what it means to be entrepreneurial and is aiming to foster entrepreneurial capacity of European citizens. (European Union, 2018)

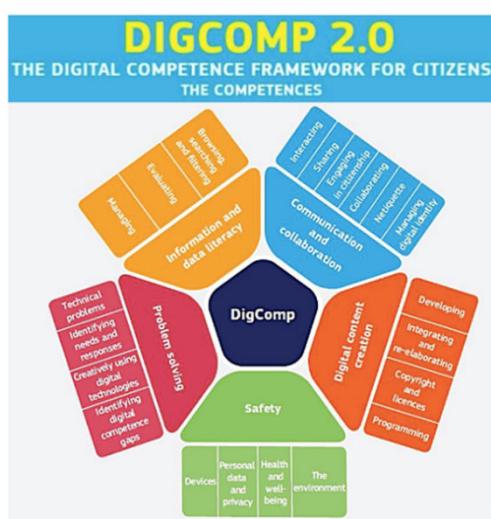


*Figure 1. EntreComp main framework with three key areas and related 15 competences*  
<https://ec.europa.eu/social/main.jsp?catId=1317&langId=en>

EntreComp is a framework of 15 entrepreneurship competences, broken down further into threads that describe what a particular competence really means in practical terms. These are clearly defined through learning outcomes – what a learner knows, understands and can do. The learning outcomes are mapped across 8 different levels of progression, from beginner to expert. (European Union, 2018)

### 2.3 The digital competence framework for citizens - DigComp

The Digital Competence Framework for Citizens, also known by its acronym DigComp, was first published in 2013 by the European Commission. It aimed to be a tool to improve citizens' digital competence, to help policymakers to formulate policies that support digital competence building, and to plan education and training initiatives to improve digital competence of specific target groups. DigComp also provided a common language on how to identify and describe the key areas of digital competence and thus offered a common reference at European level. (European Union, 2019)



*Figure 2. Digital Competence Framework for Citizens,* [https://joint-research-centre.ec.europa.eu/digcomp\\_en](https://joint-research-centre.ec.europa.eu/digcomp_en)

Originally, the first Dimension of the DigComp framework consists of key five digital components, which in turn are comprised of 21 competences (Dimension 2) pertinent to the broader Dimension 1. Together, these two layers define the DigComp conceptual reference model (European Commission, 2019). The framework has been further evolved towards DigComp 2.2, leveraging the framework to the era of AI while also introducing 250 new examples of knowledge and skills related to digitalisation (Vuorikari et al, 2022).

#### **2.4 Living Labs as a cornerstone for fourth-generation universities**

The Living Labs approach emphasizes the engagement of all relevant stakeholders of the value chain, applying open innovation procedures to all activities, and demonstrators in real-life environments, not just university labs. Specific focus is on SMEs, boosting their competitiveness in the ecosystem. TAMK Knowledge Transfer Charter (KTC) forms an essential part of the innovation and valorisation processes, utilising Living Labs and respective research and innovation infrastructures as the main assets of the valorisation pathway (Puurtinen et al, 2020; Siivonen et al, 2021).

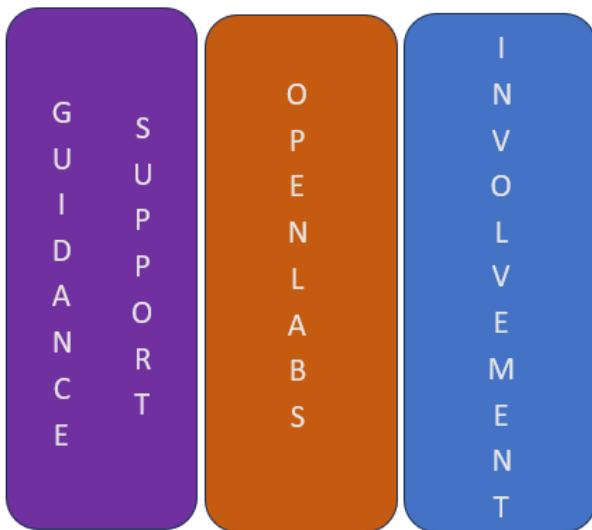
The Living Labs can be considered as one of the key approaches in the concept and realisation of fourth-generation universities. The idea of a fourth-generation university is based on the historical evolution of universities since their inception in the 12th century. The first generation of universities focused on teaching and disseminating knowledge, i.e., they had an education orientation. The second generation, which emerged in the late 19th and early 20th centuries, added research and scientific discovery to their mission. The third generation, which developed in the late 20th century, embraced entrepreneurship and economic development as their goals, that way aiming to build a role in national capacity building and policy generation.

Simultaneously these universities partnered with outer sectors and entered commercialisation of education and research (Heller, 2021). The fourth generation, which is still emerging, expands its mission to include co-creation and sustainability (Asgari et al, 2021; Oztel, 2020). It also highly promotes and needs to follow societal values on the global level, such as fairness, equity, and environmental sustainability.

### **3 TAMK's approach to support microenterprises' knowledge valorisation process**

#### **3.1 Concept-level three pillars**

The new concept level initiative, approach formed by TAMK, focuses on three pillars. These pillars are headlines describing the service and support that TAMK as an innovative entrepreneurial university offers, especially towards micro sized companies, mainly for start-ups and university spinoffs.



*Figure 3. TAMK's three pillar service approach*

The essential features of the three pillars can be defined as follows:

- (1) **Guidance and support.** The first pillar provides practical guidance, assistance and in-direct business support for micro-scale business entities such as academic spin-offs and start-ups. In this service offering, the in-direct business support consists economic arrangements of rental and leasing options for workspaces, IT infrastructure, and office tools and support.
- (2) **OpenLabs.** This second pillar enables the use and gains the access to TAMK's OpenLab research and innovations infrastructures and testbeds (e.g., TAMK FieldLab ([sites.tuni.fi/fieldlab-en/](http://sites.tuni.fi/fieldlab-en/)) and different Living Lab processes, including student contribution for jointly agreed project work or company challenges.
- (3) **Involvement.** Third pillar of our service offering is about joining TAMK's industrial networks and triple helix stakeholder forums for the benefit of new business opportunities, growth and value chain partnerships. In addition, the pillar offers options to be integrated as preferred partners to funding calls and development projects.

The approach is co-created and implemented with TAMK's start-up and spin-off partners aiming at improved knowledge valorisation and increased capacity building, hence supporting entrepreneurship and resilient growth.

### **3.2 EntreComp and DigComp frameworks to enhance knowledge valorisation – DIGI-SOC project**

The DIGI-SOC project co-funded by Erasmus+ Cooperation Partnerships (2020-2023) focused on the investigating and improving digital skills and cross-domain

entrepreneurship for societal challenges. The project aimed to develop transnational cooperation to foster innovative curricula promoting cross entrepreneurial mindsets and competences around digital skills. The project offers a platform to enrich a new paradigm in which universities work in strong partnerships to improve competences in curricula with an EU transnational approach.

During the implementation of the DIGI-SOC project, ten higher education institutions across Europe mapped their entrepreneurial competences and needs according to the EntreComp and DigComp framework related to different degree programmes. Aim of the mapping was standardising competences "What we have" and "What we need" to develop educational organisations' offering to understand needs to develop skills and abilities and matching with business needs especially in the point of view of entrepreneurial companies' growth enablers.

Mapping was implemented by using an online survey based on the two EU frameworks. The content stemmed from examples and best practices point of view, and the participating institutions were instructed to identify examples of their current practices per EntreComp and DigComp competence area existing in their selected degree program. The mapping served also as a way to identify the "diamonds", i.e. best practices to be elevated to European level for strengthening entrepreneurial and digital competences. The questionnaire in Excel included 15 entrepreneurial competences and 21 digital competences. Following tasks were given to participating partners:

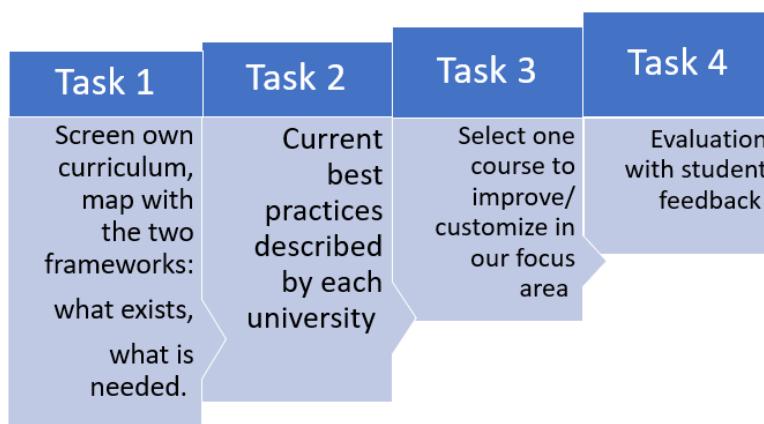


Figure 4. DIGI-SOC project's survey - tasks of the competence mapping.

Mapping was completed with the following tasks from each project partners. First each partner was asked to review, screen and map their own selected existing and compare it with the two frameworks and identify alignments. Secondly, they were asked to explore current best practices in the identified curriculum implementation, i.e., to look for successful practices related to active learning, assessment, and student engagement. In addition, they shared these practices with other project partners. Thirdly, their task was to choose a specific course within each university's curriculum for improvement and

customization towards EntreComp and DigComp theatics. And finally, the mission was to evaluate the essential modifications with student feedback and insights.

### **3.3 Case Green and responsible logistics – SPOTLOG project framework**

The goal of the "*Green and socially responsible city logistics innovations*" (SPOTLOG) project is to pilot new technologies and involve local communities in activities that result in socially responsible city logistics solutions. The project is co-funded by the Interreg Europe Program and coordinated by the University of Aveiro from Portugal. The partners are TAMK, Fundao Municipality, TTS Italy, Smart Cities of Romania Cluster, City of Mechelen, Lille Municipality, Mazovia Energy Agency, Municipality of Rimini, Vidzeme Planning Region and Constanta Metropolitan Area Intercommunity Development Association. The project is running from 1 April 2023 to 1 June 2027.

SPOTLOG's main vision is to involve local communities in creating socially responsible logistics systems, based wherever possible on zero-carbon modes, through the intelligent use of all available resources and taking advantage of the digitalisation of goods and passenger transport services. By focusing on low-density communities and medium-sized cities, SPOTLOG partners aim to improve regional policy instruments toward the European goals of inclusive and carbon-neutral mobility. One important mission here is the question on how the concept and approach levels can be applied to green and responsible logistics – Living Labs.

Lentola Logistics Ltd is a start-up company originated around drone development and usage towards sustainable logistics solutions especially extending 15 minutes city – concept (15mC) to cover last-mile deliveries also in rural areas. The company is developing a transportation system that utilizes electric-powered VTOL aircraft, which can reduce carbon dioxide emissions from last-mile deliveries in sparsely populated areas by up to 70%. This innovative approach has the potential to significantly improve environmental sustainability and efficiency in logistics.

Collaboration with TAMK has been close right from the start of the company as some of the originators of this company were TAMK students, the company spinning off from their specialisation study's project work. The co-operation between Lentola Logistics Ltd and TAMK has been formed around the three pillars' service approach as the company is placed with the premises of TAMK and located in the heart of test bed infrastructures of TAMK. The company has accompanied TAMK as a partner in several projects and external funding calls for mutual benefit, especially in the area of sustainable logistics and knowledge valorisation like the EU-funded SPOTLOG and also recently MULTIGINATION projects.

The SPOTLOG collaboration with Lentola Logistics Ltd is an indication that TAMK wants to develop expertise in the sustainable logistics sector and to generate new digital technology and service innovations. TAMK's service approach of three pillars are usefull, adequate and well-functioning while utilised during collaboration. Expertise and

innovations boost the vitality, business activities of the company while also bring value when in contact with project partners and between the different stakeholders of Tampere Region.

## 4 Results of the DIGI-SOC survey and implications on the green and responsible logistics sector

Start-ups often require practical guidance, concrete support, and special environments. Integrated with Living Lab tools, this has led to excellent examples regarding academic spin-offs and start-ups' growth paths. Our practical cases demonstrate the benefits of our dual concept combining entrepreneurial skills with real-life experimentation to support the growth of innovative start-ups and other microenterprises.

According to the DIGI-SOC project qualitative and quantitative survey, the most needed competences include features related to self-esteem, self-awareness and self-efficacy. In addition, there were significant gaps in capacities related to mobilizing resources, e.g. investments and new talents. As a result, TAMK has renewed its entrepreneurial education across disciplines as well as improved access to our incubator, accelerator, and other start-up support services.

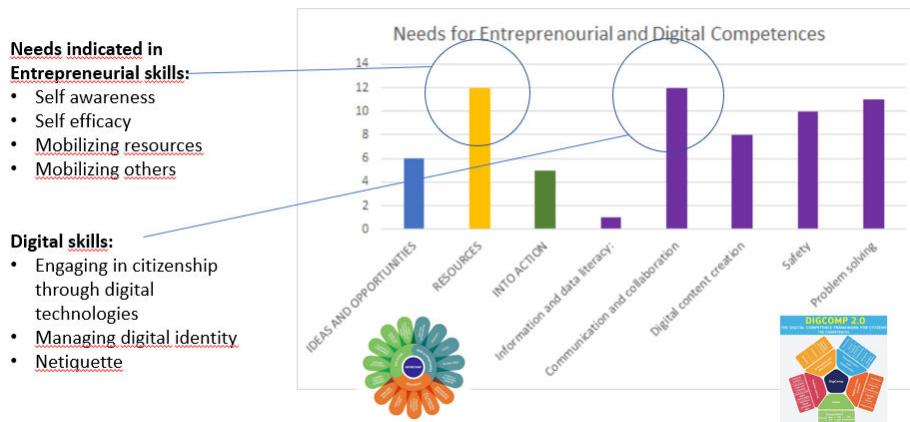


Figure 5. Skills and Competence needs – answers from seven DIGI-SOC partners

Also some lessons learned were collected from the participants about the pedagogical solutions, and working mode underlining the importance of Industry partners working as lecturers and provide new on the demand skills, need for increasing interdisciplinary collaboration within universities and finally need for innovative digital methods that are used for communication and sharing.

Valorisation concept, the new entrepreneurial education and valorisation process between universities, innovators, academic spin-off and start-ups provides key elements for improved start-up company's resilience across different disciplines and fields e.g. Green Logistics. Concept also enables improved access to our incubator, accelerator, and other start-up support services accelerating competence upskilling of the most needed EntreComp competences, this including features related to self-esteem, self-awareness and self-efficacy.

## 5 Conclusions

Innovators, spin-offs and academic start-ups play a significant role in bridging the gap between research and commercialisation. They create value from new knowledge and transfer it to innovation ecosystems. For this to succeed, they need entrepreneurial capacities and opportunities for place-based innovation such as Living Labs which maximise their flourishing and resilient growth. Moving toward future state where universities' functional platforms (Labs) utilisation for entrepreneur's knowledge valorisation are at better level.

As conclusion, research results emphasising the significance of entrepreneurial competences must be translated into concrete and agile value creation for start-ups. We will apply this concept in sustainable logistics, where excellent product and service ideas initiating from start-ups are waiting to be tested, deployed and scaled up by cities and businesses. Making value of these will facilitate the way towards the ambitious carbon-neutrality targets.

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# **Motivating industry to innovate with universities - Developing transfer relevant skills**

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## **Abstract**

Motivating Industry to innovate with Universities Co-creation (C-C) is a common way to motivate Industry to innovate with universities. "According to research, C-C occurs whenever individuals or institutions make a joint effort to create value. Traditional C-C is characterized by face-to-face interactions, continuous collaboration, and long-term relationships, (...). It involves the individual actors in the different stages of value creation (...) in which all actors contribute their own experiences and knowledge. A distinct concept is the key account management (KAM). "KAM is defined as a business approach which is strategic and has an objective of warranting sustainable and long-term business collaborations (...) (Wilson, 1998; Woodburn, Holt and McDonald, 2004). This meant that the two main stakeholders (...) should move from adversarial to a collaborative stance in order to ensure long term benefits that would build a relationship through partnership (Zolkiewski and Turnbull, 2000)." Both can be related in the context of long-term business relationships and can possibly strengthen UIC (University-Industry-Cooperation's). In 1986, Henrik Calonius published the promise theory. According to the promise theory, marketing is based on the exchange of promises as well as on the fulfilment of promises. What does that mean regarding technology transfer?

## **Keywords**

Relationship building, long-term relationships, collaboration, co-creation, key account management

## **1 Co-creation (C-C) and Key Account Management (KAM) and their connection in the context of long-term business relationships**

Co-Creation (C-C) and Key Account Management (KAM) can be related in the context of long-term business relationships and strengthen UIC (University-Industry-Cooperation's). In 1986, Henrik Calonius published the promise theory. According to the promise theory, marketing is based on the exchange of promises as well as on the fulfilment of promises. What does that mean regarding technology transfer?

Hypothesis 1: long term business collaborations are based on trust.

H2: Trust is based on the fulfilment of promises.

H3: There are "stages" of the relationship between the involved parties.

H4: As soon as trust is built in UIC, Industry is motivated to innovate (for example via C-C.)

In a Study based on Michele O'Dwyer, Raffaele Filieri, Lisa O'Malley "Establishing successful UIC's: barriers and enablers deconstructed" it is highlighted how trust evolves at different stages of UI network evolution. "There is an initial trust towards a single individual, (...) trust has been consistently highlighted as a success factor in UIC's (e.g., Barnes et al., 2002; De Wit-de Vries et al., 2019; Oliver et al., 2019). H5: Trust is built by the individuals (that are trying to) cooperate together.

## 2 Results

Motivating industries to innovate through collaboration with universities is a multifaceted challenge that involves fostering long-term relationships. H6: There are (KAM) tools in the context of business relationships, that can possibly strengthen UIC and by that, emphasize the motivation to co-create. H6: There are (KAM) tools in the context of business relationships, that can possibly strengthen UIC and by that, emphasize the motivation to co-create." ...literature on the barriers and enablers to collaboration across projects (for example, Barnes et al., 2002; Lee, 2011) in establishing successful UICs "exists. By now the role of trust and the fulfilment of promises in UIC has not been focused on. The aim of this research is to develop a "Relationship Stage Model" with deep investigations on every stage that also allows conclusions on how to motivate the parties to develop a long-term business relation. Each concept, KAM and C-C, will be explored and discussed on how they may intersect in matters of trust in different stages of the relationship.

## 3 Discussion and recommendations:

While existing literature identifies barriers and enablers to collaboration, the role of trust and promise fulfilment in university-industry collaborations (UICs) has not been sufficiently explored. Trust has consistently emerged as a success factor in UIC network evolution. This exploration will involve literature research, case studies, and surveys. Based on Michele O'Dwyer, Raffaele Filieri, Lisa O'Malley "Establishing successful university-industry collaborations: barriers and enablers deconstructed" there are four distinct phases in the UIC evolution. First, the Embryonic phase (prior to Year 1) ... Second, the Initiation phase (Year 1–3) where network members got to know each other, built trust, demonstrated their respective skills and capabilities (academics), and discussed their needs (industry). Third, the Engagement phase (Year 4–7) where different actors began to engage in knowledge-sharing activities. Fourth, the Established phase (Year 8 to date) where the network achieved its first important results, attracted additional funding, and increased in size. Based on this model the Relationship Stage Model was developed. This model shows several bonding types based on trust and time in (possible) mathematical functions. The fist data base of that model is practical

experience. Since it is based on the “practical experiences” it is very limited to the region and therefore also to the topics related to the region and its industry.

## 4 Conclusions and recommendations

The study explores the motivation of UIC focusing C-C. It aims to develop a "Relationship Stage Model" by investigating trust, promise fulfilment, and different relationship stages. The research includes promise theory resulting in forming hypotheses that link trust, promise fulfilment, and stages in UICs. It utilises literature reviews; it is identifying gaps in understanding trust and promise fulfilment in UIC and it results in the development of a comprehensive "Relationship Stage Model" using case studies and surveys.

In conclusion, the study indicates a significant relationship between the duration of a relationship, the fulfilment of promises, and the subsequent increase in trust between the involved parties. The findings underscore the importance of trust-building strategies. Trust is (possible to be) a requirement to motivate Industry for C-C with universities. Since trust is built on individual actors, KAM tools could help to create long-term and sustainable (and therefore innovative) UIC.

Further contemplations lead to the Myers-Briggs Type Indicator (MBTI) which is one of the most commonly used tools for assessing an individual's personality. Since trust is built on individuals and their type of personality, there are further studies in this direction executed.

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# Navigating startup success – The Inno Radar's role in streamlining academic incubation

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## Abstract

The domain of academic entrepreneurship is increasingly recognized as a vital force in fostering innovation and economic growth, with universities and research institutions playing a key role in nurturing startup initiatives. Despite their importance, these entities struggle to effectively monitor and realize the potential of startups due to their dynamic nature and volume. Traditional management tools often fail to comprehensively address the complexities of startup projects, necessitating more innovative solutions. This study introduces the use of the "Inno Radar," a novel digital platform that delivers a new approach for the management, evaluation, and communication of startup projects within academic environments. The research aimed to create a tool that not only facilitates the tracking of numerous startup projects but also improves their visibility and communication with external stakeholders. The "Inno Radar" is envisioned as a holistic, interactive, and user-friendly platform that transforms traditional startup project management. An exploratory survey involving 32 startup centers at German universities of applied sciences was conducted to assess current tracking methods and the potential benefits of the "Inno Radar". The results highlighted a notable deficiency in dynamic tracking and external communication with existing systems. In response, the TH Wildau team developed a prototype of the Startup Radar using the "Inno Radar". This iterative process, incorporating user feedback, culminated in the launch of a web application that offers a real-time, interactive platform for showcasing startup projects. The "TH Wildau Startup Radar" exemplifies a pioneering approach to academic startup management, providing a dynamic visualization of startups that benefits academic advisors, industry collaborators, and startups themselves. This platform enhances the ability of startups to present their projects to a wider audience, potentially attracting partners and investors. Moreover, the "TH Wildau Startup Radar" fosters a culture of transparency and collaboration, enabling various stakeholders, including students, faculty, industry partners, and investors, to engage with the startup ecosystem more effectively. This engagement facilitates better decision-making, innovation, and partnership opportunities. The "Inno Radar's" implementation at TH Wildau underscores its potential to transform academic entrepreneurship by offering a scalable and adaptable solution that addresses the limitations of conventional project management methods. The study's findings highlight the "Inno Radar" as both a practical tool for immediate needs and a catalyst for future innovation and collaboration within the academic startup ecosystem. Its development at TH Wildau serves as a prototype for further application and adaptation in diverse academic settings, marking a new era in startup management and promotion.

## Keywords

Academic Incubation, Inno Radar, Startup Management, Technology Radar, Startup Ecosystems, Digital Platforms

# **1 Academic entrepreneurship and the Inno Radar**

Academic entrepreneurship has emerged as a pivotal contributor to innovation and economic progress, with universities and research institutions playing a crucial role in nurturing startup initiatives (Etzkowitz and Klofsten, 2005; Skute, 2019). Despite the recognized importance of these endeavours, the dynamic nature and sheer volume of startup projects present significant challenges for the institutions in monitoring, realizing their potential and supporting them. Conventional management tools often fall short of effectively addressing the complexities inherent in these ventures, pointing to a clear need for more sophisticated and adaptable solutions.

## **1.1 Technology radar as an approach**

Using the “Inno Radar” as a Tracking Tool for Startups represents an innovative response to these challenges. This digital platform delivers a new approach on how academic institutions manage, evaluate, and communicate the developments and achievements of startup projects. The “Inno Radar”, incorporating the technology radar methodology originally introduced by Deutsche Telekom in 2004, is an exemplar of the application of strategic foresight tools in technology and knowledge transfer processes (Rohrbeck, 2010). This method, pivotal for technology scouting, employs a graphical visualization to encapsulate a concise summary of technologies, including their current developments, research statuses, and economic potentials. The visualization framework typically adopts a radar-like format, with the division of a circle into quadrants and rings (see Fig. 1). The quadrants generally denote nominal attributes, such as technological fields, while the rings represent evaluative metrics, often pertaining to the anticipated timeline for achieving market maturity (Berndt and Mietzner, 2021). The technology radar's utility in strategic foresight and technology scouting is underscored by its widespread adoption across various companies and institutions (Zalando, 2023; BMW, 2022; BMWK, 2022 Software AG, 2021). This adaptability speaks to the method's robustness in accommodating diverse technological landscapes and operational scales. The visualization's design facilitates a multifaceted analysis, allowing stakeholders to comprehend at a glance the position and trajectory of different technologies within a competitive or developmental landscape (Auth et al, 2017). The technology radar approach, traditionally employed to aggregate, assess, and disseminate information on existing and emergent technologies and trends (Schimpf et al., 2016), has found broader applicability beyond its initial scope. Recent academic research has expanded the usage of the technology radar to encompass a variety of other fields and purposes, including methodological assessments and support tools for design and implementation processes. An illustrative example of this expanded application is the work of Schmidt et al. (2023), detailed in their publication on the “INTIA-Methodenradar” (INTIA, 2023). This study underscores the adaptability of the technology radar framework by providing a comprehensive overview of diverse

methods aimed at supporting the design, implementation, and evaluation of everyday aids. In the context of the “Inno Radar” platform, the inclusion of example radars, showcasing also different approaches to leveraging the radar’s dimensions, further illustrates the tool’s versatility (Inno Radar, 2024). This not only demonstrates the method’s capacity to cater to a broad spectrum of use cases but also enriches the discourse on technology and knowledge transfer by providing concrete examples of how the different dimensions of the radar can be utilized to address specific analytical needs.

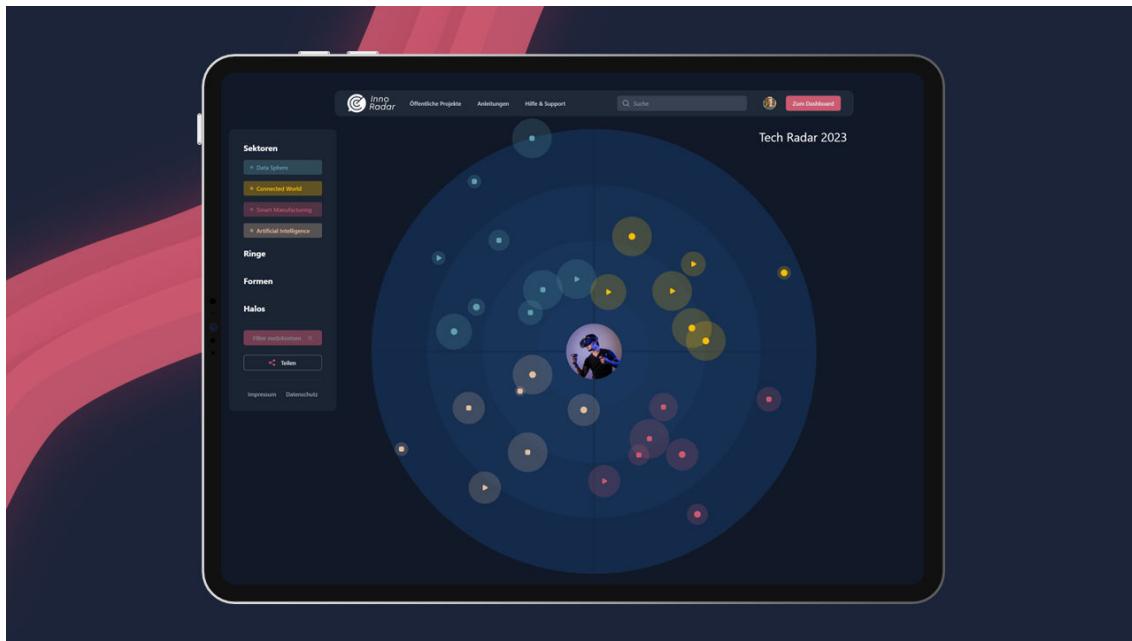


Fig. 1: Example of a technology radar using the “Inno Radar” application

## 1.2 Case study: The TH Wildau Startup Radar

Incorporating the Inno Radar as a strategic instrument to track, evaluate, and communicate information regarding startups emerges as a natural and logical progression in addressing the challenges previously outlined. Therefore, a Startup Radar for the Technical University of Applied Sciences was created. The development of the “TH Wildau Startup Radar” case study originated from the practical experience of startup guides employed at Technische Hochschule Wildau (TH Wildau) and also based on insights gained from an exploratory survey conducted across 32 startup centers at German universities of applied sciences. This survey aimed to capture a snapshot of the current methodologies and tools employed in tracking startup projects, identifying significant limitations, especially in terms of dynamic tracking and external communication capabilities. In addressing these challenges, the “TH Wildau Startup Radar” was created, inheriting feedback from potential users to ensure its functionality and user-friendliness. The resulting prototype, launched as a team-project, provides a

real-time interactive platform for tracking and showcasing startup projects, effectively bridging the gap between traditional management tools and the need for a more holistic, interactive approach.

## **2 Exploratory survey: Assessing academic startup support**

In response to the new approach of the “Inno Radar” and recognizing the necessity for dynamic tools in the sphere of academic entrepreneurship, this investigation utilizes an exploratory survey methodology to examine the management practices and challenges associated with startup support within the ambit of the StartUpLabs@FH programme. Spearheaded by the German Federal Ministry of Education and Research (BMBF), this initiative represents a strategic commitment to nurture and transparently communicate the progress of startup projects throughout 32 Universities of Applied Sciences (UAS) in Germany. This endeavor aligns seamlessly with the BMBF’s objectives to promote innovation and entrepreneurship within the academic domain (BMBF, 2024). The genesis of this survey was partly rooted in the challenges faced by TH Wildau employees in tracking and supporting their startup ecosystem. Having recognized the limitations of existing tools and methods, there was a concerted search for innovative solutions that could address these gaps. The “Inno Radar” emerged as a response to these needs, providing a dynamic and interactive platform for managing and showcasing startup projects. The exploratory survey was therefore developed not only to investigate the operational, support, and promotional strategies employed by academic institutions but also to ascertain whether other UAS were encountering similar challenges, if they had devised any solutions, or if they were in search of new methodologies.

Incorporating both structured and semi-structured questions, the survey was designed to elicit a blend of qualitative and quantitative data. This approach sought to uncover the current landscape of academic startup management. Targeting key individuals involved in the support and administration of startups within the StartUpLabs@FH programme, the survey aimed to ensure a broad and diversified understanding of the existing startup ecosystems across these institutions. Selecting participants from all 32 UAS was crucial for gaining comprehensive insights into the varied methodologies, tracking mechanisms, and communication strategies essential for the flourishing of their entrepreneurial ventures.

### **2.1 Survey results**

Conducted between 13th November and 21st December 2023, via an online survey platform, this approach facilitated the efficient collection and analysis of data. Out of the 32 UAS, 38 Employees of 24 UAS participated in the survey. The gathered responses offered a look at the different strategies devised by these UAS to track and showcase their startup activities.

### **2.1.1 Tracking startup ventures**

A paramount aspect of startup management within academic incubators involves the tracking of venture progress and milestones. The survey unveiled that Excel or similar spreadsheet tools are the predominant method employed for this purpose, with a staggering 82.05% of participants acknowledging their use. This high adoption rate underscores the simplicity and accessibility of spreadsheet applications in managing complex data. However, it also hints at a potential lack of integration with more sophisticated or sector-specific tools that might offer enhanced functionalities. In addition to spreadsheet tools, other methods such as Word documents (20.51%), calendar entries (41.03%), and various digital tools, including CRM software (30.77%), are utilized to some extent. This diversity in tools might reflect an attempt to tailor tracking methods to specific needs or preferences, albeit without a clear preference for a unified system. The mention of 'Others', which includes tools like Calendly, Miro, MS Teams, Slack and structured text files, further illustrates the fragmented nature of current tracking tools.

### **2.1.2 Other digital tools usage**

The survey further explored the utilization of digital tools beyond traditional tracking, revealing a vast array of platforms such as Planner Board, notion.so, an own cloud solution from a UAS, alongside customer relationship management (CRM) tools, Miro, and smartwe.de. Each of these tools was mentioned once by the respondents, indicating a wide dispersion in the digital toolset with no single tool dominating. Notably, the employment of project management and collaboration tools like Miro, MS Teams, and Jira suggests a keen interest in enhancing team collaboration and project oversight.

### **2.1.3 Startup status evaluation**

In assessing the status or maturity of startup ventures, a majority of 60.53% of the participants (23 out of 38) engage in some form of evaluation. This significant portion highlights the recognition of the importance of gauging venture progress as a metric of success. Conversely, 36.84% (14 out of 38) abstain from such evaluations, possibly due to the lack of a standardized approach, the missing need of evaluation or the resources required to conduct thorough assessments. A marginal 2.63% expressed uncertainty regarding their evaluation process, indicating potential areas for improvement in clarity and methodology.

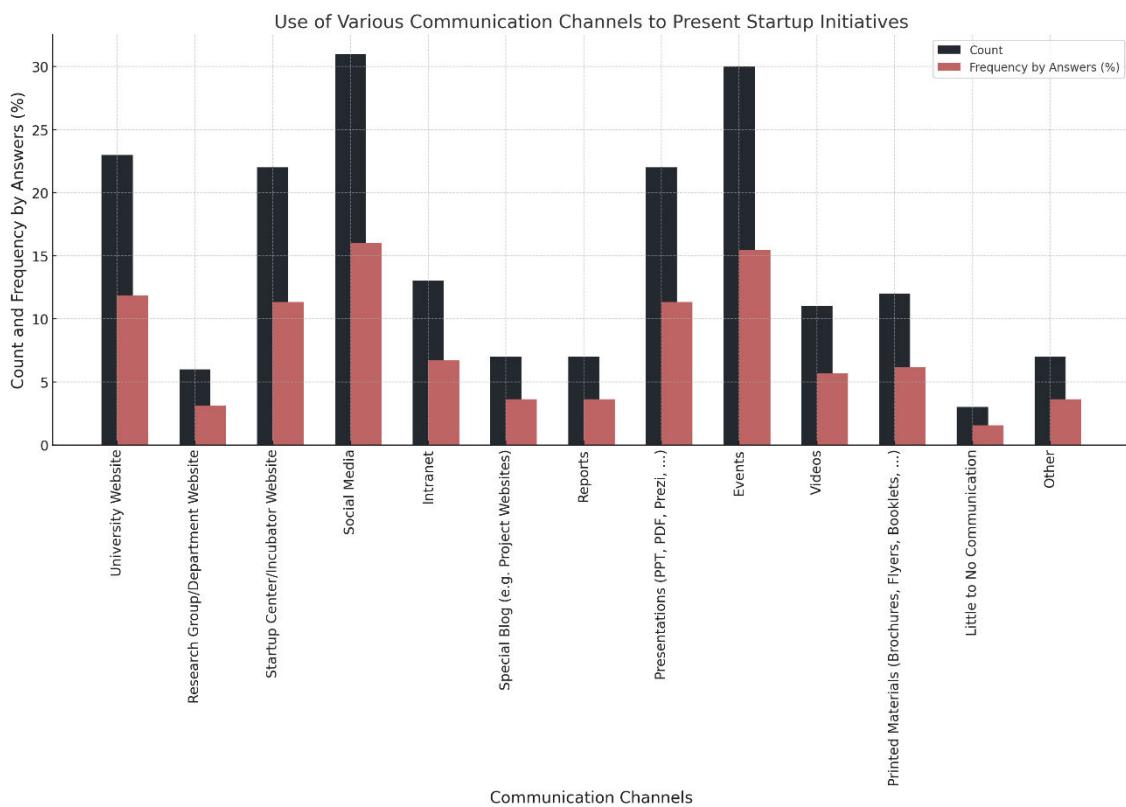
### **2.1.4 Status evaluation approach or methodology**

Despite the varied adoption of evaluation practices, the survey revealed a wide spectrum of methodologies employed, with each of the 19 responses describing unique approaches. This diversity, albeit showcasing the customization to specific needs, suggests a lack of consensus on a standardized evaluation framework. Common themes emerged, such as the use of Business Model Canvas (Osterwalder et al, 2011), Lean Canvas (Maruya, 2013), scoring models, phases models, state of the UAS' funding

pipeline and qualitative assessments. Evaluations based on the stage of the startup, such as idea presence, prototype development, and market activity, were also noted, yet no single model or method predominated, reflecting the customized nature of evaluation practices.

#### 2.1.4 Communication channels to present startups

The survey provided insightful data on the communication channels leveraged to present and promote startups. Social media and events were identified as the most utilized channels, showcasing a strong inclination towards interactive and public-facing platforms for startup visibility. The substantial use of institutional websites, startup center or service websites, and department or research group websites indicates a strategic approach to leveraging existing institutional infrastructure for communication. Digital presentation tools and print media were also significant, reflecting a multifaceted strategy to startup communication. The 'Other' category revealed more classic methods such as academic program presentations and university bulletin board postings, highlighting the analogue ways in which startups are communicated within the academic ecosystem.



*Fig. 2: Capturing insights from 194 responses provided by 38 participants*

### **2.1.5 Potential value of a web application for managing and visualizing startup ventures**

The notion of a web application dedicated to managing and visualizing startup ventures was evaluated through a survey where participants were asked to rate the statement: “A web application that enables us to systematically collect, evaluate, monitor, and present our startup projects in a condensed, interactive visualization would generate significant added value for our work,” using a scale from 0 (do not agree at all) to 10 (completely agree). The findings were primarily met with favorable feedback, as 64.87% of the participants rated the potential value of the tool highly. In contrast, 13.51% of the responses were neutral regarding its potential, while 21.62% expressed less positive views. This positivity is particularly evidenced by the common rating of 7, suggesting a consensus on the utility of such a tool among the respondents. A balanced view was observed in the survey responses, with ratings spanning from moderate to very high agreement. This could indicate a spectrum of opinions on the application's value, underscoring the diversity within the academic startup ecosystem regarding the adoption of new tools. However, a notable minority expressed skepticism, highlighting the varied perspectives on integrating such technological solutions into their workflows. The survey results collectively underscore a landscape marked by diversity in tool usage, evaluation practices, and communication strategies, coupled with a keen interest in innovative solutions to enhance the management and visibility of startup ventures. The responses suggest a readiness among academic incubators to explore and adopt novel approaches that could streamline startup management processes, improve evaluation methodologies, and broaden communication channels. This readiness is further evidenced by the positive reception towards the potential introduction of a web application designed to systematically collect, evaluate, monitor, and present startup projects in a condensed, interactive visualization, pointing to an underlying demand for more integrated, dynamic, and user-friendly solutions.

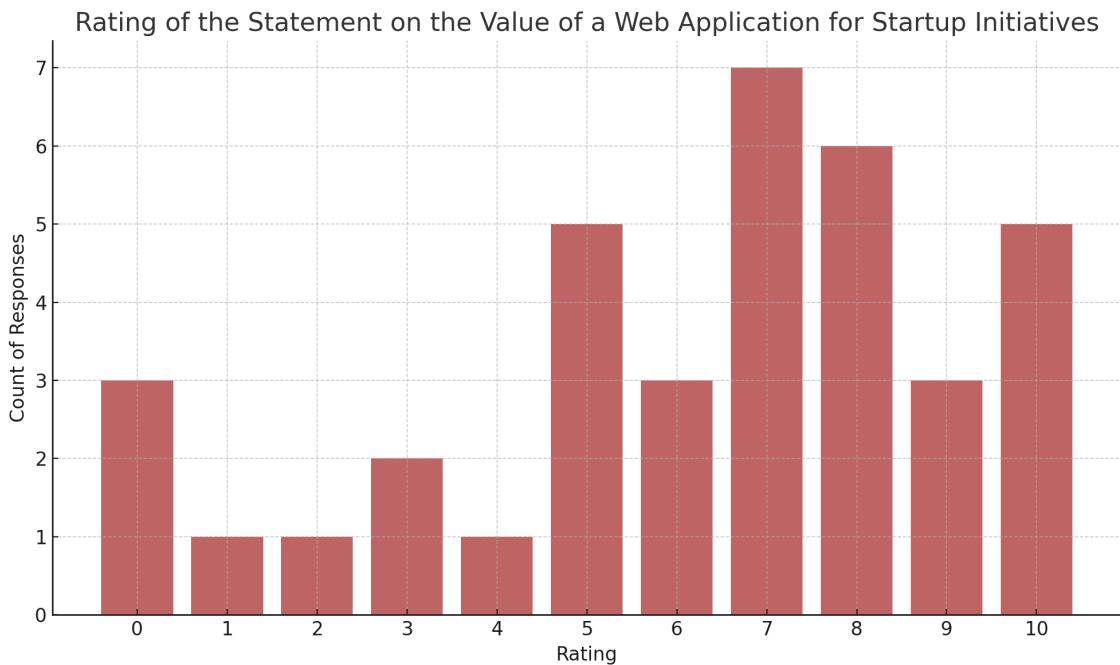


Fig. 3: Results of the rating of the statement of 37 participants

### 2.1.6 Opinions on the value of the tool

Exploring further into the attitudes towards the suggested web application, the survey prompted participants to provide reasons for their ratings - this follow-up question was posed only to those whose ratings fell between 7 to 10 or 0 to 3, revealing the diverse expectations and apprehensions present within the academic startup ecosystem. A segment of respondents highlighted the utility of consolidating various data sources into a central platform, underscoring the potential efficiency gains from streamlining data management processes. The allure of a direct toolchain and the specific benefits of a specialized web application for incubators were also noted, suggesting a recognition of the value in tailoring tools to the unique needs of startup management and advisory activities. Conversely, contentment with existing tools and apprehensions regarding the effort required to transition to a new system were cited, indicating resistance to change among some participants. This sentiment is paralleled by concerns over tool saturation and the dispersal of information across too many systems, which could potentially complicate rather than simplify startup management practices. However, for those managing a smaller portfolio of startups, the current methods, including the use of Excel, were deemed sufficient, highlighting a divide in perceived needs based on the scale of operations. Notwithstanding these divergent views, there was a clear acknowledgment of the benefits that a centralized, efficient, and time-saving tool could offer. The emphasis on visibility and centralization of information as valuable outcomes suggests a widespread desire for solutions that not only facilitate internal management processes but also enhance external communication and engagement with startup ventures.

## **2.2 The call for digital tools in academic startup ecosystems**

The survey results provide a comprehensive snapshot of the current state of startup venture management, evaluation, and communication of the UAS within the StartUpLabs@FH programme. While traditional tools and methodologies continue to serve a foundational role, there seems to be a discernible appetite for innovation, as evidenced by the diverse tool usage, the exploration of various evaluation methodologies, and the multifaceted approaches to communication. The positive reception towards the potential value of a web application for managing and visualizing startup ventures signals a readiness to embrace digital transformation in this domain. Such a tool, by offering a centralized platform for data management, evaluation, and communication, could address the identified gaps and challenges, promoting more efficient, effective, and engaging startup management practices. As academic institutions continue to play a pivotal role in nurturing startup ecosystems, the findings from this survey underscore the importance of developing and implementing tools that can adapt to the evolving needs of academic institutions. Using the “Inno Radar” to create the “TH Wildau Startup Radar”, as a prototype, represents a promising step towards achieving this goal, providing a foundation for further research, development, and application in enhancing the tracking, management and visibility of startup projects within the academic sector.

## **3 Discovering Startups with TH Wildau Startup Radar**

The “TH Wildau Startup Radar” is introduced as a platform aimed at enhancing the visibility and accessibility of startups associated with the TH Wildau. It serves as a digital interface for stakeholders within and beyond its community to engage with a diverse range of entrepreneurial ventures and helps with the tracking and management of them. The figure below reveals the results (in German language). For an in-depth view, please scan the accompanying QR code (TH Wildau Startup Radar, 2024).

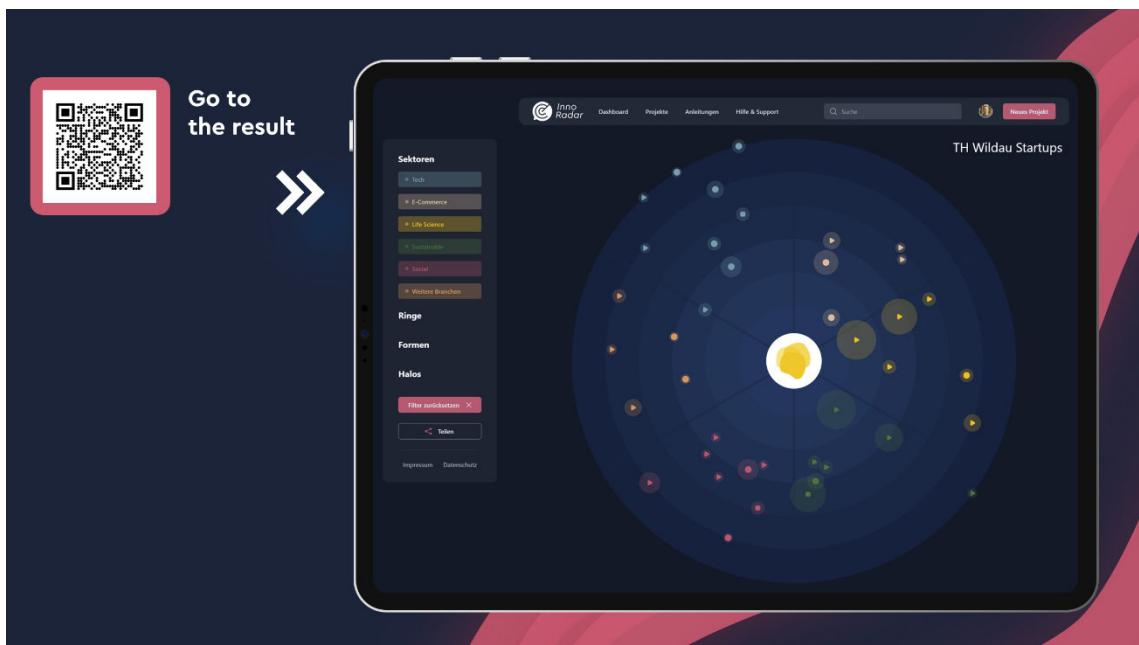


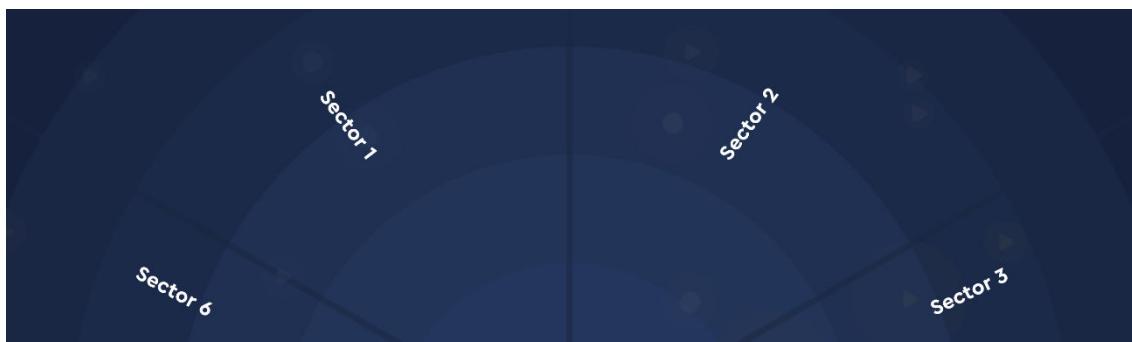
Fig. 4: The “TH Wildau Startup Radar”

### 3.1 Association with TH Wildau

The “TH Wildau Startup Radar” puts emphasis on startups affiliated with TH Wildau, including current students, alumni, faculty, and external individuals who have availed themselves of the startup center's resources. This alignment with the TH Wildau network not only showcases the breadth and depth of entrepreneurial talent within its community but also reinforces the institution's commitment to supporting its members through various stages of their entrepreneurial journey.

### 3.2 Sectorial classification

To enhance the user experience and facilitate targeted exploration, the Startup Radar categorizes startups into six key sectors: Tech, E-Commerce, Life Science, Sustainable, Social, and Other Industries. This sectorial breakdown is designed to reflect the diverse range of industries that TH Wildau's startups are innovating in. Each sector serves as a lens through which users can explore startups aligned with specific industry trends, challenges, and opportunities. Although the categorization provides a structured approach to navigation, it remains flexible to accommodate the multifaceted nature of startups that may straddle multiple sectors.



*Fig. 5: Depiction of the sectorial classification*

### 3.3 Maturity indicators

Understanding the developmental stage of a startup is crucial for potential investors, partners, and other stakeholders. The “TH Wildau Startup Radar” addresses this need through a visually intuitive system of concentric rings that signify the maturity level of each venture. From the outermost ring to the center, the stages include:

- › **Done:** The project is on hold or has failed.
- › **Idea Stage:** At this stage, the startup is still in its infancy. The founders have an idea for a product or service, but there are no concrete implementation plans yet. The main goal is to validate the idea and develop a business plan. It may create first prototypes or Minimal Viable Products (MVPs) to collect market feedback. Financing often comes from personal funds or from friends and family.
- › **Seed Stage:** During the seed phase, the startup seeks external investors to scale the business. It may already be generating initial revenue, but the focus is on expanding the customer base and product development.
- › **Growth Stage:** At this stage, the startup has an established customer base and generates regular revenue. It may receive larger investments from venture capitalists to accelerate growth. The company focuses on expanding into new markets and increasing market penetration.
- › **Established Company:** At this stage, the startup has grown into an established company. It has a strong market presence, stable revenues, and possibly has achieved profitability. The leadership focuses on optimizing operational processes and long-term strategic planning.

This granularity of startup maturity enables users to quickly assess the development and emerging needs of ventures, supporting well-informed choices and interactions. The

maturity model is informed by the seminal works of Kazanjian (1988) and Schuh et al. (2022), although it is still in an early stage and undergoing testing.

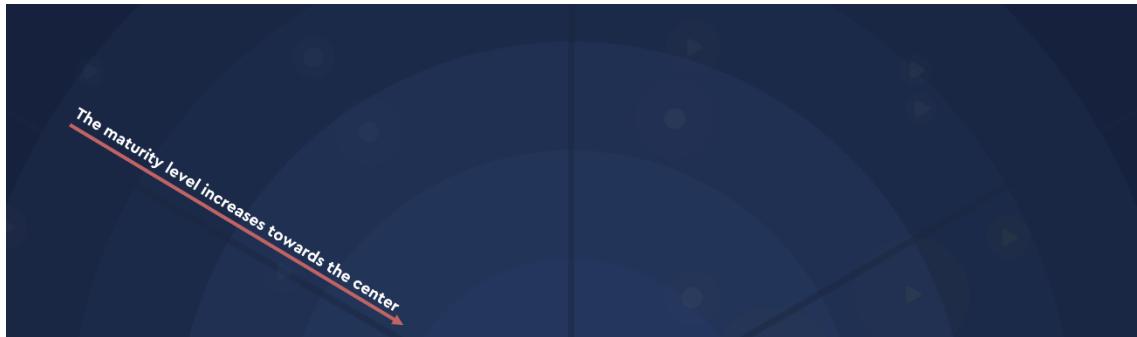


Fig. 6: Depiction of the maturity indicators

### 3.4 Team size representation

The radar employs halos around the startup blips to indicate team sizes, offering insights into the human resources behind the ventures. This visualization helps to understand the scale of operations and the collaborative effort involved in each startup.

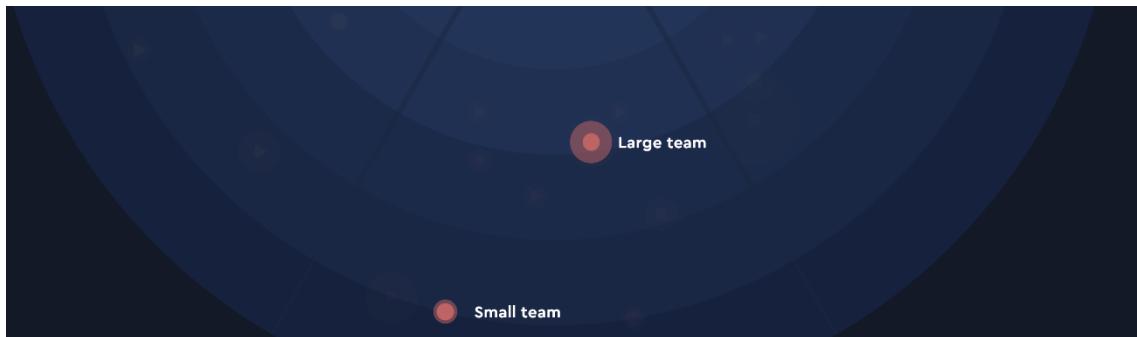


Fig. 7: Depiction of the team size representation

### 3.5 Location indicators

Geographical context is provided through distinct shapes of the blips marking the location of each startup — triangles for Brandenburg, circles for Berlin, and squares for other locations. This geographic tagging aids users in identifying startups based on location preferences, highlighting the regional diversity of the entrepreneurial ecosystem associated with TH Wildau.



*Fig. 8: Depiction of the location indicators*

### 3.6 Content and positioning

The strategic positioning of startups within the radar not only signifies thematic relevance but also operational or strategic similarities, fostering an intuitive exploration of the landscape. This spatial arrangement enables users to navigate through clusters of related ventures, facilitating the discovery of potential collaborations or competitors.



*Fig. 9: Depiction of the positioning*

### 3.7 Interactivity and filtering

The web application's dynamic filtering capability allows users to tailor their exploration based on specific interests, sectors, maturity stages, or geographical locations. This interactive element enhances user engagement, enabling a personalized approach to discovering startups. The user can also simply use the search function to search for specific terms or startups.

### 3.8 Communication and support

Detailed profiles for each startup provide essential information, including business idea, products, team composition, special achievements such as awards and contact details. These profiles serve as a bridge between startups and potential collaborators, customers, or investors, emphasizing the Startup Radar's role in fostering a connected and supportive entrepreneurial ecosystem. The following subsection presents a sample from the detailed content page of the startup PFABO GmbH (PFABO, 2024).

### **3.8.1 Characteristics**

Incorporating a summary of the startup's characteristics at the beginning of the profile adds a layer of immediate contextual information that aids in quickly situating the venture within the broader landscape of the “TH Wildau Startup Radar”. For PFABO, such a summary looks like this:

- › Sector: Sustainable
- › Ring: Growth Stage
- › Halo: 2-person team
- › Shape: Brandenburg

### **3.8.2 Short description**

Starting with a short description, “The modular reusable system for food”, this section offers a clear, immediate insight into what the startup is about. This summary is essential as it captures the essence of the business proposition, ensuring that potential stakeholders quickly grasp the core idea behind the startup's product or service.

### **3.8.3 Long description**

Expanding upon the introductory note, this part dives deeper into the startup's vision and operational model. For PFABO, it articulates the ambition to revolutionize the reusable packaging market with a system that is “simple, sustainable, and standardized”. Including a video link not only enriches the content but also provides a dynamic visual representation of the product, making the explanation more engaging and accessible. This multimedia element helps illustrating the practical application and benefits of the startup's offering.

### **3.8.4 Logo and founding team**

This segment introduces the visual brand identity through the logo and the human element with the names of the founding team members, Juliane Spieker and Adrian Spieker. The inclusion of a logo aids in brand recognition, while presenting the founders lends credibility and a personal touch to the venture, reinforcing trust among potential investors, partners, and customers.

### **3.8.5 Founding details**

Providing foundational details such as “Company Name: PFABO, Legal Form: GmbH, Location: Wildau” lays out the essential corporate information. These details are crucial for understanding the startup's legal and geographical context, impacting its operations, regulatory compliance, and potential market reach.

### **3.8.6 Awards, scholarships, and similar honors**

Highlighting accolades such as the EXIST Founding Scholarship, Red Dot Design Award, and being named Brandenburg's Entrepreneur of the Year 2022 serves to underscore the startup's recognized potential and industry validation. Showcasing these achievements enhances the venture's appeal to stakeholders by evidencing external acknowledgment and support.

### **3.8.7 Website and social media handles**

Lastly, listing contact points like the website and social media handles (LinkedIn, Instagram) facilitates further exploration and engagement. This openness invites potential customers, partners, and investors to connect with the startup, fostering a community around the brand and enhancing its visibility and outreach.

## **4 Key learnings of the implementation of the Inno Radar within the TH Wildau context**

The “Inno Radar’s” integration into the TH Wildau’s entrepreneurial ecosystem represents a pivotal development in the institution’s approach to startup incubation and support. The data collection process, conducted by the startup guides at the TH Wildau during consulting sessions, captures a comprehensive view of the active startups. This approach ensures that the radar reflects a dynamic and current landscape of the entrepreneurial activities within the TH Wildau community. Significantly, the “Inno Radar” transcends mere tracking; it facilitates robust discussions, fosters networking opportunities, and enhances the visibility of the institution’s academic incubation work. The process of implementing the “TH Wildau Startup Radar”, while manual, has been optimized through the web application’s design, emphasizing ease of data collection and updates, which, despite its labor-intensive nature, presents a substantial efficiency gain over traditional tracking methods.

### **4.1 Analyzing initial insights and the platform's impact**

The implementation of the “Inno Radar” has yielded significant insights into its operational efficacy and impact on the TH Wildau’s startup landscape. It has notably aided the startup guides in maintaining a consolidated overview of active ventures, thus ensuring continuous support and engagement with the startups, especially those founded by less extroverted individuals. Moreover, the radar has served as a foundational tool for discussions and strategic planning within the TH Wildau startup center, facilitating an enhanced understanding and alignment of operational and strategic directions. The visibility afforded by the radar through its presence on various digital platforms, including the research group’s website and project blogs, has opened new avenues for

external communication and networking opportunities for startups. The feedback underscores the radar's role in simplifying data management and updating processes, highlighting the template format and the dynamic nature of the web application as key factors in its efficiency. However, the insights also point to the ongoing requirement for manual data input and updates, indicating an area for potential further automation and improvement.

#### **4.2 Broader implications for academic incubation practices**

The adoption of the “TH Wildau Startup Radar” within TH Wildau's academic framework illustrates significant insights into the potential of digital platforms in academic incubation processes, highlighting their capacity to streamline the management and support of startup ecosystems effectively. This case study demonstrates how digital tools can facilitate a more structured and efficient approach to handling the diverse aspects of startup incubation, including enhancing visibility, enabling strategic planning, and promoting networking within the academic community and beyond. The successful implementation of the Inno Radar at TH Wildau serves as a practical example for academic incubators considering digital solutions to address their operational challenges. The platform's utility in simplifying the tracking and management of startups, coupled with its ability to foster a more connected and vibrant entrepreneurial environment, reflects the broader applicability and benefits of such technologies in the academic setting. Furthermore, the case study and associated survey results reveal a growing inclination within the academic sector towards the integration of digital technologies in incubation practices. This trend is underscored by the recognition of the value that web applications, such as the Inno Radar, bring to the table. Survey respondents have articulated an appreciation for the efficiency, dynamic interaction, and centralized management capabilities that these platforms offer, highlighting their role in not just streamlining administrative processes but also in amplifying the engagement and exposure of startup ventures. The positive engagement captured through the survey for web applications indicates a consensus on the importance of adopting tools that are capable of enhancing the operational, communicative, and collaborative aspects of startup incubation. This sentiment reflects an understanding that the benefits of such digital platforms extend beyond mere logistical support, impacting the broader goals of increasing the visibility and interconnectedness of startups within the academic and external ecosystems. The insights from the “TH Wildau Startup Radar” implementation and the survey feedback provide valuable lessons for academic institutions navigating the digital transformation of startup support. The positive reception and the outlined advantages of digital tools suggest a shift towards more sophisticated, accessible, and impactful solutions in the area of academic startup incubation. This shift is indicative of a broader movement towards enhancing the efficacy and reach of incubation practices, aligning with the evolving needs of startups and stakeholders in the academic entrepreneurship landscape.

## **5 Limitations and future research**

While the development and initial deployment of the “Inno Radar” within the TH Wildau context present significant strides towards enhancing the management and visibility of startups within academic incubators, it is imperative to acknowledge the limitations of the study and outline avenues for future research.

### **5.1 Limitations of the study**

One of the primary limitations of this study is the relatively small sample size of the survey. The constrained participant pool limits the generalizability of the survey findings, potentially skewing the results towards the experiences and perspectives of a narrow segment of the academic incubator community. This small sample size also diminishes the statistical power of the study, making it challenging to detect small but potentially significant effects. Furthermore, the diversity of responses, while offering rich qualitative insights, further complicates the process of drawing broad, generalizable conclusions from the data collected. Additionally, the study's focus on a singular Radar for one UAS as a case study inherently restricts the scope of the research. This singular case study approach, while providing in-depth insights into the implementation and impacts of the Inno Radar at TH Wildau, limits the study's capacity to generalize findings across different academic incubation contexts. The unique characteristics and operational dynamics of TH Wildau may not fully encapsulate the varied environments and challenges present in other academic incubators.

### **5.2 Future research directions**

Given these limitations, several areas for future research emerge, offering promising avenues to extend the understanding and application of tools like the Inno Radar within the broader academic incubation ecosystem. Firstly, expanding the scope of the study to include the development and analysis of Radars for multiple UAS would provide a more comprehensive understanding of the potential and adaptability of such platforms across diverse academic settings. Comparing the use of dimensions, particularly the maturity model across different Radars, could reveal insights into the operationalization and effectiveness of these tools in tracking and supporting startup ventures at various stages of development. Moreover, conducting interviews with employees and stakeholders involved in the operation and interaction with these Radars would offer valuable perspectives on the practical value and impact of the application in their daily work. These insights could inform the refinement of the Radar's features and functionalities, making it more responsive to the needs and challenges of academic incubators. Investigating the direct impact of the “Inno Radar” on startups, especially in terms of communication, visibility, and engagement with external stakeholders, represents another vital area for future research. Understanding how these platforms affect startups' developmental trajectories and external collaborations could provide critical feedback

for further enhancements of the “Inno Radar” and similar tools. Additionally, exploring the integration of automated data collection and updating mechanisms could address one of the identified limitations of the current “Inno Radar” system. Automation could not only reduce the manual effort required to maintain the Radar but also ensure its currency and accuracy, thereby enhancing its utility for startup guides and stakeholders. Lastly, the study points towards the need for a standardized evaluation framework to assess the impact of academic incubation practices on startup success systematically. Developing and validating such a framework could enable a more objective and comprehensive assessment of the effectiveness of tools like the “Inno Radar” in supporting startup ventures within academic environments. In conclusion, while the initial exploration of the “Inno Radar’s” implementation at TH Wildau offers promising insights, the outlined limitations and suggested directions for future research highlight the potential for further exploration and development. These endeavors could significantly contribute to the advancement of academic incubation practices, ensuring they remain responsive and effective in fostering innovative and successful startup ecosystems.

## 6 Acknowledgements

We extend our gratitude to the participants of our survey for their valuable insights, the entrepreneurial ecosystem of TH Wildau, and all ventures represented in the TH Wildau Startup Radar. Our appreciation also goes to the Federal Ministry of Education and Research (BMBF), the Joint Science Conference (GWK), and the European Digital Innovation Hub (EDIH), co-funded by the European Union, for their support which facilitated the development of the Inno Radar.

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# **Prospective Impact Assessment Process (PIAP) in Future Divercities Project (FDC)**

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## **Abstract**

This paper presents the prospective impact assessment process that we have developed. Our work stems from the need to perceive the impact of planned projects as early as possible and to review the direction of projects as they progress. Through our work, we see parallels between Transition Design and Transformation Pedagogy, the meaning of which we also seek to open in this context.

The development work is part of the international Future DiverCities project. In the paper, we outline our development work not only on the project but also on Design Thinking and the Frame Innovation framework on which our process is based. This framework is, in principle, a design process developed for complex challenges, and we also present how we have changed it to better fit our purpose. The design perspective is related to future-led work and helps to outline the activities and outputs of projects. The work has been supplemented with the Futures Wheel method to further assess the impact of the project qualitatively.

We conclude the paper with the notion that while PIAP has received an interested welcome within the Future DiverCities project and our organization, there is a need for developing it to enable comparison between projects. Making use of online and emerging AI technologies seems to afford better implementation. Through studying transformation pedagogy and Transition Design, we hope to develop the transformative potential of PIAP to build it into a process that supports change.

## **Keywords**

Impact Assessment, Frame Innovation, Futures Wheel, Design Thinking, Sustainability, Transition

## **1. Introduction & aim of this article**

This paper outlines our work on prospective impact assessment and its process (later: PIAP) at its current state. We will describe our first version of PIAP together with its background, methods, and tools behind it. The goal of this paper is to help us structure our work, set the stage, and find out our scope in the wider context. Simultaneously it will help us tie the process we are developing to what has been done and written by others. At the end of the article, we present our reflections on the work and its further development during Future DiverCities project (later: FDC).

## **2. Background and current need for the impact assessment in FDC**

FDC aims to influence how urban spaces can be sustainably revitalized through culture. FDC is a four-year project (2023–2026) funded by the European Commission (Creative Europe) and implemented by European organisations seeking to re-imagine culture-led regeneration of urban empty spaces in an ecological way. The project has pilots in 9

European Cities: Berlin, Zagreb, Split, Liepaja, Kuopio, Marseille, Florence, Timișoara and Athens. Each pilot has its mechanism which is believed to make change according to FDC's Theory of Change. (FDC, 2021.)

Theory of Change is a method that helps identify and explain how an intervention can lead to desired change in a specific context. It involves a participatory process that fosters consensus among stakeholders. The method begins by clearly defining the project goal or goals. From there, the team works backwards, envisioning a series of causal events that would lead from the present to the desired goal.

While this process involves some degree of imagination, it is crucial to substantiate the proposed pathway with scientific justifications. Throughout the method, the objective is to uncover underlying assumptions that, if unaddressed, might hinder the realization of the goal. It is important to define the goals as specifically as possible, as this enables a clearer understanding of the pathway and facilitates the assessment of its feasibility. Concrete goals also facilitate the creation of metrics that can be used to monitor the project's progress and success.

(Center for Theory of Change, n.d.; UNDGODOCO, 2017.)

FDC seeks to prepare creative hubs' leaders to lead bigger conversations about sustainable urban regeneration by putting ecology at the core of their organisational development and ethos. This will contribute to changing the paradigm in terms of cultural policy development with ecology at its heart.

In addition to the abovementioned pilots, FDC involves parties whose mission is to help these pilots achieve their goals. Our team in Savonia UAS has the role of leading the process and coordination of FDC's impact assessment. Our contribution is to produce a process for the pilots to help them anticipate the impacts of their work as early as possible. FDC is a culture-led project aiming for social and ecological sustainability, and our work has been guided by this ethos.

At the same time, FDC aims to respond to challenges and needs to foster cross-sectoral learning and collaboration at a local level to accelerate the production of sustainable solutions and approaches. We believe that our approach to impact assessment can offer necessary solutions by integrating future-oriented design thinking and its methods, which encompass participatory, informal, and holistic learning, into the process. Our process should also consolidate the ecosystemic capacity of the cultural players to become eco-conscious changemakers. Both these objectives have been pointed out in the FDC project plan.

According to the observations from the first FDC and, as the New European Bauhaus states (NEB 2023), responding to complex challenges requires a transdisciplinary approach. Thus, a solid collaboration is seen as an engine for change-making (FDC 2021). As an interdisciplinary team of representatives from creative professions, we wanted to use our professional assets and bring our future-oriented way of design and creative thinking to the table (ref. *Transition Design* and *Transformative Learning*). (cf. Salonen & al. 2023.) This approach is supported by the notion that societal and social systems are so-called soft systems whose boundaries are malleable and less clear (Vataja 2023, 94-98). In these kinds of complex situations, more extensive, continuous knowledge (experiential and transformative learning) and a developmental assessment (ref. *Desing Thinking* and *Frame Innovation*) are needed.

Vataja (2023, 89-109) has written a review of the assessment and effectiveness of systemic change. In this article, she points out that a certain kind of evaluation could help identify how and why pursuing a fairer and more sustainable future is needed. She also argues that currently used assessments need to be developed and renewed to better reflect the complexity of the operational environment and the decision-making needs. Vataja argues that a systemic change is needed on every level of societal structures and continues, that to understand how and why a social change occurs, one needs to understand and know about the concrete effects and how they arise because of interaction between different factors. In addition to impact chains (the so-called IOOI), new tools are needed to comprehensively examine the nature of change and interactions to help understand how changes arise.

Besides the theories of change, data collection and analysis methods, Vataja also refers to a more holistic evaluation. We find that the prospective impact assessment based on design thinking can be seen as means to deliver a more comprehensive and perceptive understanding of the nature of the problems or phenomenon, of activities that support continuous development, and – at the same time – to take into consideration the different scenarios of the people- and life-centred needs in the possible futures. (cf. Salonen & al. 2023)

### **3. Design thinking as a way to understand the significant impacts leading to a sustainable transition**

It has been verified that it is typical for our current challenges that ecological and social needs and meaning cannot be separated (cf. Salonen & Salonen). To tackle today's wicked systemic problems, development processes require more comprehensive knowledge. Transition requires new thinking and learning out of the old. (Irwin & al. 2022.)

In the previous FDC (2016-2020), an assessment of the planned and made actions was included in the project and implemented by Savonia UAS. The assessment at that time was based on the material collected in four workshops organised in Bergen, Zagreb, Liepaja, and Kuopio. The methods used during the assessment were Prospective Rapid Impact Assessment for Human Security (PRIA) and Portfolio Decision Analysis (PDA). The then-created project assessment was realized to fall short of the perception of the complex and dynamic reality. This observation led to some of the main developmental dimensions on which the working team continues its work now. Those results have provided a starting point for the methodical development work of the PIAP, intending to use a more holistic and systemic approach. (Paldanius & Kajanus, 2021.)

Transition can be made possible through key design perspectives: envisioning a desired transition, using a variety of theories and methodologies that explain the dynamics of change within complex systems, and difference-making through collaboration and self-reflection to find and learn new perspectives. (Irwin & al. 2022, 50-54.) Our approach to this, in this study and development, has been to base PIAP on *Frame Innovation* by Kees Dorst (2015). Frame Innovation is a design innovation process that aims to understand problems in a practical and human-oriented way. At its heart, solving a problem requires the ability to take on new perspectives. The key elements of Frame Innovation are its

human-centeredness and the concreteness it brings to planning. We later realized that the included changing of perspectives is connected to transformation as well.

Design Thinking has been studied extensively. It can be seen as a generally positive and problem-solving attitude and a co-sense-making process: reflection-in-action (design abstraction) and pursuing parallel lines (framing new possibilities). Design thinking is characterized by questioning both the outcome of the things being developed and the means to achieve it. Parallelly, to create room for new connections, also all patterns of relationships in a challenging situation are questioned.

Dorst uses design abstraction to justify this: since we know only little about the desired outcome character in the early stages of development, it is not possible to assume what to do and how to act to achieve the goals. He states that framing is the key to design abstraction. It is achieved by creating new, parallel ways of looking, acting and connecting within a paradoxical problem situation. These parallel frames can be seen as possible futures from which it is then possible to choose a desirable goal.

(Dorst 2015, 49-56, cf. Salonen & al. 2023, 623.)

In Dorst's view, linking change to the needs of stakeholders reinforces change. In turn, we saw the concreteness of the planning, contained in Frame Innovation, as providing a better starting point for the prospective impact assessment: after creating concrete sketches of the project-related actions and outputs, it easier to envision their impacts compared to abstract project goals. This will produce an understanding of what actions and outputs are worth implementing.

The development of PIAP relies on various other theoretical perspectives, that are related to design thinking. One starting point for this work has been a holistic approach to understanding and being human, the importance of perceptions and experiential knowledge as part of cognitive processes and decision-making. Like cognitive scientists emphasize embodied cognition, “*-- you think with your body, not only with your brain*” (Kahneman, 2011, p. 62), we find it important to acknowledge the importance of feelings and emotions in thinking and doing, and also that this embodied approach creates room for better addressing the world outside ourselves. Also, Salonen & al. discuss *Epistemic Learning* which they see related to experiences that can bring forth new affective, intuitive, imaginative, and embodied knowledge (2023, 626-628).

Here, we see connections to the phenomenological studies of embodiment, which emphasizes human experientiality and knowledge based on human perceptions. Subjective sensations and experiences are seen as meaningful information. Especially, the French philosopher Merleau-Ponty emphasizes a corporeal and experiential relation to the world centred on a perceptive body rather than a thinking mind. (Keto & al. 2022, p.53; [Merleau-Ponty 1968].) In phenomenology, a research problem is approached from an open point of view without a precise scientific framework, and – from our understanding – this can be linked to a designerly way of thinking and framing. Cartesian dichotomy is claimed to emphasise a too-individual-centred human perspective (Martusewicz & al. 2015; Foster 2014). Creating new, broader thinking requires abandoning Cartesian rationalism for a more holistic and embodied relationship with the world. Furthermore, Salonen & al. (2023) have made similar notions when developing their *Planetary Social Pedagogy* Framework. They find that the key to sustainable transformation could be a deep, holistic and systemic understanding and a fundamental

shift in human thinking (621-622). This means "seeing things differently" and learning from experience using embodied knowledge (630). Transition Design, in turn, examines the phenomenon of mindset and worldview towards more holistic design actions and thinking (Irwin & al. 2022). This openness is also present in Frame Innovation, Design Thinking and Transformation Pedagogy.

## 4. The PIAP in praxis

Our iterative and participatory PIAP is based on design and future thinking aiming to foster a meaningful transition towards positive change. PIAP can and should be repeated multiple times throughout a project to refine the understanding of what is being done and where it seems to lead. Like Frame Innovation, our process is divided into three phases (Table 1). We have modified Dorst's process to better fit our purpose and, for example, added new steps at the end to envision potential impacts and assess the significance of the identified impacts.

Each iteration of the process starts with the reconsideration of the current situation. The workshop is built upon the growing understanding of the context, the problem, and the possibilities. The actual workshop starts with a somatic enquiry to root the participants into the present moment, location, and space and continues with collecting a wider understanding of all the stakeholders of the problem at hand. These data are then used as basis for brainstorming possible solutions that benefit as many groups of stakeholders as possible. The best solutions are processed further through storytelling to make them more coherent and concrete. The concreteness of the stories helps to envision the possible impacts of the chosen solutions through the *Futures Wheel* method. The impacts are then refined into impact statements which are eventually evaluated numerically. Through these numeric evaluations of the impacts, it is in turn possible to evaluate the effectiveness of the actions causing the impacts. These evaluations and the other data created during the workshop can later be processed further to assist in decision-making about the desired path of action for the project.

Phases	Steps
1. Pre-phase (core team)	<p>1.1 Re-research</p> <ul style="list-style-type: none"> <li>› Understanding the context and the framework of the venture</li> <li>› The main question</li> <li>› The Theory of Change</li> </ul> <p>1.2 Initiation</p> <ul style="list-style-type: none"> <li>› The current situation of the venture</li> <li>› Criteria vs. Impacts</li> <li>› The workshop theme</li> <li>› Workshop preparation</li> </ul>

2. Participatory-phase (core team and stakeholder representatives)	2.1 Rooting into now <ul style="list-style-type: none"> <li>› Feel the space</li> <li>› Dreaming: What could be?</li> </ul>
	2.2 The Field <ul style="list-style-type: none"> <li>› The stakeholders and their needs</li> </ul>
	2.3 The Paradox <ul style="list-style-type: none"> <li>› Contradictions hindering the change</li> </ul>
	2.4 Themes <ul style="list-style-type: none"> <li>› Choosing the path</li> </ul>
	2.5 Framestorming <ul style="list-style-type: none"> <li>› Brainstorming new and possible futures</li> </ul>
	2.6 Storytelling <ul style="list-style-type: none"> <li>› Storytelling and -boarding new futures</li> </ul>
	2.7 Futures wheel <ul style="list-style-type: none"> <li>› Recognizing the impacts</li> </ul>
	2.8 Impact statements <ul style="list-style-type: none"> <li>› Collecting and writing data down</li> </ul>
3. Post-phase (core team)	3.1. Evaluation <ul style="list-style-type: none"> <li>› Impact statement evaluation (by stakeholder representatives using INTO tool)</li> </ul>
	3.2 Transformation <ul style="list-style-type: none"> <li>› Analysis and reflection</li> </ul>
	3.3 Integration <ul style="list-style-type: none"> <li>› Paths to action</li> <li>› Mapping out the activities that need to be done</li> <li>› The Change</li> </ul>

*Table 1: The outline of the Prospective Impact Assessment Process*

The chapters below, explain the different steps of the PIAP in more detail.

#### 4.1 Pre-phase

Pre-phase is about understanding the context, the problem and the stakeholders. The current situation should always be addressed and considered before the actual workshop. At a very early stage of a project, the **Re-research** step involves a thorough investigation of the matter at hand. Later, when the project has been running for some time already, this step is rather about making sure the upcoming workshop is really about the current situation and understanding of the project: Is the project still aligned with the goal and

the chosen theory of change? What new has been learned during work? Choosing the steps of the workshop depends on this, e.g. If concrete plans have already been made outside the workshop, the *Framestorming* –step can be left out.

The **initiation** step is about making the actual preparations for the workshop: scheduling, inviting the participants, and preparing the facilities and the tools. Here, it is important to consider the criteria that will be used for impact evaluation at the end of the process. These criteria should allow for assessments like: "[The impact] will have [a little/somewhat/very] [positive/negative] effect on [criterion]." On some projects the project criteria can be used directly, on others, some adjustments will be required. For example, during early experiments, we noticed that the focus areas of FDC (biodiversity, commoning and impermanence) fitted only partially as impact criteria. Biodiversity and commoning suited better but impermanence didn't because it was difficult to understand what it would mean if, for example, something would have a very positive effect on impermanence.

## 4.2 The participatory phase - Impact assessment workshop and methods

In this chapter, the participatory workshop methods will be presented and discussed. At this point, the previously presented cornerstones of design thinking are all in action at the same time. This is a complex process of interplay and learning together and from others, where co-creative relationships foster new thinking and transition. As Salonen & al. (2022, 633) describe, participants learn and develop collaboratively, doing reflection-in-action on reality, throughout the participatory experience. The workshop should span over two days.

### 4.2.1 Somatic experience

The workshop should begin with experiencing the location somatically. Through this **Somatic** step, we want to bring experience-based body knowledge into further discussions. When implementing the workshop for the first time in Londa, Italy in autumn 2023, we sent the participants out walking in the area and taking notes of their experiences and thoughts about the location. This was seen to help the participants be better in touch with their bodies and the location.

One reason for starting the workshop with a somatic practice is to give everyone a chance to evoke and write down their sensations, experiences and thoughts before engaging in group work. This should help the quieter ideas to be expressed. Otherwise, the loudest ideas may receive too much attention (Kahneman, 2011, p. 97).

### 4.2.2 The Field and the Paradox

In the **Field** step, the stakeholders are mapped out with their needs and gifts (Fig. 1). All the possible stakeholders of the matter at hand should be recognised. Both people and nature should be considered as stakeholders. This will create an understanding of what is important to each of them and what they can bring to the table. Engaging with

stakeholders and communities is essential for ensuring that solutions are developed participatory and inclusively and that the needs and preferences of affected nature and individuals are considered. (Dorst, Kaldor, Klippan, & Watson, 2016, p. 171.) To date, we haven't had time to implement this, and it will be the next step in our FDC workshops.

The **Paradox** step is about identifying the paradoxes and contradictions in the situation: Why is change difficult? What makes the problem hard to solve? The reasons may be personal, social, circumstantial or something else. Addressing paradoxes can help uncover hidden assumptions and biases and ensure that the actual problems are solved instead of just the symptoms. (Dorst, Kaldor, Klippan, & Watson, 2016, p. 167.)

#### 4.2.3 Themes

Prioritizing key **Themes** and issues helps to focus the problem-solving process and ensure that resources are allocated effectively. Seeing similarities between the needs and gifts of different stakeholders will help create synergy. Theming is done using *Affinity Diagramming*, where similar stakeholder needs and gifts clustered with the notes from the somatic step. Groups that tie together more stakeholders are better. Conducting several iterations may create more possible - and possibly better - combinations. (Dorst, Kaldor, Klippan, & Watson, 2016, p. 173.)

#### 4.2.4 Framestorming and Storytelling

To honour Frame Innovation as the origin of our process, we named our ideation step **Framestorming**. This reminds us that this phase is about shifting perspectives and finding new ways to feel, think and see the problem and the goal. This step is built into our impact assessment process because the plans from the first FDC seemed too abstract and required refinement and more concreteness. We anticipate similar experiences in other projects.

The best ideas are breathed into life with storytelling in the **Storytelling** step. Here, the workshop participants transform their ideas into visualized stories. The narrative form forces coherence and concreteness, which are meant to ease up the recognition of impacts. Stories also help embody the solution scenarios because they allow identification with the characters in the stories and evoke emotions. This should deepen the human understanding.

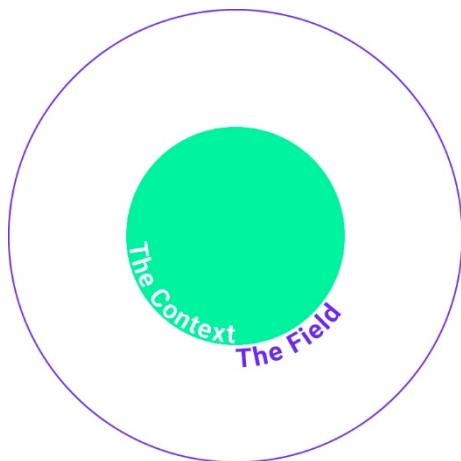


Fig. 1: The Field can be visualized with a Territory Map. The Context contains those stakeholders who are tightly knit into the project. On the Field are the stakeholders who are not directly involved but may be affected by the project.

#### 4.2.5 Envisioning the impacts with a Futures wheel

The earlier steps afford a vision of the future where the project's actions have been defined and described. To see the impacts of those actions, we chose the **Futures Wheel** because it seems to help produce a rich variety of possible impacts. As a sort of mind map, the Futures Wheel is a divergent tool, that is used for recognizing as many impacts of a defined phenomenon as possible. This is done by dissecting the possible impacts into smaller, more comprehensible pieces, through which it is then easier to think of further impacts. (Benckendorff, 2008.)

The Futures Wheel concentrates on the recognition of different impacts but does not address their probability. Understanding the probabilities of different impacts would help prioritize actions that most likely have desired impacts. We considered asking participants for probability estimations during the workshops, but research shows that this is difficult and will most likely produce unreliable results (Kahneman, 2011, p. 335).

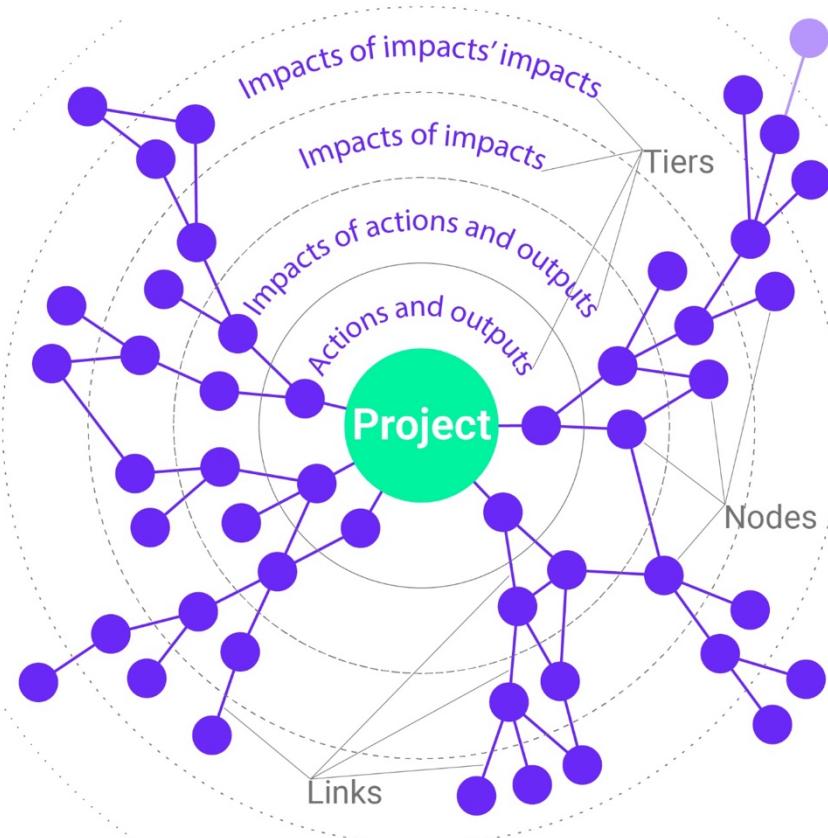


Fig. 2: The Futures Wheel is an outward expanding tool that facilitates the mapping of the impacts one by one.

The Futures Wheel is implemented by collectively brainstorming the impacts of actions depicted in the created stories. The impacts are revealed in outwardly expanding ripples, one circle at a time. Cause–effect thinking has been seen as one of the three main ways human minds connect thoughts (Kahneman, 2011). This seems to imply that it should be quite natural to humans. Despite this, the Futures Wheel has seemed a difficult method. How could we better facilitate this mindset?

Because of *WYSIATI* (What you see is all there is), the discussion in the workshops may easily guide the participants' ideas. Furthermore, A project's impacts should be considered in a larger context (SDGs, Agenda 2030) because there can be crucial impacts outside the

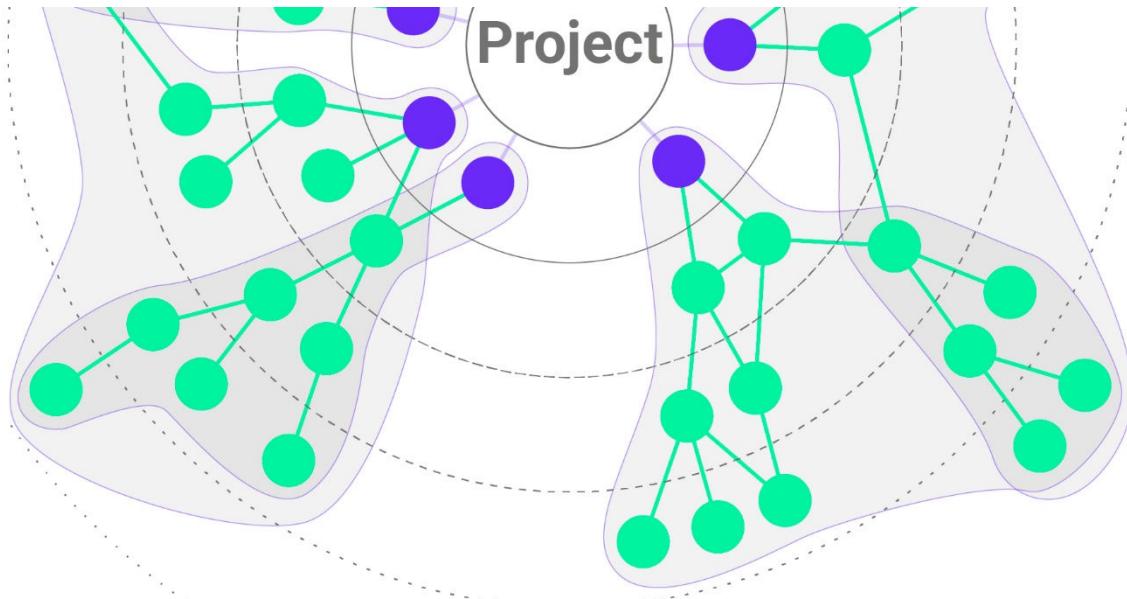
scope of the project. We wanted to facilitate an outside view and added a list of value dimensions that would help participants check they have discussed the possible impacts thoroughly (Kahneman, 2011, pp. 257-258). Each tier of Futures Wheel consisted first of free discussion and after the ideation was exhausted, the participants were asked to go through a list of six value dimensions to see if they hadn't thought of some impact. We chose the value dimensions from the Design Value Framework: Planet (environmental impacts), Democratic (political impacts), Social (socio-cultural impacts) and Financial (financial impacts) (Design Council, 2022). To these, we added the value dimensions 'positive' and 'negative' as we wanted the participants to think about the impacts also in these terms. We wrote the value dimensions on separate cards to allow more freedom during the discussion. It seemed that, written on canvas, the value dimensions might misguide the creation of the Futures Wheel by locking areas of the canvas only for certain themes (Glenn, 2009). Without these cards, the political impacts would have been completely absent in one workshop. In the end, the political impacts proved to be the most important discovery that the pilot in question had to tackle first to be able to solve their challenges. Here, the importance of an outside facilitator was also concretised. The free discussion during the Futures Wheel was seen as important because the topic and the already recognized impacts may provoke ideas of new impacts and this needed room. We wanted to use the value dimensions only as a safety net to ensure nothing important had been left out.

#### **4.2.6 Impact statements**

A ready Futures Wheel canvas can seem quite messy (Benckendorff, 2008, p. 31). To make its results more useful, we had workshop participants create sentences from those impacts that seemed important for their endeavour. We called these sentences impact statements, and instructed the participants to write them using the same structure as had been used for the Theory of Change -sentence throughout the FDC: to \_\_\_\_\_, with \_\_\_\_\_, by \_\_\_\_\_. We thought that this structure would help others understand the impacts better, remember later what they were about and compare the impact statements with the theory of change driving the pilots.

### **4.3 Post-phase – Building from the results of the workshop**

To make use of the data created during the workshop, it has to be processed. After the Impact statements have been created, they are grouped by their causing actions (Fig. 3) and uploaded into the INTO tool for a numerical **Evaluation**. INTO is an online tool developed by Savonia UAS for similar evaluations. With INTO the participants can evaluate numerically things on – usually 2 to 3 – selected criteria. The tool can then process the data using Portfolio Decision Analysis to calculate the best-evaluated things regardless of the weighing of the criteria.



*Fig. 3: The Impact statements (green: impacts) were clustered by the actions and outputs (purple) causing them. This supports the comparison between different actions.*

For the impact assessment, it was chosen that the criteria should be such that afford a positive–negative -evaluation. This way the participants could assess both the strength of each impact as well as the nature of the impact. We hypothesise that this may lead to more reliable assessments.

As the impact assessments are grouped by their causing actions and outcomes, the INTO evaluation leads to an evaluation of the actions and outcomes. This should help further planning of the project: Which actions and outcomes should be discarded, developed or pursued? Currently, the responsibility of setting sustainable criteria lies on the shoulders of the project and the impact assessment teams.

The goal of the **Transformation** and **Integration** steps is to first analyse and reflect the results of the PIAP. The chosen actions and outcomes are then developed, refined, and implemented further into reality. Along the way, new iterations of PIAP are carried through to refine the work. During this process, informal learning happens. Without it, a real change is impossible.

## 5. Conclusions, reflection and discussion

The FDC pilots are being used as testbeds for developing the impact assessment process. To date, PIAP has been established and taken into use in three pilots of the FDC to evaluate impacts on the FDC's themes and The Theory of Change: biodiversity, commoning, and impermanence. This has given us preliminary feedback on the usefulness of the method but further applications with the pilots are needed. During the development of this process, scheduling has been a touchstone. Finding enough time for the workshop has been problematic and we haven't been able to run the workshop through in its entirety, yet. This has forced us to streamline the process, which is also important. Yet, we feel that for a proper understanding of possible impacts, more time should be invested in impact assessment.

The process steps are quite clear and can be easily applied to the pilots. However, it is too early to make conclusions. The FDC pilots will be running until 2026, and PIAP will be conducted during this period. The PIAP helps to direct the attention from outcomes to the impacts of actions when designing the pilots. Currently, impact assessment is highly context and local condition specific. Its results are relevant regarding the question: "What should be done next?" From an investor's point of view, it would probably be more interesting if the assessment helped set the impacts in proportion to the project resources, and if it enabled a comparison between projects even before they have started. (Cf. Irwin & al. 2022, 50.)

Our work on PIAP has grown organically, rooting in the previous step of the FDC and fertilising on the expertise of our team that joined it at the second step. Writing this text has been a process of learning, as is the development of the PIAP and as will be our presentation at the UIIN conference in Madrid 2024. Most of us are newbies in all this. From the experience of writing and presenting this work, we expect to get new ideas for our work and learn what others outside the scope of the FDC think about it.

For FDC, the PIAP is a new method, where co-learning from Design Thinking, Frame Innovation, and Portfolio Decision Analysis occurs. The process has shown that to recognize meaningful impacts, it helps if the creative HUBs/pilots can experiment with their planned actions somatically in real life and shared situations. This helps to consider the needs of those involved in the community and to create concrete plans based on them.

So far, we have learned that experience-based impacts and their interpretations are always situational, place-and-time-bound to the moment of assessment, and that learning emerges from local conditions and the current situation of the things being developed. A status and views of impacts emerge as development progresses and the assessment of impacts renews and unfolds at every stage of the iterative process, as the developers' understanding expands and the transition of thought occurs. Therefore, several iteration rounds are needed, just as is customary in design-based development and innovation processes.

## 5.1 Plans and visions

The PIAP allows alternative solutions to be examined through their impacts. Identifying complex impact chains visually helps to identify systemic linkages between the impacts. (cf. Salonen & Salonen 2023). Framestorming and Futures Wheel enable developers to open their future horizons and new perspectives.

As Dorst suggests, the Frame Innovation, and – deriving from it – PIAP also, could drive the ability to see, think and do differently. We find that creative and radical design thinking is experiential learning by nature. In this kind of learning, an open and curious attitude as well as divergence, convergence and chaos vary in a dynamic process. Our work and understanding have emerged organically through the practical development of PIAP and applied sciences. In conclusion, the FDC and the PIAP, both could be seen as ideal initiatives applying and combining Planetary Social Pedagogy (Salonen & al. 2023) and The Transition Design Framework (Irwin & al. 2022). Thus, there has arisen a need to study these fields more deeply to develop the PIAP further. Transformative learning could be built into it using design thinking (what if? and How might we?). It would be interesting to learn more about this.

The development of bodily methods at the beginning of the participatory phase of PIAP is only just a beginning. There has been little time to test this part, but we consider the bodily approach to be important and that is why we want to bring it up and study more. If the project is location-focused, it is best if the PIAP can be done in the location, since this will help participants experience it somatically. We've also pondered upon the possibility of a project with a more abstract subject: How could we adapt the somatic approach in such circumstances? We believe it matters there as well.

There are several questions considering the use of the Futures Wheel. As the Futures Wheel helps to build a rich view of the possible impacts, it may also help to recognize amplifying or balancing circles of causality. In systems thinking, identifying, and addressing these cycles has been seen as one way to support change (Senge, 2006, pp. 82–83). So far, the results of the Futures Wheel haven't been examined through this lens and it seems that this would require extra care while marking the connections between the impacts.

Regarding the list of value dimensions used during the Futures Wheel, we currently think that a short list covering a broad spectrum of matters deemed important seems most promising because we feel that this impact assessment process creates a glimpse into potential futures where important, desired, and undesired impacts may be caused by impacts beyond the scope of the project. Yet, it may be that the list should be constructed based on some other goal.

Machine learning might be useful for generating different impacts, and it could help identify such events that do not necessarily occur to the participants in a workshop situation. However, we think that the identification of impacts shouldn't be left solely to AI based generation, because the proposals produced by AI will be based on the background information fed to AI. This possibility should nonetheless be explored further.

Regarding impacts seen with the Futures Wheel, one should consider the difficulty to properly determine the probabilities of the various impacts. One option we've considered is simulating different probabilities using PDA. Preliminary discussions have anticipated problems with this approach, and we have not had time to try the idea.

In the future, the PIAP could be used and applied in different contexts for prospective impact assessment. As a future challenge, a need to improve online applications to support the process has been identified. For example, the Futures Wheel can be developed into an online application. Also, we have identified the need to develop a course in which both making change and thinking about transition can be learned. We will consider establishing a formal e-learning platform where PIAP can be practiced and supported by engaging in transition-related tasks.

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# **Regional university model and business learning path model as innovators in developing business collaboration**

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## **Abstract**

Universities play a crucial role in developing the region's expertise, economy and innovations. Collaboration requires close interaction with the region's businesses. University actors may not speak the same language as businesses, and their operational methods are often different. To address this challenge, the Seinäjoki University of Applied Sciences established the regional university model in 2005.

Regional university activities are based on collaboration between universities and the local region, with a coordinator for cooperation situated within the regional economic development unit. The regional university provides an active model for developing rural expertise and vitality. This article aims to introduce the developed Business Learning Path model, which has been extensively piloted in collaboration with various types of small and medium-sized enterprises (SMEs).

The starting point of the Business Learning Path model is the identification and selection of weak signals predicting megatrends based on the needs of the region. In the daily operations of companies, it may be difficult to seek and monitor weak signals. On the other hand, universities must constantly monitor weak signals and take actions based on them to keep universities at the forefront of the latest knowledge.

For companies, it is crucial to obtain information specifically about weak signals relevant to them. This means that companies must extract essential information for them from the latest knowledge produced by universities and companies find it challenging. In the regional university, a trusting collaborative relationship with local businesses enables the transmission of the right signals to the companies in a business language they understand.

The second phase of the Business Learning Path model involves selecting the methods for conveying information to the company. Transmission methods may include research and development projects, student projects, open university courses, or any other method managed by the university. The regional university is familiar with the business cultures of local companies and can choose the right transmission method for each situation.

The article introduces one of the cases in which the Business Learning Path model has been piloted in a local small and medium-sized enterprise (SME) in the manufacturing industry. The pilot has lasted for several years, during which the trust relationship between the regional university and the company has deepened further.

In this pilot, the selected transmission methods include short courses, student projects, student internships, and research and development projects. All these forms of collaboration have helped the company improve its operations and enhance the skills of its personnel. One of the most significant impacts mentioned by the CEO is the increase in international sales, made possible by the company's participation in a research and development project managed by the university.

## **Keywords**

Regional university, university-business-collaboration, regional development, regional impact

## **1 Introduction**

Both businesses and universities are key players in regional innovation ecosystems. It is clear that universities play an important role in the development of innovations in the region, and similarly, SMEs face challenges in innovation activities without external knowledge sharing (Buganza, Colombo and Landoni, 2014; Markkula and Kune, 2015).

In a comprehensive previous interview study, the results showed that universities are not the primary partners in knowledge sharing for SMEs or at the forefront of innovation. The most commonly interviewed companies utilized research results produced by universities or hired recent graduates. SMEs typically seek new information from customers or subcontractors in the same geographical areas (de Zubielqui, Jones, Seet and Lindsay, 2013). SMEs often have limited resources to acquire and utilize external knowledge. Therefore, it is typical for SMEs to obtain precise information from available sources rather than necessarily being willing to invest in long-term cooperation (Mäkimattila et al., 2015).

Universities play a crucial role in developing the region's expertise, economy, and innovations. Collaboration requires close interaction with local businesses, which is often perceived as challenging within universities. University actors may not speak the same language as businesses, and their ways of operating are often different. Building collaboration requires expertise close to businesses and regions. Seinäjoki University of Applied Sciences responded to this need by establishing the regional university model as early as 2005. Over the decades, the operation has evolved to a highly professional level.

Regional university activities are based on collaboration between university and the region, with a regional developer located within the regional economic development unit. The foundation of the regional university is to respond to the individual needs of the region, with a focus on continuous learning and research, development and innovation (RDI) activities. The regional university provides an active model for developing rural expertise and vitality. This article introduces the operational model of the regional university and the developed Business Learning Path model, which has been piloted extensively in collaboration with various types of small and medium-sized enterprises (SMEs). The article provides a detailed presentation of a pilot conducted in the manufacturing industry and its effects on the development of the company's expertise, based on an interview with the company's CEO.

## **2 The regional university and learning in SMEs**

The regional university offers an active model for developing expertise and vitality in rural areas. The needs of the region and its businesses strongly guide the activities of the regional university, while also considering the specific characteristics of SMEs that are

strongly represented in the region. Both the university and the regional university serve as conduits for disseminating the latest knowledge in the region. Various methods have been designed and developed for this knowledge dissemination task, such as the Business Learning Path model presented in the article.

## **2.1 The operational model of the regional university**

Seinäjoki University of Applied Sciences launched the regional university model in 2005 to meet the needs for developing expertise in the area. At that time, the goal of the model was to bring education closer to students in the region and ensure the elevation of expertise even in the peripheral areas of the province. Over nearly 20 years of operation, activities have continued to evolve to meet the changing environments and needs of the region. Nowadays, the focus has shifted increasingly towards diverse impactful collaboration between the university and companies in the region.

The regional university operation has expanded from one regional municipality to all five regional centers of the province. The focus and most visible part of the operation in the early stages has been providing degree education for the adult population. In the 2010s, the focus shifted towards research, development, and innovation services aimed at businesses.

The operational model of the regional university is based on effective collaboration between the university and the local municipalities. The collaboration is coordinated by a locally based regional developer from the university, situated within the municipal economic development unit. The ongoing operations are supported by agreements between the university and the municipalities regarding the organization of regional university activities, and according to these agreements, municipalities contribute to the funding of the operations.

The starting point of the regional university is the individual needs of the municipalities, which are addressed through the opportunities provided by the university. The focus of the operations lies in various forms of continuous learning, RDI activities, and impactful collaboration with businesses. The operational model of the regional university includes numerous different approaches to promote expertise and support vitality in the area. These approaches are selected according to the needs and are strongly shaped by the local context. Different parts of the region have different emphases, and, for example, certain geographical areas often host companies from specific industries. These industry clusters also influence the operations and the selection of approaches for the regional university.

A significant focus of regional university operations is supporting continuous learning. There are scientific facts and well-documented characteristics of continuous learning within businesses that should be recognized and considered when implementing regional university activities and selecting appropriate approaches.

## **2.2 Continuous learning in SMEs**

In small and medium-sized enterprises (SMEs), the organizational structure is simple, and there are fewer personnel and resources available. Operations and knowledge sharing in SMEs occur in a more informal manner, relying on proximity and social interaction among employees (Marzo & Scarpino, 2016). Development in SMEs typically involves short-term, intensive, and reactive solutions, with learning largely taking place alongside regular operations (Tam & Gray, 2016). Crucial to SMEs is the support from owners and/or management for workplace learning. Learning often targets specific emerging needs or is informal (Tam & Gray, 2016; O'Brien, McCarthy, Hamburg & Delaney, 2019). Typically, learning is also sporadic, with no formal skill development plan (Marzo & Scarpino, 2016). Learning can also occur through the 70-20-10 model, although it lacks scientific basis (Kupias et al., 2019).

All the aforementioned forms of learning typical in SMEs, however, are also economical, practical, timely, and targeted to needs (Tam & Gray, 2016). SMEs are highly active in their collaboration with external stakeholders, with their primary sources of knowledge acquisition being customers and clients, enabling a rapid and direct flow of information (Marzo & Scarpino, 2016). Generally, SMEs are interested in networking with universities if universities can offer solutions to their specific needs, which could enhance their business opportunities in the near future (Pecas & Henriques, 2006).

Tam & Gray (2016) examined employee learning in SMEs and found that exploring learning opportunities always occurred at the initiative of the employees themselves. If an employee did not raise a need for learning or development, no learning took place. Learning is not planned but often occurs ad hoc, individually, interpersonally, and often collaboratively with individuals from other companies. Individual-level knowledge is crucial in SMEs (Marzo & Scarpino, 2016). Employees stated that learning was mainly linked to practice and job tasks in SMEs. If learning occurred within a team, its goal was to strengthen skills and save time. Usually, managers encourage team learning. However, there is pressure within the team to raise one's own skills to the level of others and to share knowledge with others (Tam & Gray, 2016).

Workplace learning in SMEs has been extensively studied and is found to be highly diverse: action learning, problem-solving, coaching, mentoring, performance-related feedback, social interaction, networking, self-directed learning, personal experimentation and trial-and-error, and observation (Tam & Gray, 2016; O'Brien et al., 2019).

As mentioned earlier in this article, SMEs often have limited resources to acquire and utilize external knowledge. This can also pose challenges to the continuous learning processes of a company. In order for a company to have a proactive understanding of the skills it will need in the future, the company should monitor and identify, among other things, upcoming megatrends. This can be challenging due to the company's limited resources, and the company may also lack the capability to identify megatrend-predicting weak or strong signals. A Business Learning Path model based on weak signals has been

developed at the regional university to address the continuous learning needs of businesses.

### 2.3 Business learning path model

The foundation of the Business Learning Path model lies in identifying and selecting weak signals predictive of megatrends, tailored to the needs and requirements of businesses. The world surrounding businesses is in constant flux, and predicting future changes and trends can be challenging for companies. It can be difficult for businesses in their daily operations to seek out and track weak signals. On the other hand, universities must continually monitor weak signals and take action based on them to ensure they remain at the forefront of the latest knowledge (Ojaniemi, 2022).

For companies, it is crucial to obtain information specifically about weak signals relevant to them. This means that companies must extract essential information for them from the latest knowledge produced by universities and companies find it challenging. In the regional university, a trusting and confidential collaborative relationship has been built with local businesses. This enables the transmission of the right signals to the target companies in a business language they understand (Ojaniemi and Arola, 2022).

The following figure (Figure 1) illustrates the evaluation, selection, and transmission of strong and weak signals through the university and the regional university to SMEs:

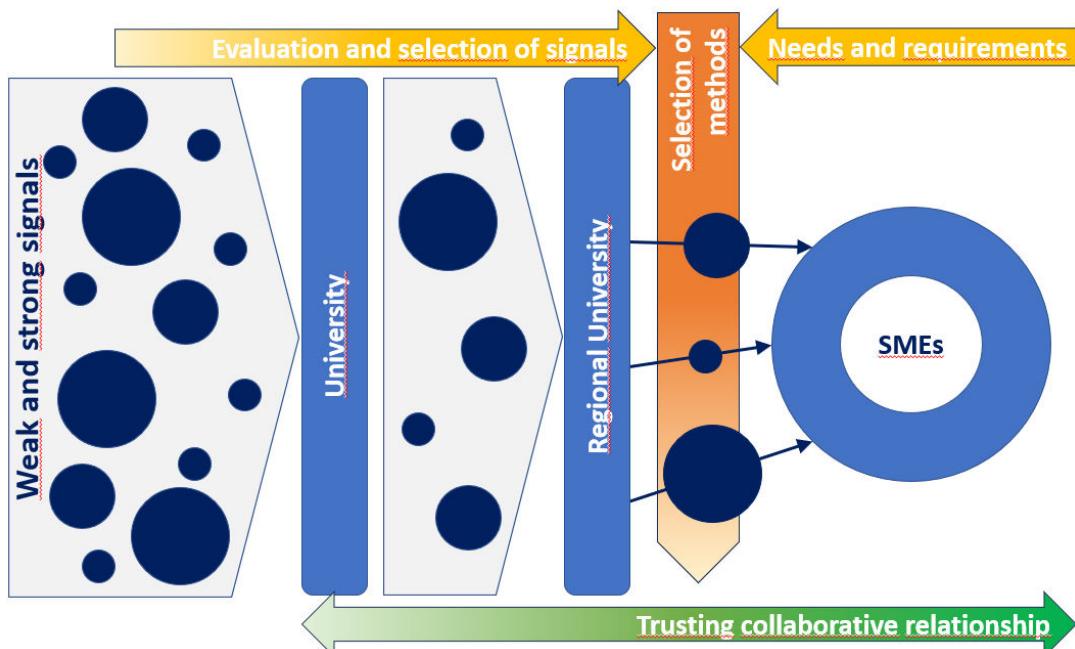


Figure 1. Evaluation, selection, and guidance of silent signals in regional university operations

Once the right signals are identified for the company, the second phase of the Business Learning Path model involves selecting the methods of knowledge transmission for the company. Transmission methods may include research and development projects, student projects, open university courses, or any other method managed by the university. The regional university is familiar with the business cultures of local companies and can choose the right transmission method for each situation.

The Business Learning Path is always individual and follows a continuum based on the company's operations. Depending on the company's needs for skill development, the learning path may be longer or shorter in terms of the number of steps. However, the long-term confidential relationships established between the regional university and the local businesses enable typically a longer timeframe for the learning path, and steps are taken as needed. For each step on the Business Learning Path, the most suitable method from the regional university's method selection is chosen for each situation. All steps can be different, or steps may be repeated as needed. Figure 2 presents a part of the regional university's method selection, from which steps on the Business Learning Path are chosen.

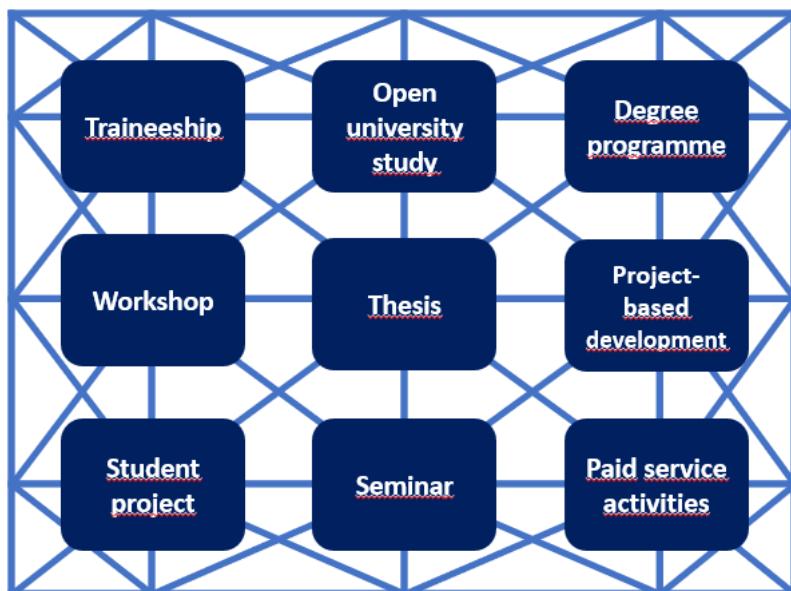


Figure 2. Examples of the regional university's selection of methods

The methods included in the regional university's method selection are tailored according to specific needs. For example, for one company, a workshop selected from the method selection may mean conducting an XR-themed workshop for the company's production personnel, while for another company, it may mean a workshop on digital marketing for the company's sales department. Therefore, the method selection is dynamic and diverse.

The following paragraph introduces a specific, individual Business Learning Path pilot project where the selected methods have been built based on the company's needs.

### 3 The pilot case

The Business Learning Path model developed at the regional university has been piloted over the years in companies of various sizes and across different industries. One of the pilot projects is with a local manufacturing SME, Jarte Steel Ltd. With over 30 years of experience, the company manufactures steel tanks for demanding needs in industries such as food, pharmaceuticals, chemicals, and wood processing. Jarte Steel Ltd employs approximately ten blue collars and operates in Töysä, South Ostrobothnia, Finland.

The pilot of Jarte Steel Ltd's learning path has lasted for several years and is ongoing. During this time, the trust between the regional university and the company has deepened further. One of the key methods for building this trust has been regular meetings between the regional university's regional developer and representatives of the company. During these collaboration meetings, the company's needs are assessed, and current themes at the university that align with the company's needs are discussed.

In this pilot, the knowledge transmission methods chosen for the company are specifically tailored to its needs, corporate culture, and overall operations. The selected methods for this pilot include RDI projects, seminars, thesis projects, and workshops (Figure 3).

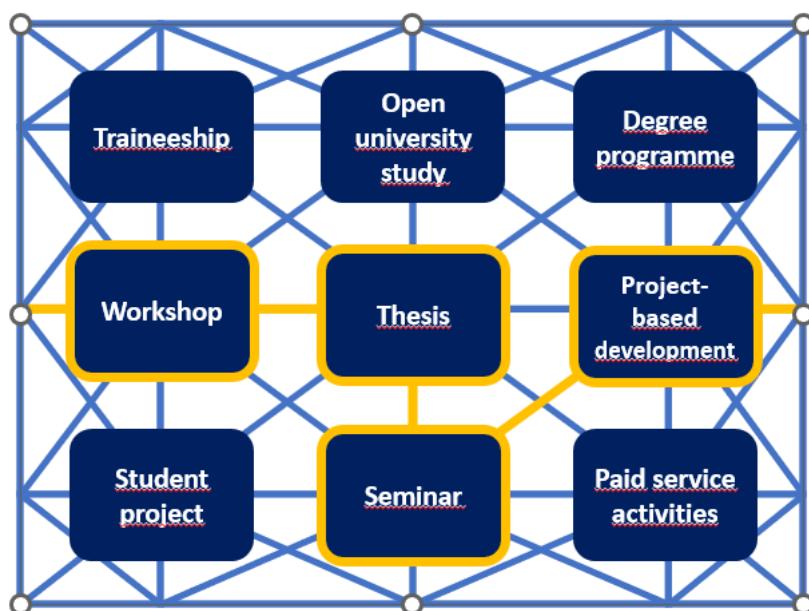


Figure 3. The selected methods for the pilot

The Business Learning Path has incorporated both individual and recurring methods. For example, the utilization of RDI projects has occurred multiple times along the learning path. Temporally, the company's learning path has spanned several years and is still ongoing. Throughout this period, the regional university's regional developer and representatives of the company, particularly the company's CEO, have been in regular interaction. The Business Learning Path is a progressive process, where the collaboration between the regional university and the company continues to deepen over time. The following figure (Figure 4) illustrates the pilot company's learning path to date.

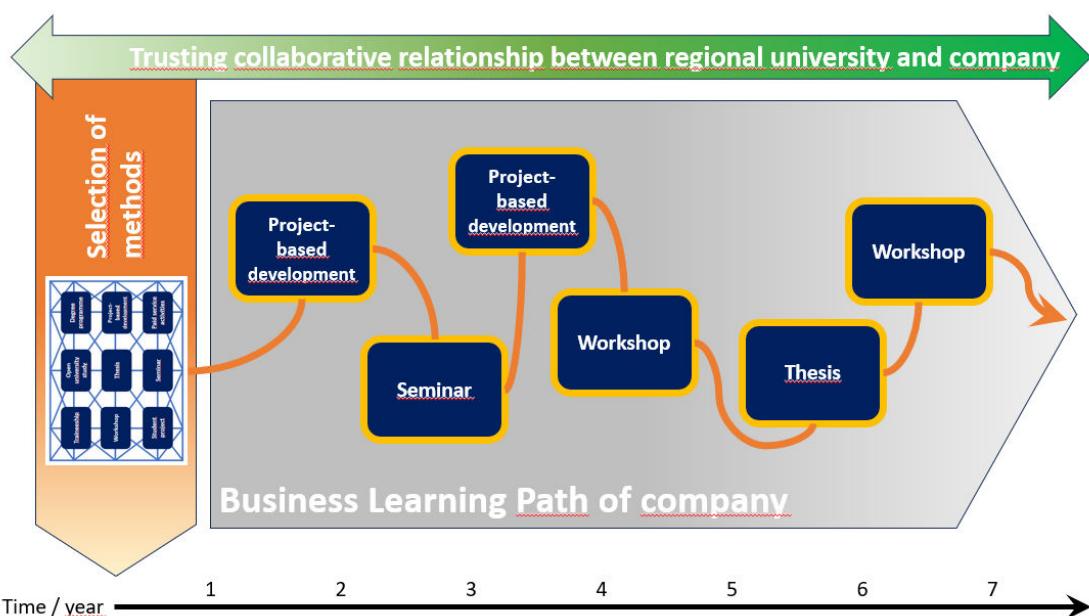


Figure 4. The pilot company's learning path

The CEO of the pilot company, Mr. Jarmo Ylä-Vannesluoma, has been interviewed regarding the pilot's results and impact so far. According to Ylä-Vannesluoma (2024), all these forms of collaboration with universities have helped the company to improve its operations and elevate the skill level of its personnel. Ylä-Vannesluoma states that piloting the Business Learning Path model has been significant for the company. One of the biggest impacts mentioned by the CEO is the increase in international sales. This was made possible by the company's participation in an RDI project managed by the university, which supported the company in renewing its website and making it multilingual. As a result of the renovation, the company acquired entirely new international customers, thus boosting its international sales. Ylä-Vannesluoma emphasizes that without participation in the university-managed RDI project, these new customers would not have been obtained (Ylä-Vannesluoma, 2024).

## **4 Conclusions and recommendations**

It can be argued that a company with a long-standing trust relationship with the regional university will always be able to progress along the Business Learning Path. The path is constructed individually based on the company's needs and is always unique due to the nature of the company's operations, its number of employees, and other factors. What is common to all company learning paths is effective university collaboration, long-term trusted relationships, and willingness for development.

During the analysis of the results of piloting the Business Learning Path model, opportunities have emerged to further complement and develop the model. One possibility is better post-project support for RDI projects. RDI projects are time-limited, and one challenge is that participating companies may lack support related to the project's topic after the project ends. Here, the regional university could take on a stronger role. After projects conclude, the regional university could identify any remaining needs or needs that arise after the project ends related to the project theme for the company and explore alternative methods from the regional university's method selection to address them.

Another opportunity for development is related to the planning phase of projects. In the future, it would be beneficial to involve local companies in the planning phase of projects so that their needs can be taken into account already in the project plan. This would also have a clear impact on the Business Learning Path model, as companies could be directed to participate in a project designed specifically based on their needs along the learning path.

Both the Regional University model and the Business Learning Path model address the challenges of university-business collaboration. In both models, the focus is on locality, strong trust relationships, and the needs of companies and regions. Without these elements, effective university collaboration cannot be achieved, and companies in the regions cannot fully benefit from the latest knowledge produced by universities. The pilot case of the Business Learning Path model demonstrates that, at its best, the model can have crucial impacts on a company's operations.

The most important aspect of both the Regional University model and the Business Learning Path model is building trust between the university and local stakeholders. For the vitality of the regions, both models have significant potential. The regional university is evidence of the collective willingness of regional stakeholders to promote regional development and raise the level of regional expertise. The contribution from municipalities to the regional university is a strong indication of the necessity of its operations and signifies significant trust in Seinäjoki University of Applied Sciences.

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# **Sharpen existing tools or get a new toolbox? Contemporary cluster initiatives and regional transformation**

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## **Abstract**

This paper explores the evolving landscape of regional innovation policy, focusing on the interplay between traditional cluster policies and emerging transformative agendas. Over the past decade, policy initiatives aimed at fostering place-based, collaborative innovation have proliferated. However, questions arise regarding the adequacy of existing policy tools in accommodating newer, transformative agendas. Cluster policies, as one of the oldest and most pervasive tools in regional economic development, warrant particular scrutiny in this context. Through a review of cluster policy research and input from a participatory working session with a network of policy practitioners and cluster initiative managers at the annual global conference of TCI Network, we identify examples of contemporary cluster initiatives and explore how cluster policies are adapting in the face of the evolving innovation paradigm. By characterizing the expanding toolbox of place-based collaborative innovation policies and examining the interaction between cluster policies and transformative agendas, the paper reflects on the potential for delivering on system-level change and provides insights into how cluster policies can be refined to better align with and support transformative regional agendas.

## **Keywords**

Cluster initiatives, cluster policy, regional transformation, collaborative innovation initiatives, system level effects, system transformation.

## **1 Introduction**

Policy initiatives to foster place-based, collaborative innovation have proliferated during the last decade, influenced by the evolution of both theoretical and practical knowledge. They include mission-driven research programmes, transformative innovation projects and city/regional transformation platforms such as smart specialisation strategies, partnerships for regional innovation or deep tech valleys. In this context, and to avoid confusion of concepts and duplication of policy efforts, it is important to understand the adequacy of existing policy tools as our thinking around the purpose and direction of regional innovation policy evolves. Can existing tools be sharpened or repurposed to fit new, transformative agendas, or does the regional innovation policy toolkit need to evolve more radically?

Cluster policies are one of the oldest and most widely used systemic tools in the regional economic development toolkit. They were developed in the 1990s at a time

when systemic approaches to regional innovation policy were first taking hold and they have proved to be remarkably resilient. Cluster initiatives of one form or another are present today in almost all European regions and in many regions in other parts of the world, and they frequently interact with other emergent transformative regional innovation policies.

This paper provides a review of the state-of-art of cluster policy research with the aim of reflecting on the adequacy of this tool in the context of the more recently emergent transformative innovation agendas. Transformative innovation agendas are manifested in a range of competing or complementary policy instruments in the place-based collaborative innovation space, and we start by characterising this expanding toolbox. We then focus on cluster policy as a previously established tool in the box, reviewing the rationale for, practice in and research on cluster policies and initiatives. This leads us to explore how contemporary cluster policies are interacting with the transformative turn in innovation policy, using a ‘framework of effects’ to explore the potential for system level effects from cluster policies. The paper concludes with some reflections on how cluster policies could be sharpened in practice to play a more instrumental role in regional transformative agendas.

## **2 An expanding toolbox: The rise of place-based collaborative innovation initiatives**

It is useful to first review the development of place-based innovation policies and how they have evolved into addressing broader system level agendas. The initial focus of innovation policy was linear and assumed that enhancing investment in R&D would lead to more (often technology driven) innovation. This approach evolved to explore how innovation policy could build the capacity and capabilities of individual actors (often in a specific sector), and then further to foster the inter-actor collaboration that has been increasingly acknowledged as key for innovation success. Most recently innovation policy has begun to focus on the potential for playing a more transformative role, moving to what has been described as a third generation of innovation policy (Schot and Steinmueller, 2018). Here, the focus moves from innovation to generate economic growth and enhanced competitiveness to innovation that can achieve broader aims, most notably addressing societal challenges associated with social and environmental sustainability.

So-called “mission-oriented policies” (Dosi *et al*, 2023) fit within this third generation framing, which is strongly related to the hypothesis that innovation can deliver greater value if approached with long-term thinking and appropriate investment from government for inclusive and sustainable growth (Mazzucato 2013). Similarly, industrial policy has also evolved, extending beyond dedicated support for specific

sectors to include a focus on place-based regeneration, new industrial opportunities (digital, data) and sustainability (Juhász 2023).

Transformative Innovation Policies (TIP) are by nature longer-term and aim to foster new connections between systems, providing “spaces for experimentation” and co-producing solutions that can be expanded to enable transformative change in socio-technical systems (Weber and Rohracher, 2012). Because of the complex nature of the challenges, they are aiming to address, there is a need for the involvement of a range of stakeholders to deliver success. Through bringing together diverse actors (e.g. problem owners, entrepreneurial developers and solution owners, users, enabling organisations, etc.) to work collaboratively on common system challenges, new solutions and opportunities can be generated. Yet often it is the actual building of an effective dialogue between system actors that represents the key challenge in implementing such policies. The collaborations needed go beyond research-business interaction, requiring the involvement of both government and civil society corraling around the new directionalities implicit within a system transformation agenda.

While highly challenging, such collaborative innovation agendas – involving diverse partners across industry, government, academia and civic society, identifying common challenges and working collaboratively to address gaps and take forward opportunities – are nevertheless already apparent in a range of existing policies. Indeed, fostering collaboration between actors has been a mainstay of the place-based economic development policies that have been progressively developed over recent decades, including a focus on regional innovation systems, industrial districts and cluster initiatives. More recently these regionally focused investments in collaboration are being complimented by variants of place-based systemic policies with a more explicitly transformative rationale that seek longer term impact and sometimes reach beyond previously defined geographic boundaries.

The progressive uptake of smart specialisation strategies (S3) within and beyond Europe over the last decade are a good example of place-based systemic policies taking an explicitly transformative rationale. S3 are premised on the idea that territories should prioritise research and innovation investments as a pathway to the structural transformation of their economies, and that they should do so through an approach that draws on the systemic collective intelligence of an ‘entrepreneurial discovery process’ involving businesses, universities, government bodies and other key territorial actors (Foray *et al.*, 2009; Perianez Forte and Wilson, 2021). Moreover, the desire to orientate such strategies explicitly towards societal challenges is reflected in recent debates around S3 for sustainability (Miedinzski *et al.*, 2021; Pontikakis *et al.*, 2022).

Alongside the broadly-adopted S3 framework, there are a wide range of more specific policy programmes that are experimenting with more transformative agendas, three of which are illustrated in Table 1.

<b>Global Innovation Clusters in Canada (formerly known as the Innovation Superclusters Initiative)</b>	Launched in 2018, with renewed commitment from government in 2022, the Global Innovation Cluster Programme has identified 5 areas where building innovation ecosystems can bring benefit to Canada, namely Digital Technology, Protein Industries, Next Generation Manufacturing, Artificial Intelligence, and Ocean. Whereas they had a geographic root, they are anticipated to build connections and have impact across Canada. Key aims for the clusters include, building connections and collaborations, particularly supporting SMEs to adopt technology, and creating jobs and attracting talent for key knowledge intensive industries. Whereas a key driver is commercialisation of Canadian innovations and ensuring IP stays in the country, many of the drivers for such innovation are to address key societal or environmental challenges, for example keeping oceans healthy, or ensuring food security.
<b>Deep Tech Valleys in Europe</b>	As part of the New European Innovation Agenda, adopted in summer of 2022, regional innovation valleys are being created to drive forward the new wave of deep tech innovation, helping Europe to develop new technologies to address the most pressing societal challenges. The ambition is to better connect innovation ecosystems across the European Union, including funding to support concrete interregional projects, as well as supporting startups and deep tech entrepreneurs. Whereas these types of instruments have a long history in innovation investment across Europe, there is now an explicit ambition to deliver the continent's twin digital and green transitions and accelerate Europe towards a climate-neutral future.
<b>Tech Hubs and Regional Innovation Engines in the US</b>	In the US, the CHIPS and Science Act of 2022 aimed to stimulate semiconductor manufacture and innovation to reinvigorate the industry and meet national security concerns. Alongside the semiconductor investment the act also included provision to support Tech Hubs, centres of innovation for the development of key technologies including regional manufacturing capability. In addition, the Act launched the National Science Foundation's Regional Innovation Engines programme. This new intervention combined science and technology research and development with regional level resources to have an impact (on economy and jobs) within a geographic region (often areas that had previously not benefitted from innovation investment) whilst also addressing societal challenges.

Table 2: Examples of policy instruments experimenting with transformative agendas

Thus, the new broad system transformation agenda in innovation policy is beginning to be also adopted by previously bounded regional innovation policy interventions. Indeed, while the transformative innovation policy agenda has been developed primarily at the national and super-national levels to date, this has generated questions and debate around how regional policies can contribute to big societal challenges and missions, taking forward the implementation of TIP ambitions at a regional level. This also opens the opportunity to link regional delivery of innovation policy with TIP at national and other levels, thus maximising impact.

Rather than creating a whole new plethora of interventions and capabilities to take forward these policies, therefore, it is pertinent to review existing tools and see what can be learnt from and adapted to this new transformative agenda. Is there, for example, an opportunity to build on existing collaborative innovation infrastructure already in place and take the learning from implementation, evidencing impact and approaches being

adopted there in ways that ‘sharpen the existing tools’? In the next section we explore this question through a focus on one of the ‘oldest tools’ in the place-based collaborative innovation policy toolkit: clusters.

### **3 A well-established tool in the box: Cluster policies and cluster initiatives**

#### **3.1 The origins, instruments and impacts of cluster policies**

Clusters were popularised in the economic development policy sphere by Michael Porter in the early 1990s (Porter, 1990, 1998), although the cluster concept has its roots in earlier analysis of industrial districts, initially by Marshall (1890) and later by Becattini and others in the Italian context (Becattini, 1990; Pyke *et al.*, 1990). Indeed, the economic benefits that arise from the spatial concentration of firms in the same industry are well understood (Glaeser *et al.*, 1992), and have been analysed most notably in terms of innovation externalities (De Dominicis *et al.*, 2012; Delgado *et al.*, 2014; Gruenz, 2004; Uyarra and Ramlogan’s, 2016), productivity benefits (Martin *et al.*, 2011; Cainelli *et al.*, 2016), and boosted regional employment or economic growth (Spencer *et al.*, 2010; Delgado *et al.*, 2014; Ketels and Protsiv, 2021).

Porter defined clusters as “geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, agencies, and trade associations) in particular fields that compete but also cooperate” (Porter, 1998: 197), and the broadness of this definition has led to great diversity in how the concept is applied. Clusters vary according to the nature of their activity (e.g. common value chains, technological bases, end markets), their size and diversity of different types of actors, their structure (e.g. see Markusen’s (1996) typology: hub & spoke, satellite platforms, state-anchored), and the geographic scale at which they are focused (e.g. local areas, metropolitan areas, sub-national regions, small countries, cross-border geographies).

While clusters are structural features of economies, cluster initiatives have emerged as purposeful actions oriented at strengthening collaborative relationships within clusters in ways that will boost their collective economic success (or competitiveness). These cluster initiatives can be purely private, but they are frequently supported (at least in part) by public policies. Following Wilson (2019), the policy instruments typically employed to support cluster development fall into three broad categories:

- (i) Facilitation of cooperative dynamics and coordination of actions to upgrade competitiveness in several clusters from a regional development agency or similar;

- (ii) Provision of financial and/or other forms of support for formal organisations (often called cluster associations) whose role is to facilitate cooperative dynamics supporting the competitiveness of specific clusters;
- (iii) Funding calls for cluster projects, focussed on cooperation among the applicant firms and other agents to address one or more competitiveness challenges (innovation, internationalisation, training, specialised infrastructure, etc.).

The rationale for implementing such cluster policies is rooted in the arguments that: (i) collective actions are required to fully exploit the economic development externalities of spatial agglomeration; and (ii) a lack of trust and/or social capital present significant barriers to that collective action and provide a justification for policy support. Hence cluster policies are typically designed to support the construction of social capital in long-term collaborative processes that in practice respond to tackling a range of different types of shared competitiveness-related challenges: innovation, internationalisation, value-chain reinforcement, cluster specific talent or infrastructures, etc.

As such cluster policies take many shapes and sizes in practice, but what unites them is that they are designed to address system or network failures – missing or weak interaction between actors – within activity-specific and geography-specific clusters (Wilson *et al.*, 2022). Indeed, it is in part the versatility of cluster policies that has contributed to them becoming a permanent feature of the regional economic development policy toolkit. Despite initial criticism around the wave of popularity in cluster policies in the 1990s, which included Martin and Sunley's (2003) influential deconstruction of Porter's cluster concept and warning that clusters should not be seen as an economic development policy panacea, they have proved to be extremely resilient. There is widespread take-up of different forms of cluster policy across the European Union, and the European Commission has created a European Cluster Collaboration Platform as an umbrella for wide-ranging dialogue, analysis and support activities oriented to cluster initiatives and cluster policymakers.<sup>3</sup> The Inter-American Development Bank, World Bank and UNIDO have also supported many cluster development projects (Maffioli *et al.*, 2016; UNIDO, 2013) and the well-established global network of cluster practitioners (TCI Network) reflects the spread and influence of cluster initiatives and their supporting policies around the world.<sup>4</sup>

Yet while the process of clustering itself offers clear and well-acknowledged economic benefits, there is less consensus around the suitability and effectiveness of cluster policies. Indeed, the fact that the geographic specialisation of economic activity in

<sup>3</sup> See [www.clustercollaboration.eu/](http://www.clustercollaboration.eu/), where 1070 cluster organisations based in the EU have currently registered profiles, plus an additional 299 cluster organisations from other parts of the world.

<sup>4</sup> See [www.tci-network.org](http://www.tci-network.org).

clusters occurs naturally, including in places where there is no active cluster policy or cluster initiatives, raises questions around the added value of policies. That these questions have not been satisfactorily answered is due in large part to widely acknowledged challenges in evaluating the effectiveness of cluster-type policies. These challenges are related fundamentally to the multi-dimensionality and heterogeneity in the use of clusters as a policy tool, the interactions of cluster policies with wider regional policy mixes tackling specific competitiveness challenges, and the data issues inherent in assessing a policy that is designed to work on what are essentially human relationships (Cantner *et al.*, 2019; Schmiedeberg 2010; Smith *et al.*, 2020; Wilson *et al.*, 2022).

Thus, while the evidence that exists on the economic impacts of cluster policies can be characterised as mixed and fragmented in the context of significant evaluation challenges (Wilson *et al.*, 2022), their resilience as a policy tool over three decades and the prevalence of cluster initiatives around the world is indicative of a strong perceived value (both among regional policymakers and on the ground among cluster actors). This perceived value is related to the crossover between cluster policies and a range of other regional competitiveness policies (science and technology policy, innovation policy, internationalisation policy, infrastructure policy, skills policy, etc.), and an understanding that strengthened cooperative relationships are likely to improve policy outcomes in these areas, regardless of how difficult that is to demonstrate empirically.

### **3.2 The transformative potential of cluster policies**

Until very recently cluster policies have been seen purely as an economic development tool. However, the underlying policy rationale potentially fits well with the needs of regional policymakers to strengthen the systemic interaction of firms and other actors more generally, and in ways that could be imbued with other directionalities. This raises the question of whether there is scope for leveraging the existing regional collaborative infrastructures supported by cluster policies to contribute to transformative innovation policy rationales.

To consider this possibility it is important to note that, conceptually, clusters offer great potential to bridge economic, social and environmental agendas in ways that could be transformative. This is because, by definition, they are territorially rooted constructs characterised by cooperative dynamics that integrate a wide range of different actors (business, government, research, and potentially also civil society), each of which has different knowledge, capabilities, and roles to play in systemic transformation at the regional level.

Moreover, there are important conceptual and empirical precedents in considering the territorially bound social roles of clusters. For example, in presenting a framework for binding the social and economic dimensions of clusters, Konstanynova and Wilson (2017) point to the emphasis in Becattini's (1990) conception of industrial district on a

community of people with its own system of values and institutions capable of simultaneously shaping the development of firms and territory (Becattini 1990; 2002).

Work by Porter and Kramer (2011) on the concept of ‘creating shared value’ (CSV) also provides a basis for a conceptual bridge between the collaborative dynamics within clusters and the capacity of firms and other actors to simultaneously work towards economic and social outcomes, in what Grimbert *et al.* (2024) label processes of ‘collective shared value creation’. They note, for example, growing recognition and empirical work on a widening range of specific cases related to the potential for clusters to support social and environmental sustainability (Alberti and Belfanti, 2019, 2020; Belfanti and Alberti, 2022; Collazo Yelpo and Kubelka, 2019; Jackson and Limbrick, 2019; Pezzi *et al.*, 2021).

Indeed, there is growing interest in the cluster policy community around how the collaborative dynamics endemic to clusters can be harnessed to solve complex socioeconomic challenges beyond their narrow economic development remit, for example related to the circular economy or public health enhancing innovations. More generally, adopting more socially embedded approaches to cluster development that work explicitly on the link between cluster firms and a broader set of actors with the territory’s community of people may enhance the capacity of territories to respond to so-called ‘grand societal challenges’, providing a strong collaborative foundation for regionally-embedded transformative innovation policy. We explore this idea further in the next section by examining in greater depth the types of system-level effects that cluster policies might achieve, alongside their other actor- and cluster- specific effects.

## 4 Towards system level effects from cluster policies

### 4.1 Framing the effects of clusters

Despite deep experience with cluster policy implementation over several decades, practitioners still struggle with monitoring and evaluation of these systemic instruments (Smith *et al.* 2020). Evaluation practice has typically maintained a focus on indicators of innovation and firm-level economic performance and has failed to capture the development of collaborative strength and the contributions that clusters can make to wider system-level impacts. Yet we witness increasing interest in exploring and tracking the contribution of collaborative initiatives to broader system-level effects. Examples include the analysis of economic ripple effects of clusters in the Norwegian Innovation Clusters programme (Røtnes *et al.* 2017), exploration of regional and national level impacts of the German leading-edge clusters (Rothgang *et al.* 2019) and attempts to apply Porter and Kramer’s (2011) shared value concept to cluster dynamics (Alberti and Belfanti 2019, Pezzi *et al.* 2021).

In an effort to shine a light on the full range of effects to which cluster policies can contribute, Wilson *et al.* (2022) proposed a generalized framework of effects, structured around two dimensions: the *level of effects* and the *timing of effects*.

There are three broad levels at which the effects of cluster interventions can be felt (and evidenced):

- › At the individual actor level, among specific cluster actors (**A**)
- › At the group level, among the cluster/collaborative initiative as a whole (**C**)
- › At the system level, among the broader territorial innovation system (**S**)

Table 2 explains in more detail what is meant by each level and how the types of effects that can be evidenced by evaluation differ across each level.

<b>Actor Level (A)</b>	The individual actor level (A) encompasses companies, research institutes and other organisations that are participants of the cluster/collaborative initiative. These individual actors may commit themselves to the collaboration through formal mechanisms (e.g. letters of intent, membership fees) or through looser participation and engagement in collaborative activities. Their aim in engaging in collaborative initiatives is assumed to be to <b><i>strengthen their own capacities and performance</i></b> , and evaluation at this level can seek to measure the effects of cluster collaboration on these capacities and performance.
<b>Cluster Initiative Level (C)</b>	The cluster initiative level (C) encompasses the set of individual organisations that act together in a collaborative group, with a common purpose. The aim of acting in collaboration is assumed to be to <b><i>achieve results together that cannot be achieved by acting alone</i></b> . Thus, an important focus for evaluation at this level is to capture how the strength (critical mass), dynamics and depth (collaboration), and strategic direction of the initiative evolves over time.
<b>System Level (S)</b>	Cluster policy interventions can also contribute to changes at the level of the broader (local, regional, national) territorial system (S). This is likely to occur most immediately among the natural cluster or agglomeration of related activities that exists beyond those actors explicitly targeted by the policy. However, cluster initiatives also connect with other related clusters in the region and are increasingly asked to contribute to more general regional improvement strategies. They may therefore exhibit <b><i>strategic leadership effects</i></b> as they adopt a leadership role in the territory (for example, acting as a credible, knowledgeable voice and through their roles in smart specialisation strategies), they may amplify and catalyse innovation in the region, and they may make <b><i>higher-level contributions to broader territorial priorities</i></b> (for example, societal challenges related to environment, inclusion, cultural vibrancy or wellbeing agendas). Thus, an important focus for evaluation at this level is to capture spill-over (or ripple) effects from the policy intervention that extend beyond specific cluster initiatives and generate change at the level of the broader territorial system.

Table 2: Levels of effects

The second dimension concerns the types of effects that would be expected from cluster policies over different time periods in their development. The framework distinguishes between:

- › *Short-term effects* experienced 1-3 years after initiating collaborative activities (**ST**)
- › *Long-term effects* that become consolidated after the first few years of activity (**LT**)

Different dimensions of the three levels of effects (A, C and S) will be more, or less, relevant in the short-term and long-term, and 3 explains in more detail the types of effects that can be evidenced at each point in time.

<b>Short Term Effects (ST)</b>	<p>Short term effects (ST) encompass changes in behaviours and perceptions alongside more concrete outputs that are experienced as a direct result of the cluster intervention during the first 1-3 years.</p> <ul style="list-style-type: none"> <li>• For individual actors (A), these changes include (perceived) increases in competencies, knowledge exchange and capacity to innovate as well as changes in behaviour (e.g. engaging in collaborative activities).</li> <li>• On the level of the collaborative grouping (C), one would expect to see indications of (increased) engagement from a diverse group of actors, new linkages (internally and externally), and the emergence of a shared view of the rationale and value of collective action, alongside a functioning governance for the collaborative initiative.</li> <li>• At the level of the territorial system (S), a cluster initiative's activities may contribute to building system resources that help to improve the competitiveness and international attractiveness of the territory and/or develop a strategic leadership role within the territory. However, while one may see initial steps toward such system-level effects in the short-term, it generally takes more time before collaborative actions can affect or contribute to these more complex and indirect effects.</li> </ul>
<b>Long Term Effects (LT)</b>	<p>Long-term effects (LT) encompass changes to performance, as well as changes to behaviours, structures, policies, and institutional arrangements that need time to consolidate. Although there is no well-defined timeframe, these longer-term effects may be observed after the first few years of a collaborative initiative.</p> <ul style="list-style-type: none"> <li>• For individual actors (A), longer-term effects include strengthened economic performance, as well as more competitive strategies and behaviours.</li> <li>• At the level of the collaborative grouping (C), one expects to see continued development over time of the types of effects that began in the short term (critical mass, new linkages, collective will), with their application to more complex challenges and a deeper level of collaboration. This also includes continual improvements to the quality and professionalisation of the collaborative governance.</li> <li>• It is in the long term where the level of the territorial system (S) really comes into play. With more maturity, critical mass and capacity to drive</li> </ul>

complex collaborative actions, the cluster initiative is able to adopt a stronger leadership role within the territory or domain. They may act as the voice of industry, influence policy and strategy, amplify the reputation and position of the sector and/or territory, and connect with other system leaders in new strategic partnerships that help align actors in a regional strategy. A cluster initiative could also make other higher-level contributions to broader priorities of importance to the territory, for example leading responses to key societal challenges.

Table 3: Timing of effects

Figure 4 presents the complete framework of effects. While the focus of cluster policies has traditionally been on firm-level effects over time (the top row of the framework), it is the bottom-right quadrant of the framework where clusters may demonstrate a contribution to system-level change and regional transformation. If clusters are to be tools of transformation, this is where the focus should be and where the sharpening of the tool needs to take place. And after decades of cluster policy implementation, we begin to observe examples of clusters delivering on this broader mandate and contributing to system-level transformation.

Level	Short-term results (1-3 years) <b>Cluster participants</b> (direct/immediate results claimed by cluster participants)	Long term effects (3-10 years) <b>Cluster participants &amp; beyond</b> (indirect/subsequent effects that can be observed over time)	
<b>Individual Actor (A)</b>	<b>Perceptions, Capabilities &amp; Behaviours</b> <ul style="list-style-type: none"> <li>- Competence development</li> <li>- Knowledge exchange</li> <li>- Capacity to innovate</li> <li>- Involvement in collaborative activities</li> </ul>	(Economic) Performance experienced by individual actors	
<b>Collaborative Group/Cluster Initiative (C)</b>	<b>Composition, Perceptions, Capabilities &amp; Behaviours</b> <ul style="list-style-type: none"> <li>- Engagement of different actor groups</li> <li>- Dynamics of linkages over time</li> <li>- Perceived value of collaboration</li> </ul> <b>Collaboration Infrastructure</b> <ul style="list-style-type: none"> <li>- Quality of cluster management</li> <li>- Leadership</li> <li>- Processes</li> </ul>		
<b>Territorial System (S)</b>	<b>System Resources</b> <ul style="list-style-type: none"> <li>- Improving the competitiveness and international attractiveness of the innovation ecosystem</li> </ul> <b>System Leadership</b> <ul style="list-style-type: none"> <li>- Contributing to increased effectiveness (structures, policies and institutional arrangements) of the innovation ecosystem</li> </ul>	<b>System Resources</b> <ul style="list-style-type: none"> <li>- Improving the competitiveness and international attractiveness of the innovation ecosystem</li> </ul> <b>System Leadership</b> <ul style="list-style-type: none"> <li>- Contributing to increased effectiveness (structures, policies and institutional arrangements) of the innovation ecosystem</li> </ul>	Higher Level System Effects

Figure 4: Cluster policy framework of effects

## **4.2 Clusters as agents of system-level transformation?**

While cluster initiatives are usually seen as focusing on firm-level innovation and growth, cluster policies have often assumed a broader remit in terms of strengthening the local system through collaborative action. They typically bring industry, science, the public sector and (more occasionally) civil society actors together in participatory processes geared to increasing competitiveness, encouraging diversification, and ensuring resilience. Moreover, as described in the previous section, we have witnessed an evolution of cluster policies and increasing attention to clusters' contribution to system-level effects.

Cluster policies are proven to be useful instruments for the mobilisation of actors and the implementation of a portfolio of collaborative actions towards shared goals. The core of collaborative action for strengthening firm-level performance is also at the core of influencing system-level transformation. As such, we can identify several examples that illustrate how cluster policies are being reoriented to contribute to system transformation with new strategic aims and directionality, inclusion and mobilisation of a broader range of actors, implementation of actions to address user and demand-side perspectives, and more reflexive and learning-oriented approaches to evaluation. At the most recent TCI Network conference in Reykjavik<sup>5</sup>, we explored how this evolution in the policy landscape was playing in practice through an expert panel and workshop session focused on new transformative cluster policies. The session reflected on the consequences and implications of the strengthened focus on system transformation and highlighted various examples of how cluster policies and initiatives are evolving in practice. Some of these examples are elaborated below.

The **Basque Country** and **Catalonia** are two of the European regions with the longest trajectory in cluster policy, having pioneered its introduction in the early 1990s. Over recent years both have actively experimented with evolving the directionality of their traditionally business-competitiveness oriented approaches to cluster policy. In Catalonia this has centred on introducing the concept of shared value (Porter and Kramer 2011) around a particular focus on three systemic transitions (food, mobility and energy) that are viewed as those that can best contribute to a low carbon economy. An analysis of cluster cases active in these sectors (Pezzi *et al.* 2021) highlighted the value added that clusters bring in terms of providing leadership and collaborative linkages with other clusters and international stakeholders, as well as taking on new roles in relation to anticipation of market trends, leveraging the power of certification/regulation and developing strategic partnerships to overcome structural barriers. In line with this, the Catalan cluster policy has also introduced new indicators

and approaches to evaluation, including measures of social impact. In the Basque Country, the approach has centred on exploring the contribution that clusters supported by the policy can make to the sustainable development goals (SDGs), and has included a recent focus on leveraging cluster organisations in energy-intensive industries to accelerate decarbonisation through a so-called net-zero industrial super cluster.<sup>6</sup>

In Sweden, the Vinnväxt programme was initially launched in 2001 to promote sustainable growth in Swedish regions by engaging triple helix actors in long-term collaborative initiatives to develop internationally competitive regional innovation systems in specific growth areas. Vinnväxt has reoriented itself over time to use the Sustainable Development Goals (SDGs) as a driving force for renewal and transformation. The most recent generation of Vinnväxt initiatives have strategic aims that go well beyond sector renewal and growth, with visions to address challenges in the areas of digital health innovation, green chemistry and agricultural technology. This has influenced not only the composition and “centre of gravity” of the collaborative initiatives (with a more prevalent role for e.g. entrepreneurs, public sector service providers and regulatory bodies), but also the types of action areas being implemented (e.g. more focus on building capacities of public sector employees and developing new approaches for working with the demand side – articulating demand and accelerating innovative public procurement processes). In addition, the Vinnväxt programme has developed their strategic learning practices to foster stronger reflexivity in the tracking of system-level effects and transformation over time (Wise et al. 2022).

The Innovation Centres in Scotland were initially conceived as an industry demand-led initiatives bringing together triple helix partners to address sector innovation needs. Over their ten years of delivery, they have evolved from a focus on industrial growth to a new generation that encompasses both economic and societal benefits (including supporting the journey to net zero or working with Health and care systems to change service delivery). The Scottish Funding Council has recently invested in these ecosystems as long-term infrastructure investments to create transformational collaborations between universities, colleges, the public and private sectors. An example of this changed directionality is the innovation centre “Construction Scotland” who are now “BE-ST”: Built Environment for Smarter Transformation<sup>7</sup> and have the aim of being Scotland’s launchpad to a zero-carbon built environment. As part of this strategic re-orientation, the centre has been more active in mobilising actors from different academic disciplines, across new business sectors, and with different public sector partners – opening new perspectives, creating new connections and exploring the requirements for the journey to Net Zero. In addition to supporting firms’ development

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6 See: [https://www.spri.eus/en/support/netzero-basque-industrial-super-cluster/](https://www.spri.eus/en/support/net-zero-basque-industrial-super-cluster/).

7 <https://www.be-st.build/>

of new products, services and business models, BE-ST have also introduced a broader portfolio of collaborative actions focused on the user and demand side including work with building standards, approaches to procurement to stimulate innovation, test and demonstration (leveraging a new Innovation Factory) with a particular focus on sustainable home-grown materials, and consumer behaviours to drive circularity.

## 5 Discussion and conclusions

The examples in the previous section illustrate that cluster-type initiatives are an existing and well-functioning collaboration infrastructure that can be used not only for addressing firm/actor-level needs, but also for contributing to system-level aims. With an evolution in directionality (targeting broader system-level change and addressing societal challenges), we see the rise of more transversal clusters that combine sectors and areas of expertise. In addition to mobilising the traditional triple helix actors (firms, academia and the public sector), we see cluster initiatives engaging investors, civil society and other stakeholders that are required to understand and react to societal challenges that need to be addressed. We also see the emergence of new approaches to tracking contributions to system-level change and using this information to inform adjustments in strategic direction and planned actions. These shifting characteristics in directionality, actor mobilisation and coordination, demand articulation, and reflexivity in monitoring, evaluation and learning processes (see Table 4) mirror the characteristics of longer-term processes of transformative system change (Weber and Rohracher 2012).

*Table 4: Comparison of cluster policy characteristics*

Characteristics:	Traditional cluster policy initiatives	Transformative cluster policy initiatives
<b>System boundaries</b>	<ul style="list-style-type: none"> <li>- Sector or thematic area</li> <li>- Regional or local</li> <li>- Innovation ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>- Cross-sectoral</li> <li>- Broader geographies</li> <li>- Innovation ecosystems and beyond</li> </ul>
<b>Directionality/aim</b>	<ul style="list-style-type: none"> <li>- Economic growth</li> <li>- Competitiveness</li> </ul>	<ul style="list-style-type: none"> <li>- Sustainable growth</li> <li>- Sustainable competitiveness</li> <li>- Contributions to addressing societal challenges</li> </ul>
<b>Actor mobilisation and coordination</b>	Triple helix (firms of different sizes, academia, public sector)	Pentahelix (triple helix + investors/capital, civil society) and beyond
<b>Demand articulation</b>	Demand understood as trends in the market (firm vs. user perspective) and more linear approaches to development and dissemination on the market	Demand understood from the perspective of challenge owners (including public sector demand), and approaches that integrate users in open innovation models

<b>Reflexivity in evaluation</b>	Monitoring and evaluation typically focused on actor-level (e.g. firms and knowledge institutions) capabilities and performance	Monitoring, evaluation and learning processes that include a focus on tracking system-level change
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We now return to the question of whether existing tools – like cluster policy – can be sharpened and repurposed to fit new, transformative agendas. Can clusters be a tool for TIP, or do we need new tools in the regional innovation policy toolbox? The examples presented demonstrate that it is possible to sharpen and repurpose the cluster policy tool. Yet the appropriateness of the tool depends on the nature of the policy (its rationale and direction) as well as the existing collaborative infrastructure that it leverages. If a cluster policy has been developed with a logic of industrial competitiveness, it would be hard to switch logics and aims with simple resharpening. Indeed, the example from Scotland shows that an integrated evolution in the policy aims and implementation logic (moving from a focus on industrial growth to a new focus on both economic and societal benefits) are necessary.

In addition, all the examples identified here are of longer-term policy initiatives that have developed collaborative infrastructures over a sustained period of time, reaching both critical mass of engaged actors and the collaborative leadership capacities necessary to take on more complex challenges. This includes the capacity to link-up with other initiatives (on multiple geographical levels) and to leverage instruments in other policy areas. Just as certain sectors are part of broader systems, so are cluster policies (one instrument in a mix of instruments that are needed to drive system transformation).

While what we call “transformative cluster policy initiatives” are a growing segment, they are still not a large portion of cluster policies and initiatives around the world. The appropriateness of the cluster policy tool is ultimately a question for policymakers and cluster initiatives themselves. However, as we have seen from learning from long-standing cluster policy regions<sup>8</sup> and their evolving use of cluster initiatives in a wider system transformational role, there is an opportunity to adapt an existing approach for broader purposes. If they are open to more flexible use (adjusting the directionality toward societal challenges vs. a sole focus on economic growth, mobilising and coordinating not only supply-side innovation producers but also understanding and engaging with demand-side actors, and taking a more reflexive approach to evaluation and learning processes), then cluster policies can also be transformative.

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<sup>8</sup> See summary of plenary session *Towards New Transformative Cluster Policies: New Policy Landscapes* (TCI Network global conference 2023)

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# **The Centre for Enterprise - forging leadership, growth and innovation in the UK's Northwest**

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## **Abstract**

The Centre for Enterprise (CfE) at The Manchester Metropolitan University in the UK is an innovation, leadership and growth knowledge exchange specialist centre. Having worked with 2500 small firms in the last twelve years, winning over £40M of funding and creating over 550 jobs, the Centre has a significant footprint in the UK's Northwest. We have pioneered a collaborative, interdisciplinary approach to supporting small firms to undertake technological innovation, embedding and exploiting technology for business growth. The Centre's aim is to transform SME success in the North West through the injection of university research and expertise, particularly around technology adoption and diffusion, where access to technology is possible, but business skills to embed, upskill and adopt that technology means that businesses are not achieving their potential. The Centre for Enterprise is currently undergoing a crucial period of change, moving away from structural funds to Innovate UK funded technology specific projects, as well as developing new interdisciplinary projects with other academic areas, including art and fashion. Learning points may be around our methodology, our blend of academic and professional services teams for success, and we are keen to gain insight from colleagues across the world working in entrepreneurship and small firm growth.

## **Keywords**

Knowledge exchange, innovation, growth, entrepreneurship, enterprise, business support

## **1 Introduction**

The Centre for Enterprise (CfE) at The Manchester Metropolitan University in the UK is an innovation, leadership and growth knowledge exchange specialist centre. Our mission is “to transform businesses with innovation and learning, enabling them to thrive, grow sustainably, embrace the future and succeed, in a rapidly evolving digital environment.”

The CfE grew out of a significant track record of entrepreneurship research and practice at The Manchester Metropolitan University Business School, a theme which has grown into working directly with 2500 small firms in the last twelve years, winning over £40M of funding and supporting creation of over 550 jobs in small firms.

The Centre has a significant footprint in the UK's Northwest, leading consortia of several universities and private sector partners.. We have pioneered a collaborative, interdisciplinary approach to supporting small firms to undertake technological innovation, embedding and exploiting technology for business growth.

We aim to transform SME success in the North West through the injection of university research and expertise, particularly around technology adoption and diffusion, where access to technology is possible, but business skills to embed, upskill and adopt that technology means that businesses are not achieving their potential. The Centre for Enterprise is currently undergoing a crucial period of change, moving away from structural funds to Innovate UK funded technology specific projects, as well as developing new interdisciplinary projects with other academic areas, including art and fashion. Learning points may be around our methodology, our blend of academic and professional services teams for success, and we are keen to gain insight from colleagues across the world working in entrepreneurship and small firm growth.

This practitioner paper will outline some of the Centre for Enterprise's approach and methodology, and will discuss our current period of change, as a specialist knowledge exchange centre within a large university.

## **2 The Centre for Enterprise approach**

The Centre for Enterprise was set up by Professor Ossie Jones in 2012. Jones had developed the concept of strategic space, which enables owner-managers 'to focus on strategic renewal and change'. Strategic space recognises the need for SME managers 'to have the resources, motivation and capability to engage in critically reflexive processes to review and revise organizational practices to accomplish learning and transformation' (Jones et. al, 2010).

Building on this seminal entrepreneurship work, Professor Julia Rouse's research further developed the evidence-base by examining financial barriers for disadvantaged entrepreneurs, with results applicable to all SME owners. The acquisition of social capital, specifically through large networks, bonding ties, trust, reciprocity, obligations and expectations, is shown to be crucially important for entrepreneurs (Rouse and Jayawarna, 2006).

Recognising the importance of both social capital and the strategic space to "work on the business, not in the business", The Centre for Enterprise has focused on developing innovative SME support programmes reinforced by robust research. These initiatives explicitly develop cross-disciplinary peer group network building, rather than the more traditional business one-to-one support focus.

We now detail 3 key examples of our approach to working with small firms.

### **2.1 The Centre for Digital Innovation (CDI) InnovateUK Innovation Accelerator Project**

The Manchester Metropolitan University, through the Centre for Enterprise, leads this project. It also has academic partners in the University of Manchester, Lancaster University and the University of Salford, as well GM Colleges – the consortium of

further education colleges across the ten boroughs of Greater Manchester. The project also has over ten key industry partners, including Barclays Bank and Jacobs Engineering.

CDI recruits firms to a suite of innovation development workshops, delivered by the Centre for Enterprise, which focus on “soft skills” of business innovation, within a technological context. Businesses can then move on to developing a particular project within one technology from AI, Cyber, Industrial Digitalisation or Immersive Technology. They develop a technical project and bid for support from one or more of the key universities in a Tech Panel. Businesses can also go straight to the Tech Panel stage of the project. The project recognises the importance of innovation and business leadership skills in the development of innovative technologies. This is a current project, due to end in 2025.

## **2.2 PrintCity Network (PCN) (2020-23) – European Regional Development Fund project – 2020 - 23**

This project focused on advanced/digital manufacturing sector and supported 142 SMEs. Whilst all 142 were working on innovations focussed on advanced manufacturing technologies, 70 were specifically classified as manufacturing, engineering or production through their SIC code. The project was highly successful, through our unique approach to project delivery, from the 142 SMEs we were able to evidence 28 new to market products/services and 76 new to firm products/services.

A key principle of our projects is that innovation is not a single event, and that it requires the business to proactively engage with their ecosystem of customers, business support/ training organisations, grant providers and supply chains. Mapping and incorporating this into delivery enabled the PCN project to become an active agent within the existing stakeholder network of innovative organisations and strategic support providers, enhancing the opportunity for local business. It was embedded into the local ecosystem and connected businesses to the best support available post-project. This was, in part, achieved through a cross-cohort workshop session, introducing the businesses to key stakeholders, such as Innovate UK, the Growth Company and Made Smarter, that might be able to support their ongoing innovation activities.

As a research institution, we are able also well placed to inform businesses of the latest technological opportunities for innovation and product development. In the case of the PCN project, this involved access to state of the art, industrial grade 3D Printing, scanning and immersive digital technologies which were used to support SMEs with their innovation ambitions. Typical projects involved streamlining production, producing lean prototype's, creating digital twins and adopting digital manufacturing as an alternative to outsourcing production abroad.

During the PCN project we engaged and partnered with stakeholders, such as the Northern Automotive Alliance, Made Smarter, Greater Manchester Chamber of Commerce and the Growth Company, to get their support for our recruitment activities.

The success of the PrintCity Network project, in creating 28 new to market products/services and 76 new to firm products/services, was recognised at the 2023 Educate North Awards with the Business collaboration and partnerships award.

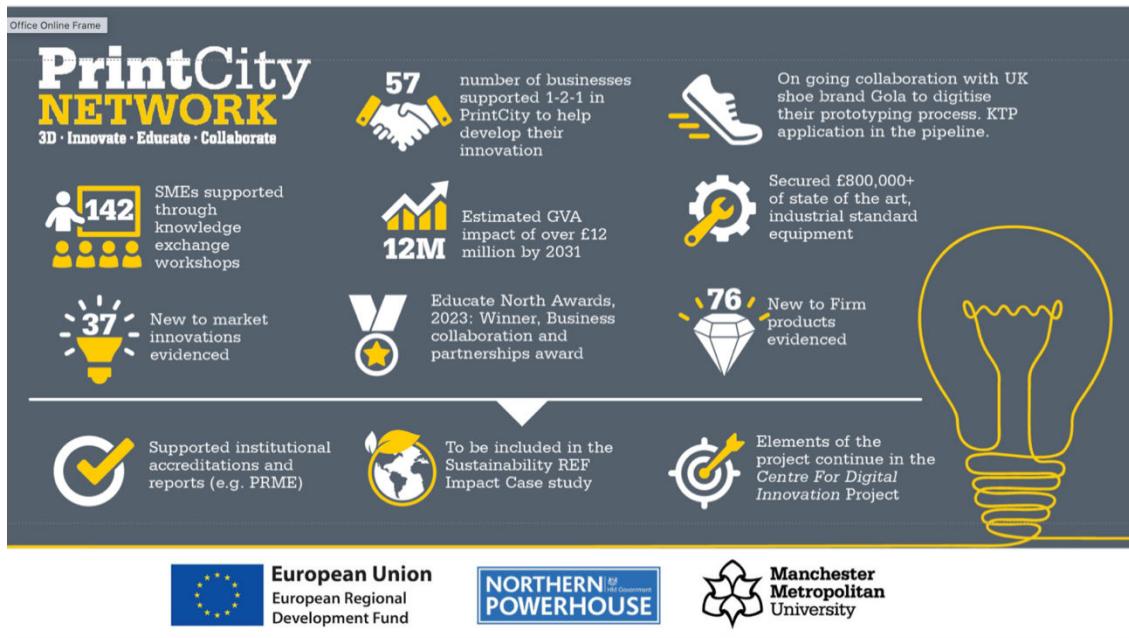


Figure 1- Print City Network project summary

### 2.3 Eco-I NW project (2020-23)

This was a partnership between six research institutions, including Manchester Met. The CfE developed an innovative approach to decarbonisation and resulted in 100% of delegate businesses developing a sustainability/decarbonisation action plan. We delivered our programme through workshops of 10-15 businesses, which builds a network of businesses developing their sustainability strategies and creates opportunities for peer support and collaboration - groups have continued to meet and support each other beyond the lifespan of the project. The project was delivered in an inclusive way, enabling all businesses to identify opportunities for change, creating CO<sub>2</sub>e reduction in their businesses.

Businesses reflected on their own operations and identified the most CO<sub>2</sub>e intensive activities, which would present opportunities for change and innovation, without the need of an external carbon account. This approach enabled over 100 SMEs to develop a sustainability/decarbonisation action plan with short term (3 months), medium (12 months) and long-term goals (12 months +). Long term innovations required the support of specialists and the project evidenced 26 of these innovations. An example is how the

project supported a footwear manufacturer to identify the opportunity to innovate with immersive technologies to replace the production of physical prototypes. The development of digital twins removed the need to produce over 4,000 physical prototypes per year, in South-East Asia, saving the business significant time, money and over 66 tonnes of year on year of CO<sub>2</sub>e. This overall approach enabled us to evidence 26 low carbon innovations, which were all significant transformations within the business. These enabled us to evidence 690 tonnes of year-on-year CO<sub>2</sub>e reductions, within the limited time frame of the project, with more significant long-term impact projected.

Our structured approach involves having business development and marketing professionals as integral parts of the team, ensuring a self-sufficient approach to recruiting businesses to the project. A key part of our recruitment strategy is to run awareness raising seminars, both in person and online, to help generate a pipeline of businesses. We also partnered with other organisations to support our recruitment activities, such as Cumbria Chamber of Commerce. This collaboration enabled us to recruit and support over 40 businesses in through two cohorts delivered in Penrith, outside of our usual catchment area.

The success of our Eco-I NW project, was recognised at the 2023 Triple E awards in Barcelona with the European SDG Initiative of the year award and the PraxisAuril KE awards with the Net Zero collaboration of the year award.

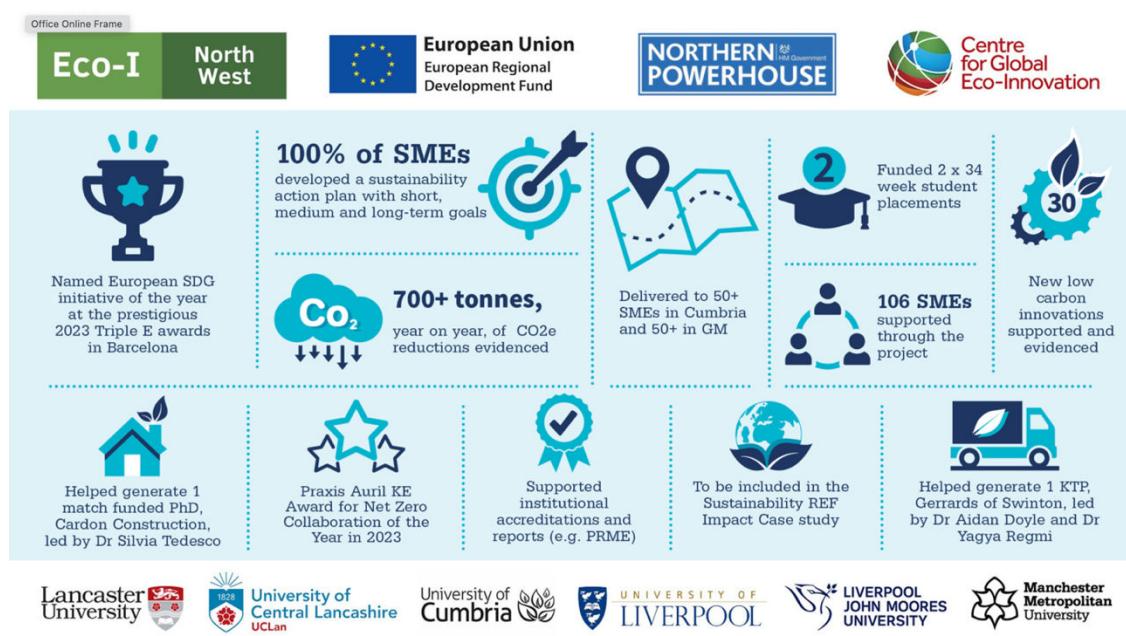


Figure 2 – Eco-I North West Project Summary

Throughout our work with SMEs, we have developed a tried and tested methodology to identify and exploit an individual business' innovation potential. This is achieved by helping them to understand the key principles and lean approach required to increase the odds of successful innovation, embed a repeatable process and understand the market opportunity that drives innovation. This is developed into an action plan to support the business in the delivery of their innovation to market.

This delivery is grounded in science, particularly the theories of *Effectuation* and *Diffusion of Innovations*, as well as "strategic space" – the participants develop as a cohort, attending workshops that consist of interactive, practical exercises. Through this process the participants can identify actions that can be executed to bring innovation to life within their business. From our underpinning research, we know the power of social capital and networks that are crucial to small firms' success, and our cohort approach (generally 10-15 businesses) germinates these relationships, which last long beyond project end. This approach has proved to be highly effective, creating significant economic impact.

In addition to 'innovation readiness' and technical expertise the CfE also has an experienced project and financial management team dedicated to working proactively with funders to manage each project within time and budget constraints. We also have a team of professional marketers and industry engagement managers to ensure programmes are effectively promoted and recruited to as well as research expertise to evaluate and assess impact.

### **3 Conclusions and recommendations**

The Centre for Enterprise has undertaken a significant number of European Regional Development Fund (ERDF) projects from 2012-2023. With the cessation of this fund in England, the Centre for Enterprise has evaluated its approach and has attracted new funding pots from UK government, Innovate UK and local authorities in the UK as well as the Shared Prosperity Fund (SPF) which is the UK government's "replacement" for ERDF. The benefit of this shift, including a significant change in leadership, is for the CfE to align its priorities more closely to research strengths, hence the delineation of strands into Leadership and Growth, and Innovation. While not a conclusion to this practitioner paper, we invite discussion of our approach and embrace discussion and advice as to how best articulate and understand our methods, specifically in order to support small firms and to truly exchange university knowledge with those outside the academy.

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# **Training women to ameliorate venture capital bias**

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## **Abstract**

There is a gender gap in the Canadian, US & European venture capital (VC) investment sector. VC plays a critical role for start-ups and rapidly growing companies that occupy the small and medium-sized enterprise sector. Toward the goal of improving women entrepreneurs' access to VC funding, this report provides an overview of a science-based training program, *InvestorQ&A*, which informs and equips women entrepreneurs with competencies in addressing investor questions (Q&A) posed by VC investors. Notably, training (not coaching or mentoring) helps women role play situations to secure investment funding in the entrepreneurial ecosystem and has assisted women in raising \$20M to date.

Empirical research has repeatedly confirmed the gender gap in accessing VC. Although women and men entrepreneurs demonstrate the same level of need for capital, women start-up entrepreneurs not only obtain fewer rounds of finance, but also receive less funding per round, compounding the detrimental effect on their total raised. Research demonstrates that the expression of unconscious bias by both male and female venture capitalists significantly contributes to the gender gap in venture capital as investors pose different questions to women than they do to men during typical Q&A sessions.

Findings are derived from the pilot participants' and ecosystem partners' observations of a program designed to prepare women to manage investor conversations. Forty-seven pilot participants and an additional 152 women founders from across Canada and the US have participated in *InvestorQ&A* training. Ecosystem partners who commented on the program include venture capitalists, incubators, accelerators, university entrepreneurship centres (ECs), and government departments and agencies. In total, 60 people from 29 organizations advised and consulted on the science-based objectives, purpose and method of the training.

The report concludes with the following recommendations to improve women's access to VC funding:

1. At the macro level, policy orientations should recognize and acknowledge the bias with evidence-based professionalized training about unconscious bias for: a) ESOs working with women, and b) limited partners, venture capitalists and competition judges intended to identify and address deep-seated preconceptions.
2. At the meso level, ESOs recognize the growing interest by their funders and donors to advancing diversity and women-oriented founder programming.
3. At the micro level, fund women-focused skills improvement with train-the-trainer and client-oriented programming delivered by ESOs, ECs, incubators, accelerators and private sector firms.

## **Keywords**

Venture Capital, Train, Women, Startup, Entrepreneur, Unconscious Bias, Implicit, Role-Play, Question and Answer

## **1 Introduction**

There is a significant gender gap in the venture capital (VC) industry. Fortune Magazine, Harvard Business Review, Academy of Management Review, Tech Crunch, Pitchbook and CB Insights all report the lack of funding for women-led startups. The background of this bias has been well-documented in terms of the proportions of finance aimed at women. Moreover, it has been convincingly traced to unconscious bias (implicit bias) on behalf of both men and women investors. Until just recently, the main problem was modestly addressed by macro actors (governments and large VC funds) allocating small amounts of funding earmarked for women-led startups. To date, this has done little to ameliorate the underlying issue of unconscious bias or its outcomes. This paper investigates a newly created training program, gaining ground in Canada and the US, which has the intent of training women founders about unconscious bias and strategies to deal with it during the investor question and answer sessions following the pitch.

## **2 Structure of the paper**

This paper begins by investigating and documenting the VC decision-making process and the barriers facing women during this process. This is followed by an outline of the evidence-based skills training program designed for women-led startups called *InvestorQ&A* and the software created to support the training. The program content focusses on the post-pitch investor decision-making question and answer (Q&A) session. The next section is a review of the method by *InvestorQ&A*'s ecosystem partners such as ESOs, venture capitalists and government actors. The report then shares the findings generated from the pilot project using a grounded theory approach to shed light on the outcomes of the training program. Finally, results from more recent editions of the program illustrate further refining improvements.

## **3 Literature review**

There is increasing concern regarding the dearth of VC raised by women. This section of the paper reviews the literature on the gender gap in VC and identifies some of the factors contributing to this gap—in particular, the unconscious bias that negatively impacts women entrepreneurs' success—and its influence on the questions posed during Q&A sessions where investment decisions are made. The goals of the *InvestorQ&A* program are based in this literature.

Venture capital plays an essential role in dense and innovative entrepreneurial ecosystems. Venture capital is part of the social fabric of interactions that provide the funding, contacts, and networks of financiers needed for growth, research and

development, validation, product-market fit, and commercialization. Being denied access to these resources dampens one advances in technology, business, and future community resources.

Education, experience, developed social networks, and industry insight are necessary qualities to be a candidate for VC. Many women-led ventures are represented in high-performing categories such as science, technology, engineering, and mathematics (STEM); information technology (IT); and deep sciences, and they have significant entrepreneurial potential and experience. Yet they continue to be less likely to be awarded VC funding than similarly endowed men-founded firms (Funding to Female Founders' Report, 2020) The loss of these financing opportunities also affects the lives of women entrepreneurs' families and diminishes the number of women founders as role models for young girls. Perversely, barriers preventing women from accessing critical financial support exist at all levels of the ecosystem (Cukier, Mo, Chavoushi, Borova 2022). Systemic discrimination and gender stereotyping, for example, even have a negative impact on the success of women and girls in pitch competitions (Why women-owned startups are a better bet 2018).

The funding divide between women and men is an empirically supported phenomenon in the literature and it is rampant in the UK, US and Canada. Crunchbase, a VC and seed technology database, reported that "In 2010, only 3% of invested dollars went to women-only founders, and in 2019, almost 10 years later, that number remained at just 3 percent" (Sheppard, Accessed April 2024).

MassChallenge, an international super accelerator, had BCG review hundreds of previous start-ups and reported that men founders averaged \$2.1 million in funding compared to women founders' average funding of \$0.9 million despite showing women-funded ventures had higher revenues and better investment efficiency (Why women-owned startups are a better bet 2018). In the U.K., the *Financial Times* has reported that women-founded start-ups receive less than 1 pence of every 1 pound of VC investment. Further results from the British Business Bank show that the odds were better for women-men founding teams, which were represented by 12 percent of the financings, although still Conley2019)only 10 percent of the value. A U.K. Treasury report indicates that teams led by women only represented 4% of U.K. VC deals (UK VC and Female Founders Report.2019).

In Canada, it is estimated that women founders receive less than 4 percent of venture capital (Alrubail, 2022). Women start-up entrepreneurs not only obtain fewer rounds of finance, but receive less funding per round, compounding the effect on their total (Why women-owned startups are a better bet 2018). Founding teams that are composed of only women are the most financially disadvantaged. The nature of the asset class means the likelihood that these ventures will survive is reduced, as they continuously strive to raise funds, spend more resources in the process, and are less likely to raise successive rounds of finance every time they are denied an earlier round.

Researchers at Statistics Canada examined the gender differences associated with a broader group—small and medium-sized enterprises (SMEs) seeking external funding—and found that the capital needs of women and men entrepreneurs are the same. Women and men entrepreneurs require and request similar amounts of funding. Thus, differences in funding levels are driven by the suppliers of equity capital. Women employing equity markets for business growth are financed at a rate of 58 cents on the dollar compared to men, not because that is what they ask for, but because that is what they are given (Statistics Canada, 2019).

The fact that women offer better performance in revenue generation and investment efficiency, yet are offered much less investment, suggests that there are biases discouraging investors from investing in women-led ventures. These biases include venture capitalists investing in men because high-growth funding goals (typical of VC) are considered a masculine trait; there is a perception that competent entrepreneurs are men; and men prefer to invest in men because they are like themselves—a concept called homophily (Brush, Greene, Balachandra, & Davis, 2018).

Proposals for systemic change are slow to alter underlying inclinations accumulated over decades of conditioning. Remedies put in place, in co-operation with the VC industry, encourage more voluntary funding for women. These include pledges to commit more financings and funding for women, or limited partners (venture capitalists' funders) encouraging minimum-women requirement codicils on funds placed with a VC general partner. Governments and mega-funds are currently establishing women-investor-led funds and women-founder VC funds. Yet the total of these changes is not expected to make a substantial change given the hundreds of billions invested or investable.

It was widely thought that the rate of investment to women would improve as the number of women investors increased. A Canadian report found that in 2019, women constituted just 15.2% of partners, 11.8% of managing partners, and 10.3% of venture partners at VC firms in Canada (Women in Venture Report, 2019). However, because the rate of women investor growth does not match that of the amount of funds under investment, the gap is actually increasing instead of decreasing. Barriers preventing women from accessing critical financial support exist at all levels of the ecosystem (Cukier et al., 2022). Systemic discrimination and gender stereotyping, for example, even have a negative impact on the success of women in pitch competitions (Why women owned, 2018).

## 4 InvestorQ&A – The Program

Highlighting the importance of improving women entrepreneurs' access to VC funding, this section describes an effective program that informs and supports women entrepreneurs. The program developed, InvestorQ&A, was designed to provide skills training to women to help them to succeed in securing VC using scientific findings

noted in the earlier section. The program's intent to facilitate a change in funding for women currently in the entrepreneurial ecosystem.

*InvestorQ&A* trains women to a) understand the startup fundamentals and to b) convert obstacle-type questions (playing it safe) into promotion-type answers (vision of the future and aspiring to achievements). It is the visionary leader and competent business builder that the venture capitalist seeks. Using automated role-play to practise circumventing negative Q&A engagements, *InvestorQ&A* equips women and girls with new skills to redirect the types of answers they provide. *InvestorQ&A* uses training, role-play, and automated science-based feedback to develop their Q&A skills.

Recently published work highlighting well-known theories and robust methodologies was applied to the VC asset class by a team of scholars with a deep understanding of VC, biases, regulatory focus theory, and content analysis software (LIWC) (Kanze, Huang, Conley and Higgins, 2018). The coherent theory of investor-entrepreneur conversations focussed their analyses on typical investor-entrepreneur conversations following the pitch. Redirecting the focus away from the pitch altered the research emphasis. The entrepreneurial pitch is a well-honed exercise that is a staple instruction in every incubator, accelerator, ESO, EC, and hundreds of other spaces where start-ups are the clients. Whereas the pitch is the subject of much curation, practice, rehearsal, and tailoring by (often) numerous ESO coaches, entrepreneurs frequently describe significant discomfort with Q&A sessions and what they will be asked. Chiefly, founders are adlibbing as there is little prescribed direction (and no known science) about what questions will be asked or how to answer them.

Venture capitalists point out, however, that funding decisions are based on the Q&A, where an entrepreneur's manner and response reassure venture capitalists that the founder has the requisite depth to build a high-growth start-up. Hence, the investor Q&A is a vital component of raising VC.

The work noted earlier confirmed some suspicions that women were being asked different questions than men (Kanze et al. 2018). Wittingly or unwittingly, investors more often ask men founders questions that incline their answers toward a self-promoting, visionary type of response. The questions asked of women, however, incline their answers toward a preventative/security-type response, situating them defensively and discussing strategies built around avoiding losses. The same research suggested a style of response behaviour that correlates with entrepreneurs who win more funding because they respond to negative questions with positive answers.

#### **4.1 Program goals & method**

Based on these findings and a well-developed knowledge of venture capital, venture capitalists, considerable student teaching, and competitive experiences, a research question posed the usefulness of deploying these findings in a role-play scenario. *InvestorQ&A*'s creation as a training regime (not coaching or mentoring) was based in

the comfort that comes with repetition such as that used in role-play. In this sub-section, we discuss the program goals and learning goals, the software content, the Console, the recruitment process, and the training/coaching approach. Using scientific findings, a team was created with specializations in VC and software to create a program specifically for women.

InvestorQ&A key program goals inform women about the nature of unconscious bias, and how to manage it. The long-term goal is to find a method that delivers better results for women, putting funding into their hands earlier, and in increasingly larger sums. This requires the system/program/method to be accepted by women, VCs and incubators/ accelerators interested in ultimately working with InvestorQ&A. We expected to work with a pilot project with later revisions as the prototype was put into practise.

InvestorQ&A contains elements of delivery, timing, content, practise, and immediate, unbiased feedback using both teaching and training. InvestorQ&A's program includes small-group instruction, business self-assessment, instructional materials, role-play software, feedback and small group-support in practicing, learning and supporting one another.

The skills-based role-play Console was designed to enable students to acquire or rehearse a specific skill with specific performance criteria (Bolinger and Stanton, 2020). The specific skill criteria were to prepare and record applied startup fundamentals while deploying conversion techniques whenever possible. These strategic skills allow women to control investor conversations. The Console prompts women to answer typical investor questions, transcribes their answers, rates the type of answers they deliver, the concepts covered, and provides them with a minimum of metrics such as the length of the answer, number of sentences, and its tone. The four goals specific to The Console were:

1. Online presence to reach the widest possible audience of women-led start-ups.
2. Automation was easy to manipulate for participants' convenience because they would have to role play regularly to make the necessary changes in behaviour.
3. Console had to provide participants with immediate feedback (within 30 seconds).
4. Feedback had to be industry-agnostic.

## 4.2 InvestorQ&A role-play mimics typical investor questions

Building a program and accompanying software, along with a strategy of how the two might be delivered in a scalable model, required the interpretation of well-regarded, long-standing theory and textual analysis methodologies. The well-regarded regulatory focus theory outlines two different strategies that an individual can use to pursue a significant goal (Brockner & Higgins, 2001; Gamache, McNamara, Mannor, &

Johnson, 2015; Scholer, Cornwell & Higgins, 2019) such as an entrepreneur starting a business. One strategy considers the venture's current situation and looks to prevent activities that threaten the safety and security of the new venture (prevention strategy). The other strategy pursues a dream that outlines the potential of a venture and the activities in which to engage that propel the pursuit of bigger opportunities (promotion strategy). Because the two names sound similar and are easily confused, we refer to them with women founders in the VC context as obstacle and aspiration strategies, respectively.

When applying regulatory focus theory to the needs of the VC asset class, aspiration (promotion) strategy questions neatly mapped onto the questions posed to men. Venture capitalists look for rapidly growing ventures with visionary founders whose financial needs exceed their means as they scale and grow to larger and larger firms. Venture capitalists ask aspiration questions to highlight how the (male) entrepreneur intends to achieve their goals.

In the typical investor-entrepreneur conversations experienced by women, more obstacle-type questions were observed. When women answer the obstacle questions as posed, their focus is on issues that do not correlate with funding, thereby putting their ventures in a negative light (Kanze et al, 2018). Venture capitalists use these reasonable, but negative, answers to justify denying funding to women and the lion's share of the funding is invested in men.

However, it is notable that the Kanze et al. (2018) research indicate that when entrepreneurs addressing obstacle questions converted their answers into aspiration responses, their start-ups went on to raise many times more in investment over the lifetime of their ventures. The skill of being able to convert negative questions into positive answers is a significant potent skill for founders.

In *InvestorQ&A* role-play engages the founder in a Q&A session and helps them develop the conversion skill that becomes increasingly easier when practised out loud. Database questions are delivered to participants with increasing difficulty to encourage founder comfort in earlier sessions (Lund, and Jolly, 2012). The role-play software allows the participant to prepare the answer and deliver it aloud. They practise the key startup fundamentals venture capitalists want to hear, and it provides a safe space for them to practise navigating away from obstacle-type questions. Because women have become accustomed to answering questions asked of them – not challenging the questioner by discussing topics not asked of them – they begin controlling the conversation. Principles of role-play scaffolding are enacted in the Console to improve women's comfort levels to participate in vocalization (Bolinger & Stanton, 2020).

### 4.3 The practice console

*InvestorQ&A*'s Console design assists women to deliver practiced startup fundamentals during investor Q&A sessions. Women become familiar with the startup fundamentals

that correlate with VC funding and demonstrate qualities necessary to build a growth company which combine as the “the narrative” sought after by venture capitalists.

The Console’s private online practice location is where InvestorQ&A participants train. Participants gain access to the Console after their introductory workshop to ensure they have had adequate preparation about unconscious bias and the Console’s purpose. Women apply their company’s tailored concepts learned from the workshops, instructional material, and regular Mini Meetups. The software enables women to deliver their pitch and respond to text-delivered investor questions. Women have time to prepare answers before beginning to speak.

Feedback is available immediately and includes: the number and question text; the type of question; their conversion ability; the concepts discussed; time in seconds of each answer; number of sentences; transcripts of answers; transcripts of their pitch; and charts and graphs to show their progress over time (Figure 1 & 2). All previous practice sessions are accessible. The recommended role-play and feedback review is 15 minutes daily.

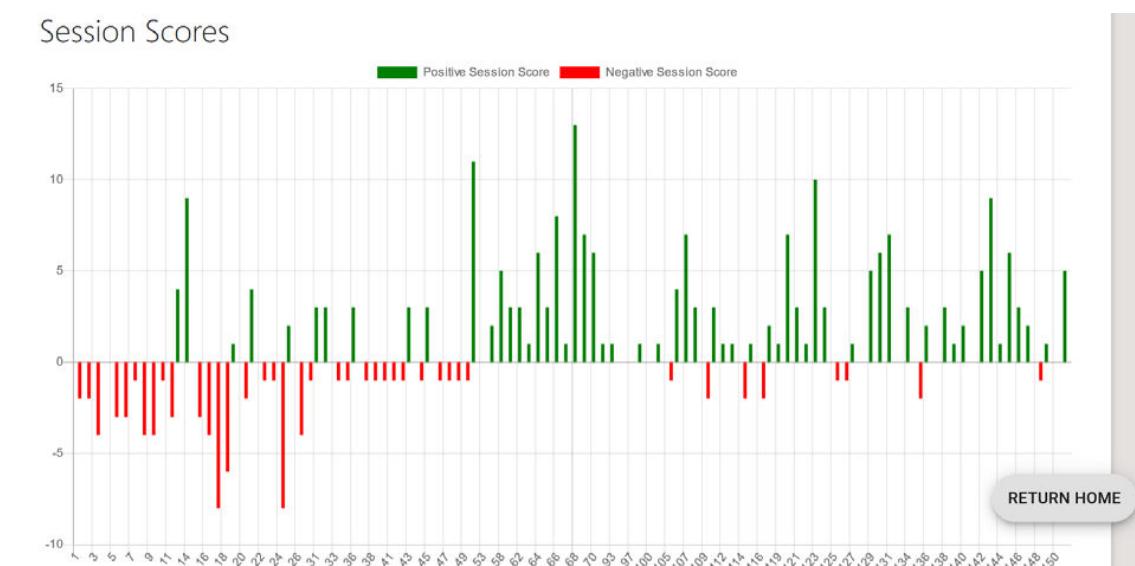


Figure 1 – Participant scores over time

#### 4.4 Pilot Participant Recruiting & Field Tests

Women founders were invited to participate in free training workshops held by InvestorQ&A in January 2022. Branded online marketing campaigns recruited potential participants and interested ecosystem supporters by driving traffic to the dedicated website, [www.investoready.org](http://www.investoready.org). Direct mail, email and social media campaigns were directed nationwide to opinion leaders, women entrepreneurs, incubators, accelerators,

ECs, and ESOs. The campaign had a heavy emphasis on diversity and inclusion, featuring different ethnicities, ages, and combinations of women.

Field testing was performed by three separate team members to ensure quality control by iterative testing (words/topics/questions were listed in the correct categories), confirming insights and testing assumptions such as randomness, and consistency of transcriptions (Coorevits, Georges & Schuurman (2018). At this stage, relevant insights allowed the team to re-engineer The Console to avoid too much complexity. Two groups of 10 students prepared under the direction of the author to attend the international Venture Capital Investment Competition New England edition in Boston in 2022 and 2023. All students were trained using concepts designed for InvestorQ&A. In the four events over two years, they won 2<sup>nd</sup> and 3<sup>rd</sup> in the Undergraduate edition and 2<sup>nd</sup> and 2<sup>nd</sup> in the Graduate edition.

The pilot was conducted with five small groups of women. After signing up, participants engaged in a small-cohort two-hour workshop where instruction information was presented. Participants were given a personal account and were led to the home page, where they learned to operate inside the Console. Entry poses four categories to select from:

- Discover - instructions, glossary and workshop collateral;
- Practise - eight minutes of questions are posed to founders;
- Feedback -where the metrics, results, and transcription of their Practice sessions are presented;
- Discord - where participants join the Investor*Q&A* Community.

During the pilot, the Console's construction lived up to the expected requirements delivering results consistent with the research goals. It was delivered online and was received extremely well by the pilot participants, who at that time were well-versed in online/Zoom operations because of the COVID-19 pandemic. It posed questions to participants and then provided industry-agnostic, unbiased feedback. The feedback was based on the key topics positively or negatively correlated with funding. Transcriptions of the participants' answers highlighted key concepts observed in their responses. The automated feedback was provided within seconds.

Following their weekly practise, women met in one-hour “meetups” where participants shared their experiences, or recent Console observations, discussed startup fundamentals and/or any recent competitions or investor meetings.

## Number of Responses

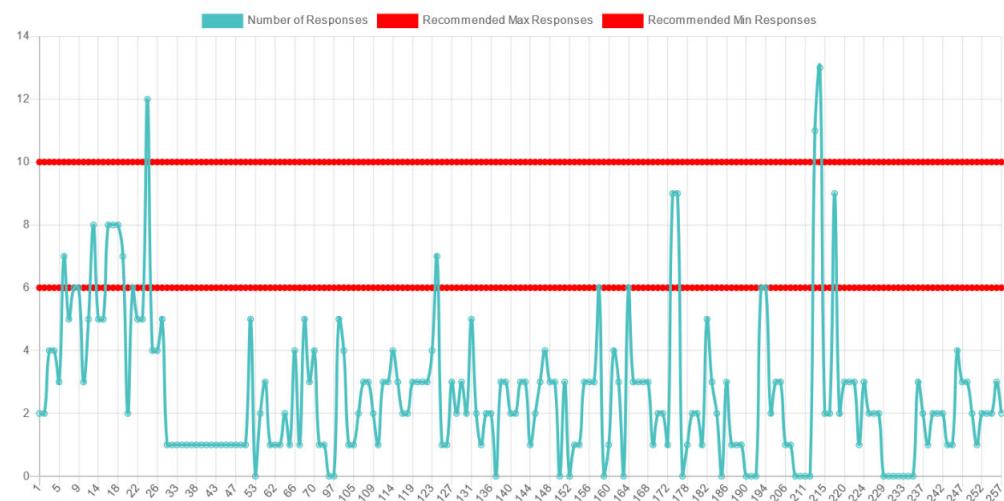


Figure 2 – Practise Response

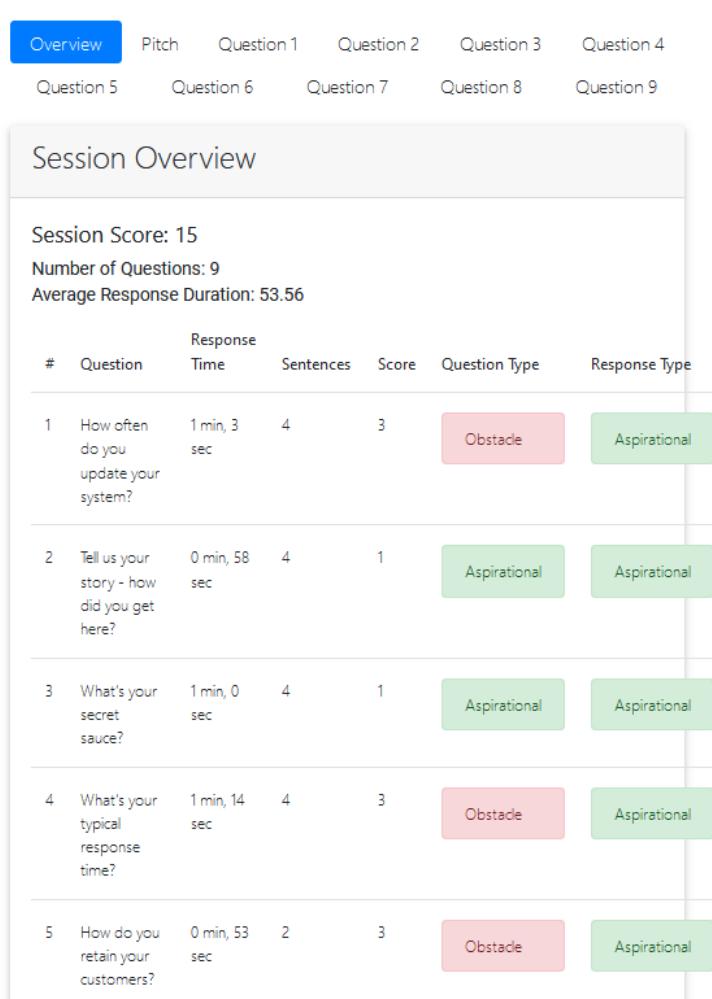


Figure 3 – Conversion Capability

## 5 Ecosystem Partner Observations

The women participants and ecosystem partners were consulted about their observations and feelings about the program. Ecosystem partners are those organizations that would be working with, or supporting, women who would be expected to benefit from the training. Because venture capitalists, women founders, their families, and society have much to gain from successful and successive investments into women-led firms, these organizations were consulted for their insights and observations about the method, the findings and the Console. Those observations are solicited from four principal groups: the participants; ESOs; venture capitalists; government/agency organizations; and national business organizations. Open-ended conversations allowed participants to freely chat about InvestorQ&A, problems as they saw them, potential improvements, their likely use of the training, and the potential rewards of the program. Table 1 outlines the various constituents consulted about InvestorQ&A and their comments. A total of 60 different people from the 29 organizations were part of the consultations about the objectives, the purpose of the training, the role-play Console, and its capabilities. This paper outlines the comments of participants, venture capitalists and ESOs.

TABLE 1

Ecosystem partner organizations

Venture Capital Funds (18 Participants)	Incubators/Accelerators/ Entrepreneurship Centres (16 Participants)	Government Departments/Agencies (17 Participants)	Others (7 Participants)
Six Bridges Capital, N.Y.	Centre for Entrepreneurship Education and Development	Atlantic Canada Opportunities Agency	Canadian Council Small Business & Entrepreneurship
Innovacorp	Centre for Women in Business	National Research Council	TD Bank
New Brunswick Innovation Foundation	Creative Destruction LabVolta	Business Development Bank of Canada	Deloitte
Concrete Ventures	Genesis	InBC Investment Corp.	National Post
Build Ventures	Junior Achievement	Innovation PEI	Small Scale Food Producers Association
Relay Ventures	Memorial Centre for Entrepreneurship	Nova Scotia Business Inc.]	
Natural Products Canada	Saint Mary's University Entrepreneurship Centre		
Venture Grade Student Investment Fund	Propel		
Sandpiper Ventures			

Table 1 – Ecosystem Partner Organizations

**Participants:** During and after workshops, participants were excited about the opportunity to work with InvestorQ&A. Zoom's chat function allowed participants to have conversations while the workshops and meetups were progressing. Many candid

conversations were found in the chat function following meetings. Almost all conversations observed among the workshop participants were beneficial and supportive. Here are some notable comments made by participants:

- *I've done many pitches; this is absolutely amazing. I went to a lot of pitch workshops, and this alone tops them all! Prepping for Q&A was always something that I struggled [with].*
- *Immediately beneficial feedback. Gotta love that!*
- *It is amazing!!*
- *Q&A always is my challenge in the pitch.*
- *It's a constant struggle to overcome things that were 'baked into' us.*
- *In just this first 10 slides, I have had a radical shift in thinking; I have always been apologizing for raising money because I felt inadequate for not being able to build the company on my own.*

**Venture Capitalists:** Eighteen different venture capitalists from nine different venture capital funds spanning from Montreal to New York observed the workings and science of InvestorQ&A. The objective of training women to lead the conversation, instead of being led, was recognized as a valuable strategy, as was the ability to convert obstacle questions into aspirational answers also endorsed. Two well-known venture capitalists, as well as the New York venture capitalist, indicated very similar sentiments about the lack of a narrative and the need to sell the business rather than the product. One venture capitalist suggested that even if the training did nothing but help develop the narrative, it would be a useful outcome. Men, they recognized, were often not good at this either, but they see *lots of men* so the concept of creating a program specifically for girls and women was seen as a significant value proposition. In terms of getting ahead of the criticism that the industry is facing as a result of the women's funding crisis (outlined earlier in this report), all but one of the venture capitalists were prepared to endorse an instruction and training regime pilot such as the one created here.

Below are some of the individual comments from venture capitalists:

- *In my view you're hitting the nail on the head by helping to develop a skill set critical to fundraising.*
- *If this does nothing but help women view the business side of the business, it will have done enough.*
- *Q&A is critical. They need to weave a story rather than jumping all over the place.*
- *They need to visualize their progress; reinforce that they're moving in the right direction.*
- *I like this approach; I want to help.*
- *It's a performance, unfortunately. They need to weave other aspects into their answer.*

- *This is a pretty cool focus on Q&A. It takes self-study to a new level.*
- *Responding naturally and quickly to a question gives the VC comfort that the founder has a depth of knowledge.*

**Incubators, Accelerators, and Entrepreneurship Centres:** Incubators, accelerators, and ECs are ESOs financed with government and sponsor funding mandated to support the development of start-ups. These vital ecosystem organizations develop programming that fosters an understanding of the process and necessary steps for startup success. Their programming includes: mentorship, advice, financing, networking, small grants or investments, and competitions.

The 16 participants from eight support organizations provided deep insight into the difficulties that their organizations face. Participants included CEOs, directors, and programming managers. Some have changed their business models or updated their brands, and some are looking for a bigger impact. Their programming sees varying degrees of engagement, application, and progress for the clients they serve.

These organizations are trying to invest in more women programming in light of the controversy about women and VC. One key challenge they shared is the difficulty of finding/developing new, or in this case evidence-based, programming. Most of the programs they offer are derived from the experience, background, viewpoints, and suggestions of former successful (or sometimes unsuccessful) entrepreneurs, venture capitalists, and former founders. Participating organizations were optimistic about InvestorQ&A potential. Their CEOs recognize that their clientele is often more than 50% women; however, their results with women raising funding are nowhere near those proportions.

- *Support groups are defined by their programming; they are always looking for new programming. It helps them justify their funding levels.*
- *Two groups struggle with seeding their companies—newcomers and girls.*
- *We really wanted to make sure that women had an edge when they were pitching for venture capital, and this is the key to adding that piece to our Grow Now program.*
- *I am not surprised that [the author's] research has led her to develop a program that has the potential to have a major societal impact.*
- *It's like taking music lessons. You learn new material, you go away and practise it all week, and then you go back to your music teacher and show them what you learned.*
- *You should be showing this to Sheryl Sandberg and Melinda Gates.*

## **6 Limitations**

There are several limitations of the study. There is a lack of comparison data for training because most instruction aimed at entrepreneurs is heavily personnel-laden coaching and mentoring. Second, this program has been specifically positioned for women due to the well-documented lack of VC for women-led start-ups. It is unclear whether this program could achieve similar outcomes for other specific equity-deserving groups or mainstream groups. Future studies in this area could be adapted to test outcomes with various groups of entrepreneurs to compare the results.

## **7 Conclusions**

Evaluating significant science and interpreting it into a format that is digestible by women addresses the barriers to accessing VC finance. The InvestorQ&A program highlights one method of improving women entrepreneurs' access to VC funding focusing on the demand side of the equation – their requests for VC funds. Providing women with strategies to best prepare for and deliver important information about their startups, at the same time as dealing with unconscious bias is a proven model to accomplish this goal. The training model is offered as the remedy to over-coached, over-mentored programs that are easy to listen to but do not require significant effort.

This review of women's growing successes with professionalized training and their improved experiences with investors and outcomes sheds light on a method that delivers real value. The InvestorQ&A program provides support for women to prepare for the investor Q&A sessions where investment decisions are made. Using this method, women learn about unconscious bias and how it plays out in VC situations, understand the biases behind certain questions and role-play inside the Console for feedback.

Ongoing small-group support helps them develop strategies to manage the key fundamental constructs that venture capitalists want to hear discussed for investable startups. Her ability to control the conversation directs post-pitch Q&A sessions towards meeting investor expectations.

Based on this experience with women entrepreneurs, the following recommendations are intended to suggest practical steps that can improve women's access to VC funding.

At the macro level, policy orientations should recognize and acknowledge the bias: a) evidence-based professionalized training for ESOs and other ecosystem partners regarding the issue of unconscious bias and potential remedies, and b) evidence-based professionalized education for limited partners, venture capitalists intended to identify and address deep-seated preconceptions.

At the meso level, ESOs recognize the growing interest by their funders and donors to advancing diversity and women-oriented founder programming.

At the micro level, fund women-focused skills improvement with train-the-trainer and client-oriented programming delivered by women business support organizations (ESO), ECs, incubators, accelerators and private sector firms.

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# **"Wake Up! Design matchmaking" between students and young companies of the "New Made in Italy"**

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## **Abstract**

"Wake Up, Design Matchmaking" is a groundbreaking educational initiative spearheaded by Fiera di Parma, uniting 90 students from Politecnico di Milano with peers from two esteemed Chinese institutions, namely the Beijing Institute of Fashion Technology and Jingyan University. Together, they collaborated with 15 emerging talents from "New Made in Italy" companies.

Under the guidance of two professors of the Politecnico di Milano, along with two professionals from Fiera di Parma, and under the supervision of the Delegate of the School of Design for relations with companies, the primary objective was to bridge academia and industry, fostering innovation in fashion. The focus lay on nurturing a "New Made in Italy" ethos rooted in sustainability, cultural fusion, and contemporary craftsmanship.

This collaboration aimed to facilitate a knowledge exchange between students and companies. Students tackled real-world market challenges, while companies absorbed innovations from the academic sphere. Key areas of exploration included upcycling collections and platforms, sustainable practices in fashion design, digital manufacturing in fashion, the creation of innovative retail physical and virtual models and the development of digital viral communication strategies for European and Chinese markets.

This project stood as an extraordinary experimental creative forge, fostering collaboration and innovation in the "New Made in Italy" that transcended national boundaries. Students contributed tangibly to shaping this new paradigm, collaborating with small companies, creatives, entrepreneurs, and autoproducers committed to innovative, sustainable models rooted in Italian tradition.

Within this collaboration, university-generated knowledge intersected with contemporary productive reality, transforming students into dynamic catalysts for change in the national production landscape. Design students and professors acted as mediators between diverse cultures, facilitating a global and interconnected reality where different heritages coexisted in the local design process. As a result, this initiative propelled a new creative wave, amplifying the global impact of the "New Made in Italy".

The projects were completed thanks to the final exhibition held at the Parma fair, which was held together with two days of edutainment with talks and workshops on responsible fashion and the New Made in Italy. For this occasion, a practice-based publication showcasing the project's results has been produced, defining the main aspect of the New Made in Italy movement and underlining a replicable model in the field of university-companies cooperation.

This collaborative model holds potential as a replicable framework for universities in Italy and abroad. It applies across various design fields, connecting local companies with student innovations, fostering creativity and practical application.

The main goal of this paper is to analyse this framework in order to explore their possible further developments such as the implementation of other pilot projects in other design fields and countries and the creation of a design toolkit in the field of design for local impact.

## **Keywords**

Design matchmaking, New Made in Italy, creative networks, local impact design

## **1 Introduction**

The transformations that have occurred recently in the fashion industry, as a result of globalization, the rapid development of countries considered formerly of little economic interest, and the entry of the latter into the market at highly competitive prices, have generated a new global competitiveness. Hence the need to redevelop the territory and local realities through the enhancement of cultural resources and the creative class, which represent the soul of the city and the engine of economic development (Pagani 2010). The Italian territory has always been characterized by the presence of a network system of actors: companies, universities, fairs, and exhibitions, places of sales and promotion that collaborate in a creative collaboration typical of Made in Italy. In recent decades, there has been a shift from the concept of the traditional industrial district to that of collaborative networks, complex and integrated ecosystems where creative and productive enterprises work closely together, carrying forward common values and instances.

Being competitive in world markets and, at the same time, expressing the territory's identity is a very complex goal for companies of modest size (Bedeschi, Marseglia Trivellin 2008), which is why various entities such as universities and trade fairs are posing as promoters of the new territorial creative networks in the field of fashion and design.

The creation of experimental projects that feature excellent small businesses as protagonists allows them to make leaps in innovation that make them competitive with large, established brands. Expanding the system of territorial relationships appears increasingly necessary to meet contemporary technological and social challenges (Bedeschi, Marseglia Trivellin 2008).

Through research-action projects, bringing together international students with young creative companies, the School of Design of the Politecnico di Milano collaborates on the work of New Made in Italy business networks, infusing them with the innovation produced by the academic world in a perspective of promotion and development of the territory and an opening to international markets. "Wake up!" is an experimental research-action project that generates systematization, creative collaboration, promotion, and international development of New Made in Italy promoted by Fiere di Parma in collaboration with the Politecnico di Milano. The university, which has always collaborated with other universities in emerging countries, welcomes foreign students to work in contact with Italian companies, opening them up to the world of globalization and new growth markets, increasing their competitiveness worldwide. The Fair becomes the pivot of a territorial system generating experiences, contacts, links, and visibility in

local, national, and international contexts. Universities and fairs thus play the role of centers of innovation and promotion of small creative excellence in fashion and design, which through them come into contact with the challenges of global competition.

Through a practical experimentation in the fashion field the "Wake Up!" Project creates a new model of action research project based on the collaboration between universities creative networks of fashion and design companies and fairs of the territory in order to promote of the creative and productive reality of a country.

The main goal of this paper is to outline a replicable and exportable action-research model to be applied in many different design fields, territories and countries.

### **1.1 The structure of the paper**

The structure of this paper consists of 7 different sections:

1. **Context definition:** This Section aims to explore the main aspects of the contemporary scenario in the Italian design-driven production in the fashion field and the role of design universities in innovating the Italian fashion system.
2. **Explication of the main goal of the paper:** This Section clarifies the primary goal of the paper, which is to define a replicable action research model in the field of design.
3. **Project framework** explanation: This section defines the method used to conduct the "Wake Up!" Project, its pillars, and aspects related to replicability.
4. **Empirical results:** This section highlights the practical outcomes of the "Wake Up!" Experimental workshop, such as the projects developed by the students, the exhibition and edutainment event, the publication of a book, and the creation of new job opportunities in the companies for the students.
5. **Main results:** In this chapter, the main goals of the project, such as the promotion through design of new sustainable and creative economies of a country, are underscored.
6. **Conclusions:** This section outlines a role for design universities and design students in promoting sustainable, productive, and creative networks within the territory.
7. **Limitations, recommendations** for similar projects, **further research**, and **new collaborations:** This section discusses limitations, offers recommendations for similar projects, suggests areas for further research, and proposes new collaborations.
8. **Future steps:** This section underlines the future steps of the project, its replicability in different design fields and territories, and potential partners.

## 2 Context definition

The delocalization of production, creative competition between countries, and emerging markets are reshaping the production and consumption scenario in the fashion and design fields. The Italian socio-productive fabric has historically been characterized by diffuse entrepreneurship based on small and medium-sized enterprises grouped in territorial districts, homogeneous by product category and carriers of widespread know-how. Notably, in the Emilia Romagna region, there's the productive district of Carpi known for knitwear and ready-to-wear production; in Tuscany, the Prato district is renowned for textiles, ready-to-wear, and leather; and in Campania, the sartorial district of Naples and the silk district of San Leucio. These traditional districts have evolved into creative and productive territorial networks, characterized by common values and practices.

In recent years, there has been growing interest in the Italian province, both from researchers exploring its peculiarities and from brands and companies seeking to engage with this territorial dimension. In the northern Italian productive areas, we observe the emergence of new promising artisanal brands related to urban subcultures. "In the field of creativity, urban subcultures are seen as innovation drivers in fashion and fashion trends" (Dell'Acqua, 2007). Subcultures in the fashion field are configuring as creative networks, composed of micro and small artisanal businesses with common features, connected by networking events and projects such as the "Wake Up!" Project.

Creative networks play a pivotal role in shaping trends, fostering collaboration, and driving innovation in the dynamic world of fashion. These networks encompass a diverse array of individuals, organizations, and platforms that come together to exchange ideas, share resources, and push the boundaries of creativity within the industry. At the heart of creative networks are designers, whose artistic vision and craftsmanship set the tone for the entire industry.

Fashion communities and networks extend beyond the virtual realm to physical spaces such as co-working studios, incubators, and fashion schools. These spaces provide emerging designers with resources, mentorship, and networking opportunities to help them grow their brands and navigate the complexities of the industry. Furthermore, events such as fashion weeks, trade shows, and industry conferences serve as gathering points where designers, buyers, media, and consumers celebrate creativity and foster collaboration.

In parallel, there's a growing emphasis on sustainability and ethical practices within the fashion industry. Sustainable fashion brands are emerging, prioritizing eco-friendly materials, ethical labour practices, and circular business models aimed at reducing waste and minimizing environmental harm. Moreover, there's a greater demand for diversity and inclusivity in the fashion industry, with calls for more representation of diverse body types, ethnicities, and cultures.

The first edition of the "Wake Up!" Project in 2023 brought together more than 180 emerging brands in a large fashion market and event at Fiere di Parma, becoming a significant networking moment for the new wave of Italian creativity in responsible fashion. It aimed to define a New Made in Italy movement based on the values of sustainability, heritage, and craftsmanship. The second edition is configured as an innovation lab, involving 15 selected brands and 3 universities: Politecnico of Milan, Beijing Institute of Fashion Technology, and Jiangnan University, School of Design. It matched 15 of the most promising brands from the first edition with 90 students from 16 different countries, divided into 15 multidisciplinary groups, to develop specific projects in fashion, communication, and interior design to address the needs of the brands. The second edition was an extraordinary experimental project culminating in an exhibition and two days of edutainment events featuring talks and workshops on responsible fashion and the New Made in Italy movement.

### **3 Project framework**

"Wake up! Design Matchmaking" is a project combining an academic workshop organised by the Politecnico di Milano with a public event taking place at the Mercante in Fiera di Parma. The learning path, starting from frontal teaching, develops into a creation, production and exhibition process.

"Wake up!" is an experimental contamination project addressed to 90 students from the Department of Design of Politecnico di Milano, the Beijing Institute of Fashion Technology and the Department of Design of Jiangnan University, coming from different educational backgrounds.

The project, launched in September 2023, involved 15 companies selected from over 100 emerging brands; it consisted of a six-month course divided into two phases: the university workshop followed by the set-up of an exhibition alongside a series of cultural events hosted by the Mercante in Fiera di Parma. The project aimed at strengthening the cooperation spirit as well as the development of innovative synergies, during the conception and production of design projects.

#### **3.1 Companies selection - A creative network in the field of ethical fashion: the New Made in Italy movement**

The project "Wake up! Design Matchmaking" has had as its main result the connection of the most promising subjects of the Italian emerging fashion that have been configured as a creative network capable of formulating projects of cultural depth together with the international students of the Politecnico.

The selection of the companies has been the strategic starting point of the whole projects, the companies that participated to the projects are:

The 15 companies selected to participate in the "Wake Up" project represent the excellence of the new wave of Italian fashion. Artisanal and innovative, digital and sustainable, they share common traits that enable the birth of creative collaborations and collective promotion and communication events.

The project could underline the characteristics of the New Made in Italy movement a new contexts in which design energies, digital fabrication tools, and alternative business, communication, and distribution models allowed a new generation of small realities to grow and influence the fashion system.

These projects have revealed common themes, shared values of what can be considered the New Made in Italy, composed no longer of traditional industrial production districts but of territorial creative networks with small productions of high aesthetic and cultural quality. A starting point of the companies' work is Heritage, the valorisation of tradition, symbols, and archives of Italian fashion, which is contaminated with cultural expressions peculiar to emerging countries, in this case, China. This gives rise to projects that are based on the cross-fertilization of cultures, the valorisation of local stylistic archetypes in a global perspective attentive to international market trends. The most significant cross-cultural aspect uniting the New Made in Italy companies is an ethical revolution in the way fashion is viewed and a critique of its development and promotion processes. The waste of resources, the accelerated seasonality of fast fashion, and unsustainable models of production and consumption are questioned. The theme of circularity in fashion emerges. Upcycling projects of materials such as leather and jeans are multiplying, giving rise to new businesses based on original models of producing unique pieces. No-season, no-size, and waste-free pattern collections are born. Service product systems based on garment rental are taking their place alongside the traditional concepts of buying and owning. Businesses are structured as networks, collaborative platforms are born that connect the different players in the fashion system: creative designers, freelancers, and local production companies. This creates new jobs related to innovative projects based on new ethical and collaborative business models. New Made in Italy companies are innovative startups that challenge old business models and invent new models of fashion production and consumption. The use of digital design and fabrication technologies revolutionizes how fashion is conceived and produced. 3D models and virtual showrooms present designs to the customer before they are actually produced and reduce warehouse and point-of-sale costs. New 3D printed elements become part of garments, contributing to a futuristic and futuristic aesthetic. Also, thanks to the use of these technologies, the small independent manufacturer becomes a great innovator, bringing new content to fashion that puts it on the same level as established brands. The enterprises of the new Made in Italy work in networks, exchanging contacts and information, creative cues, and promotional strategies. They use events such as the exhibition at the Fiera di Parma to present themselves to the public as active players in the area. They can express the full creative potential of a

country that has been able to renew itself and interact with the current social, ecological, and cultural challenges of the globalized world.



Fig. 2: *Cantoprimo* company lookbook

### 3.2 Workshop development

The workshop lasted 4 months, from October 2023 to January 2023, involving the lifestyle and fashion course at the Department of Design of Politecnico di Milano, in collaboration with two Chinese universities: the Beijing Institute of Fashion Technology and Jiangnan University, Department of Design. Alongside the main workshop, students from the two Chinese partner universities attended a parallel workshop to deepen their understanding of the values of "Made in Italy" and its internationalization potential. Initially, 15 teams of 6 students were formed: heterogeneous groups with complementary skills in terms of sensibilities and specializations, "matched" with a brand. The 'balanced' lineup of the teams and streamlined management were critical factors.

In the first lesson, a co-design session took place where brands introduced themselves to students and explained their design needs, ranging from new product development to digital communication strategies for Italian and external markets, as well as promotion and sales space design. Subsequent lessons at Politecnico provided the appropriate habitat for turning creativity into products, fostering teamwork integrating experiences, cultures, and intuitions while working in line with sustainability goals.

The 15 teams interacted with important design-production companies and workshop partners of the involved brands. Four hours a week in the classroom were dedicated to

developing theoretical-practical aspects of works in progress, also discussed through professionals' storytelling. Student-brand interaction resulted in 36 projects, assessed during the university examination, covering textile and digital products, accessories, graphics and visual identity, commercial and web strategies.

At the final review, companies involved and the fair's team were impressed by the outputs of the students, which were coherent with the brands' style and values while bringing significant innovations. The output projects were presented at the Mercante in Fiera di Parma in March 2024 as part of a two-day cultural event. Students actively collaborated in designing the exhibition, finalizing layouts, graphic projects, catalogue writing, and social media content production, learning crucial presentation and promotion skills.

The teaching and coordination activities, in line with academic standards, enhanced young talents and impressed brands. By following the design match-making approach, students and companies pushed the boundaries of creativity, contributing to the development of a new sustainable concept of Made in Italy.

The parallel course continued collaboration with Italian companies, overcoming cultural and communication barriers and developing new fashion products based on values of cultural contamination and sustainability. Students also had theoretical lessons on ethical fashion movement, sustainable materials, and cultural heritage in fashion.

The final event at the fair included the exhibition with workshop results and two days of edutainment with talks and practical workshops on Made in Italy, sustainable fashion, and Italian heritage. At Fiere di Parma, students actively participated in building the exhibition and attending talks and workshops, solidifying their knowledge and collaboration with the New Made in Italy.

For all participants, "Wake Up!" was a very intense experience, from a creative, project-based, and human point of view, creating new collaborations and a real creative network within the companies.

As a conclusion of the process, Politecnico di Milano and Fiera di Parma published a practice-based book containing workshop results and theoretical contributions from Politecnico professors about the New Made in Italy and the definition of an action research model in the design and fashion field. The fair was satisfied because through this action and the edutainment event, they could assume a new cultural role in promoting the creative forces of the territory and repositioning their brand.

### **3.3 University-industry collaboration**

The matchmaking between companies and students in the "Wake Up!" project underscores the university's role as an innovation driver in a strategic sector like the fashion system in Made in Italy. University administrators must recognize the imperative to revitalize curricula, emphasizing real-world learning and providing a

contextual framework for developing updated social competencies. In today's competitive landscape, designers must possess not only creativity and innovation but also business competencies. Integrating design and business is critical for success, fostering superior dynamic performance across industries. It's evident that enhancing the interconnectedness of design and business in contemporary education is crucial.

There's ongoing discourse about strengthening ties between academia and industry, highlighting the vital role universities play in supporting the evolution of the design industry. Effective university-company collaboration is increasingly indispensable amid significant shifts in the design sector. However, there's acknowledgment of the growing gap between skills imparted in universities and those demanded by the labour market. Relevant education must be customized to meet students' needs and align with company needs. Departing from the current design education model, adopting a flexible and synergetic approach is necessary to accommodate today's students' study and work responsibilities.

The model proposed by the "Wake up!" project, involving real and consultative collaboration between Polytechnic students and New Made in Italy companies, aimed to align companies' current requests with students' skills. This provided students with valuable work experience, sometimes leading to actual collaborations and placements.

### **3.4 International universities collaboration and cultural contamination**

Another important element of the collaboration was the cultural exchange with the two Chinese universities that is the result of a long term collaboration agreement between university institutions in the field of fashion.

The spread of fashion across diverse global cultures mirrors the evolving contours of our daily lives and emerges as a remarkable indicator of cross-cultural interchange. This phenomenon captures the intricate interplay between commercial and cultural interests, serving as a reflective channel for each country's unique identity and preferences. In today's globalized world, the fashion industry has undergone noticeable transformations. Beyond the conventional pursuit of aesthetic appeal confined by geographic borders, it has evolved to encompass a global awareness of prevailing social, economic, and political trends. Concomitant with this transformation, the contemporary job market has also undergone notable shifts and introduced novel realities that have reverberated across our higher education system. This evolving landscape necessitates a comprehensive re-evaluation of educational frameworks to align them with the dynamic demands of the modern fashion industry.

Recognizing the potential advantages of cross-cultural collaboration, it would be advantageous for students from both national backgrounds to engage in collaborative endeavours. Such interactions would facilitate mutual learning, providing students with a broader perspective and enriching their skill sets by drawing upon the diverse strengths of both educational systems.

These reflections have taken shape in two distinctive international Italo-Chinese programs. The collaboration between Politecnico di Milano and the Beijing Institute of Fashion Technology as well as a second partnership between Politecnico di Milano and Jiangnan University. An internationalized curriculum model was conceived and implemented to ensure optimal educational delivery tailored to the participants' unique backgrounds. This model comprises two complementary intertwined modules: the "polytechnic module," designed to give students comprehensive fashion industry knowledge through immersive workshops, and the "personalized module," which aims to impart tacit knowledge, fostering the development of intercultural skills among students.

One representative example of this intercultural convergence and interaction emerges through the fashion project spearheaded by Nicole Carrasco, a young Italian fashion designer and founder of the namesake brand Carrasco, in collaboration with students from the three institutions mentioned above. In this project, Carrasco discovered intriguing parallels with the traditional attire of the student's country of origin: China. Together, they embarked on a comparative exploration to unveil resonances between Carrasco, an enthusiast of Made in Italy, and the students, who cautiously broached the subject of Made in China. The outcome of this conscious collaboration is a delicate interplay that elucidates diverse identities while simultaneously engendering questions about cultural barriers and the inherent tension between two distinct worlds.



*Fig. 3: Project of the students Xiang Chen, Jiangnan University, Xinyu Hu, Politecnico di Milano, Francesca Modini, Politecnico di Milano, Mariasole Musicco, Politecnico di Milano, Yuxuan Zhao, Politecnico di Milano, Jiaxin Liu, Beijing Institute Of Fashion Technology for the company Carrasco*

### **3.5 The role of exhibitions and fairs**

The final exhibition at Fiera di Parma and the accompanying edutainment event brought the results of the experimental project developed by the universities back to the territory. This activity showcased how a fairground, with its exhibitions and various artifacts, services, and concepts, can trigger positive spillover effects and serve as a

milestone for an entire community, including non-visitors. Fairgrounds, especially when deeply rooted in their context with specific creative and manufacturing capacities, could take on the challenge posed by the new 'Design Value Framework' by advancing their exhibition design. This involves becoming socially impactful with displays, promoting research, fostering cross-fertilization, and offering ground for new sustainable concepts, visions, and pilot projects.

Italian designers have long focused on exhibition design, enhancing the "style" of Italian commercial fairs and supporting their commissioners with new creative contents, strategies, and visions. This has helped them grow relevant international networks, as exemplified by events like Salone del Mobile, Cersaie, and Cosmoprof, which initially represented manufacturing districts and now attract visitors, creatives, producers, and concepts from around the world.

In this post-pandemic rebound, fairgrounds and exhibition design could foster not only the development of design-driven innovations for manufacturing districts but also create new experiences and a "new expressive language." Through temporary exhibitions, they have nurtured a generation of Italian designers, encouraging new beginnings after the war.



Fig. 4: Farma282 company stand at Fiere di Parma

## 4 Empirical results

The 90 students from the Lifestyle and Fashion course at Politecnico di Milano collaborated with 15 emerging New Made in Italy brands, developing 36 projects in various design areas: fashion, communication, and interiors. The interdisciplinary groups, comprising individuals from 16 different nationalities with a substantial Chinese component, were formed to match diverse technical skills and expertise with the varying needs of the involved companies.

Each company chose to focus on different aspects, primarily involving communication and fashion, as well as store design in both physical and virtual dimensions. In the communication realm, projects spanned from established activities such as rebranding company logos and corporate identities to redesigning websites for improved usability. Additionally, there was a strategic study of promotion through social networks in both European and Chinese markets. The students acted as real consultants for brands, enhancing their reputation on social media, producing promotional videos, and coherently aligning their aesthetic and cultural vision.

In the fashion domain, projects were developed under the banner of cultural contamination, where companies and students collaborated on archetypal garments from both cultures as inspiration for new designs aligned with global market trends. Many projects involved upcycling, including shoes crafted from leather scraps from the Prato district, new collections in recycled denim, and garments made from reused linen towels.

Interior designers focused on point-of-sale design, ranging from pop-up stores as low-cost promotional and sales tools with high communicative impact to virtual showrooms for the presentation of collections entirely made from 3-D modelling. Digital and digital fabrication technologies were widely used for the representation and design of products, such as shoes or statues, and integrated into the fashion project through the insertion of special 3D printed elements.

The students actively collaborated in the production of the exhibition, showcasing the creative energy of New Made Italy.

The student's projects, the exhibition, the book and the edutainment event are the most important empirical results of the project. They showcased to a whole public the innovations produced by the university in collaboration with the brands and they gather and promoted the New Made in Italy movement.

#### **4.1 Main results**

In recent years in Italy there has been an increasing interest in entrepreneurial projects in the fields of creativity (design, fashion, media and music) conducted above all by young people who, unlike the recent past, often manage professional activities with a managerial vocation built on basis of a careful and planning reading of the reference market (Casati, 2004)

This projects worked with new brands and creative networks that have a role of innovation engine in the fashion and design productive system.

University as well has the role of innovation driver in the cultural and productive panorama of a territory.

The main result of this paper is to define an action-research model in design and fashion field based on the collaboration of university with emerging creative networks and the promotion of the sustainable productive and creative wave of a territory.

Design students have become engines of innovation for a sustainable creative local economy and have taken on new roles in 'designing networks' based on the creative economy and local production.

Another important result is to identify new roles for a designer in local impact project:

- designer as creator of networks
- designer as innovator of businesses
- designer as creator of identity
- designer as local brand strategist

The paper is structured in three main parts:

The contextualization of the project and definition of creative networks in fashion fields as innovation engines of the Italian cultural productive system.

The definition on an action-research model replicable model based on the experience of the "Wake Up!" Projects. The main pillars of the project are the collaboration between creative industries networks and students from the university in order to develop innovative solutions, the collaboration with international universities in order to introduce the companies to the global markets, the final exhibition and cultural event at the fair in order to give back the results of the project to the territory.

The results analysis and the final considerations about the replicability of this model to others local contexts and design fields.

In conclusion "Wake up!" has been much more than an experimental educational project; it has been a format of a territorial development project through design that can be replicated in different local and productive contexts featuring emerging creative enterprises, universities, and local fairs as protagonists. Several aspects ensure its success; firstly, a careful selection of the most promising creative enterprises in Italian emerging fashion carried out by Fiere di Parma as early as the 2023 edition. Next, the involvement of the university provides the innovation skills of its best international students and the relationship with Chinese universities. This leads to the creation of projects in the fields of fashion, communication, and interiors with high innovative and cultural potential. The continuous relationship with the productive territory on the one hand and with the world of research on the other allows the district to detect, process, and systematize the needs of enterprises and to filter, translate, and disseminate the potential for innovation offered by both research organizations and technologically advanced enterprises in a continuous matching activity at multiple levels and in differently codified ways (Bedeschi, Marseglia Trivellin 2008). New Made in Italy companies can, thanks to their relationship with the university, confront new market,

technological, and cultural challenges; in doing so, they overcome their own limitations and open up to the global competition of the fashion system. By adopting methods and tools proper to design research - interdisciplinary approach, design as a catalyst for different contributions, research/action, research/project relationships - the projects developed at the territorial level highlight how the main characteristic of the discipline is to address the complexity of the "polysystemic whole" (Zurlo, 2014). Students gain valuable formative experience, interacting directly with professional practice, leading them to be the protagonists of innovation in the Italian creative fabric. The combination of educational experience and exhibition-event at the Fiera di Parma contributes to the promotion of emerging brands to a wide audience. In parallel, it sees the dissemination of the culture of Design and Fashion carried out by the Politecnico in a non-academic sphere, close to the real needs of civil society. All actors involved in the process benefit. Emerging brands broaden their perspectives, network, gain visibility in the eyes of the public, and propose themselves as elements of innovation in the fashion system. The university confronts the real challenges of the productive fabric and globalization, leading students to be active agents of change in design and creative dynamics. The fair rises to a higher cultural level and assumes a role as an articulator of innovation projects in the territory.

#### **4.2 Limitations, recommendations for similar projects, further researches and new collaborations**

"Wake Up!" is just one of several projects made by the faculty of Politecnico that see the collaboration between design students and creative networks. The team of professors worked in different territories all over the world across the years, developing a defined methodology.

The first point of this methodology is the creation of a multidisciplinary team composed by a scientific director, a coordinator, a design or fashion expert, a local talent scout, an art director and communication expert, a representative of international universities, an exhibit reality.

The second important step is the selection of the brands, that should have an overall potential of quality, creativity, manufacturing knowhow and a strong relation with the cultural heritage of the territory involved.

The methodology of the workshop includes: companies analysis and assessment, briefing, concept generation, co-design sessions, concept development, prototyping, final presentation and exhibition.

An important role in this kind of projects is played by the coordinator that has the role to connect all the stakeholders and to facilitate the communication between different actors that can sometimes be difficult in an international context, with people with different background and focuses. It is also fundamental the activity of matchmaking

between companies and groups of students that should be correctly matched considering their skills, needs and specificities.

Is also important the identification of a fair as partner and promoter of the project and of the companies in a local and global context.

The communication of the project is fundamental, the creation of a brand that brings together the companies and define the project is the first promotion strategy for the creative productive networks in the local and global design and fashion panorama.

This action-research model is replicable in different contexts, countries, districts and territories in order to enhance the potential of the creative productive networks and innovate and internationalize the sustainable local manufacturing. A promising sector are the new fashion and design emerging brands involved in processes of circular economy that can be the driver for a transition toward a more sustainable productive paradigm.

A further research field is the creation of a design toolkit that can be applied to similar projects in different field of design and fashion and in different countries.

The main partners of this kind of research can be european and international universities, especially in the countries where are emerging new productive districts and networks, companies associations and networks, that want to start promotion and innovation processes through the collaboration with academia, local development agencies and local governments.

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