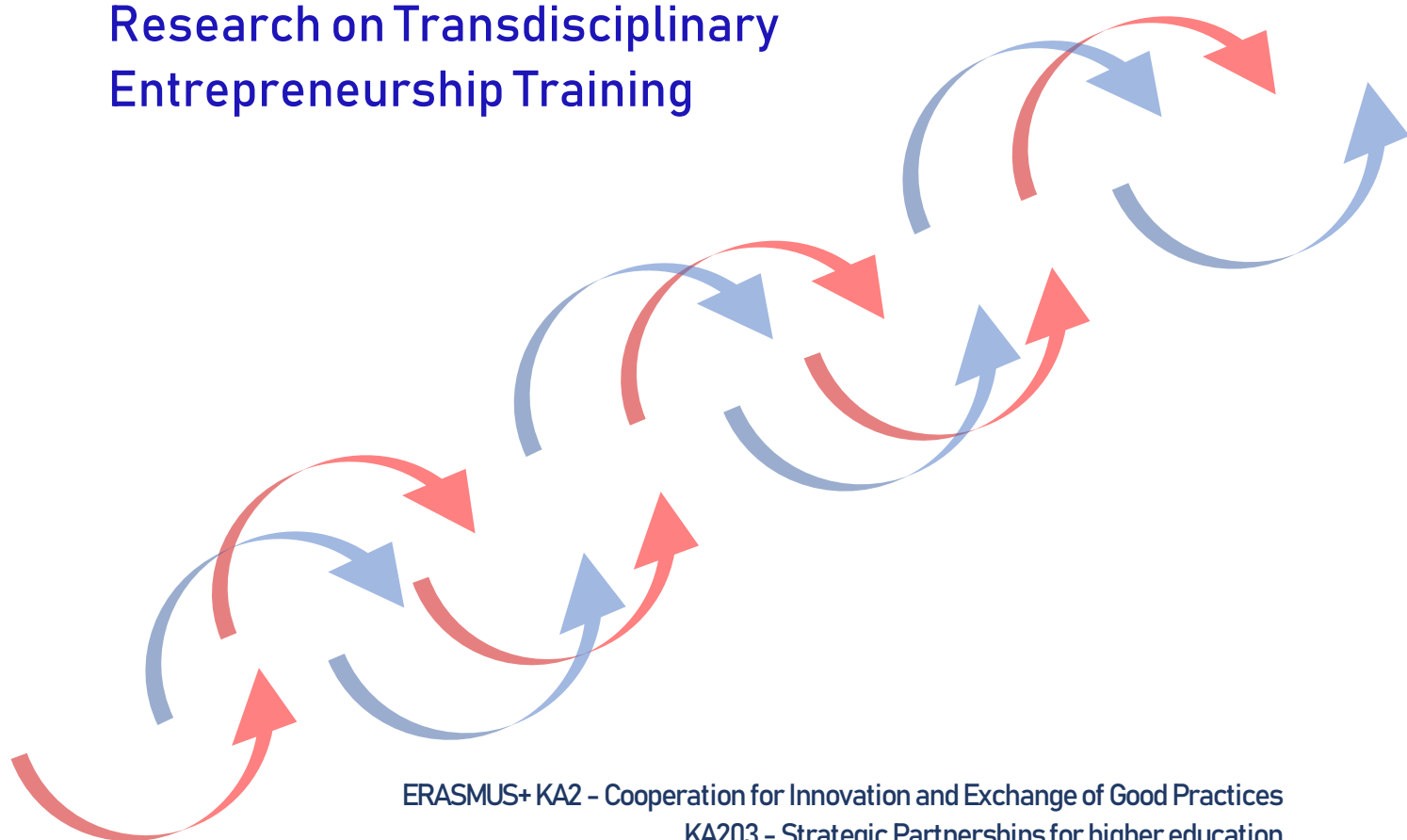




Good Practices

## Intellectual Output 2

### Research on Transdisciplinary Entrepreneurship Training



ERASMUS+ KA2 - Cooperation for Innovation and Exchange of Good Practices  
KA203 - Strategic Partnerships for higher education  
European Entrepreneurship Training Community  
Reference No. 2018-1-LV01-KA203-046974

February, 2020



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### Introduction

The project “European Entrepreneurship Training Community” (Reference No. 2018-1-LV01-KA203-046974) is focused on developing a self-fulfilling, sustainable and responsive transdisciplinary entrepreneurship training environment among the project Consortium – four entrepreneurial universities: Riga Technical University (Latvia), Anglia Ruskin University (the United Kingdom), South-Eastern Finland University of Applied Sciences (Finland) and Rotterdam University of Applied Sciences (the Netherlands). The project is financed by the ERASMUS+ activity Cooperation for Innovation and Exchange of Good Practices, KA203 - Strategic Partnerships for higher education.

The main activities within this project are: (1) research on transdisciplinary training methodology; (2) development and simultaneous approbation of Transdisciplinary Entrepreneurship Training Methodology with a united Venture camp at the end of the programme, which is targeted at the student and trainer audience; the methodology shall be in the format of an electronic handbook; (3) creation and maintenance of the Project Platform [www.goodpractices.eu](http://www.goodpractices.eu) that is used mainly as a dissemination tool throughout the project to share good practice on transdisciplinary entrepreneurship training.

A fundamental activity within the project is this Research on Entrepreneurship Training. The Research has a focus on understanding the existing entrepreneurial training activities with relation to entrepreneurship competence development primarily in partner countries of Consortium members, secondarily in the European Union.

The research topics are as follows:

1. Challenges and activities in achieving sustainable entrepreneurship ecosystems in Finland, Latvia, the Netherlands and the United Kingdom.
2. Developments of entrepreneurship competences worldwide since 2016.
3. Entrepreneurship training trends in higher education.
4. Entrepreneurship training trends in business supporting institutions.

The result of the research:

Unique collection and analysis of entrepreneurship training activities and competences among start-up entrepreneurs that provides a foundation to build the entrepreneurship training methodology. Research results will be available to other universities, vocational education and adult education organisations or individuals interested in the topic.

### Project methodology

The methodology applied throughout the activities of the project is 4D: Define it, design it, do it, develop it. The visual in Figure 1 illustrates the succession of the activities in the methodology.

At the research stage of the project (Define it) the situation is studied in order to collect and analyse the existing practice in entrepreneurship education at the partner institutions and beyond in close cooperation with the industry stakeholders to identify business ecosystem demands.

Based on the research, the second stage (Design it) will be performed. During this stage the transdisciplinary entrepreneurship training methodology (TETM) will be designed and disseminated among the Consortium and beyond in the form of a handbook.

At the third stage (Do it) the study methodology will be applied in the real study process at all partner institutions. The study process will be monitored and analysed, conclusions will be developed and summarized.

Finally, at the last phase (Develop it) the methodology will be evaluated and improved. Project activities and Intellectual Outputs will be disseminated to other universities and interested stakeholders in Europe.

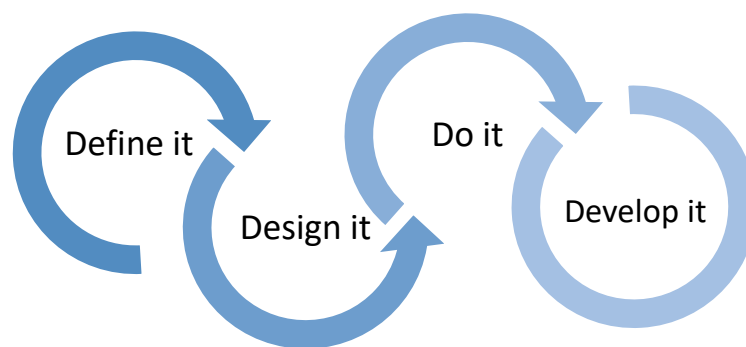


Figure 1: 4D Methodology

### Major authors and contributors

#### **Riga Technical University**

Modris Ozoliņš, Madara Māra Irbe, Elīna Gaile-Sarkane, Inga Lapiņa, Tatjana Nikitina, Māris Millers, Deniss Ščeuļovs and Viktorija Babiča

#### **Anglia Ruskin University**

Lynn Martin

#### **South-Eastern Finland University of Applied Sciences**

Mikhail Nemilentsev

#### **Rotterdam University of Applied Sciences**

Martijn Priem and Matthijs Smits

## Glossary of applied terms

**Alumni** – graduates of higher education institutions and entrepreneurship supporting institutions that have undergone and successfully completed a particular programme.

**Best practice** – significant methods or processes carried out by higher education institutions or entrepreneurship supporting institutions that contribute towards high growth of startups and success of young entrepreneurs.

**BSI** – business supporting institutions such as business incubators, accelerators and co-working spaces. These organisations work in the area of entrepreneurship development and support outside higher education institutions (HEIs), i.e. business incubators, NGOs, state agencies, seed funds and accelerators and others.

**Competences** – entrepreneurial capacity based on the OECD/EU Studies, pages 109-110<sup>1</sup>.

**Consortium** – the partners within this project, i.e. Riga Technical University (Latvia), Anglia Ruskin University (The United Kingdom), South-Eastern Finland University of Applied Sciences (Finland), Rotterdam University of Applied Sciences (The Netherlands); in conjunction with ‘countries’ refers to the countries of the project partners.

**Ecosystem** – a set of elements that have a system of relationships affecting a specific area (economic field, industry, specific trend).

**Business ecosystem** – an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they co-evolve their capabilities and roles and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions to align their investments and to find mutually supportive roles.<sup>2</sup>

**Entrepreneurship ecosystem** – a generic context aiming to foster entrepreneurship within a given territory. It consists of a horizontal network (customers and providers) and a vertical network (competitors and complementors). It also includes organizations supporting entrepreneurs: public or private funding agencies (banks, business angels, venture-capital, etc.); support entities (business incubators, consultants, etc.); research organizations (research centers, laboratories, etc.); and businesses' consortiums (active businesses, associations and trade unions, etc.).<sup>3</sup>

**Innovation ecosystem** – the term used to describe the stakeholders and members of the business ecosystem, their interaction and role that is critical for innovation development and growth.

**Start-up ecosystem** – an ecosystem formed by people, startups in their various stages and various types of organizations in a location (physical and/or virtual), interacting as a system to create new startup companies. These organizations can be divided into categories: universities, funding organizations, support organizations (like incubators, accelerators, co-working spaces etc.), research organizations, service provider organizations (such as legal or financial services etc.) and large corporations. Different

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<sup>1</sup> Supporting Entrepreneurship and Innovation in Higher Education in the Netherlands, OECD Skills Studies, OECD Publishing, Paris/EU, Brussels, 2018. 109-110 pp. Available: [https://read.oecd-ilibrary.org/industry-and-services/supporting-entrepreneurship-and-innovation-in-higher-education-in-the-netherlands\\_9789264292048-en#page111](https://read.oecd-ilibrary.org/industry-and-services/supporting-entrepreneurship-and-innovation-in-higher-education-in-the-netherlands_9789264292048-en#page111)

<sup>2</sup> Predators and Prey: A New Ecology of Competition, J.Moore, Harvard Business Review, 1993

<sup>3</sup> Theodoraki and Messeghem, 2017

organizations typically focus on specific parts of the ecosystem function and/or startups at their specific development stage(s).<sup>4</sup>

**Education 4.0** – the current level in the education evolution concept that is focused on innovation-driven education, virtual learning environments and demanded skills in the fourth industrial revolution (Industry 4.0); it is based on Education 3.0 (knowledge producing education) and demanded skills from the industry (Industry 3.0).

**EntreComp framework** – an entrepreneurial competence model developed in response to ‘A New Skills Agenda for Europe: Working together to strengthen human capital, employability and competitiveness’ by the European Commission. It describes entrepreneurship as a transversal competence, which can be applied by citizens to all spheres of life from nurturing personal development, to actively participate in society, to (re)enter the job market as an employee or as a self-employed person, and to start up ventures (cultural, social or commercial). It is made up of three competence areas: ‘Ideas and opportunities’, ‘Resources’ and ‘Into action’. Each area includes five competences, which, together, are the building blocks of entrepreneurship as a competence.<sup>5</sup>

**Entrepreneurial mindset** – the ability to focus on entrepreneurial activities and outcomes. Individuals with entrepreneurial mindsets are often drawn to opportunities, innovation and new value creation. Characteristics include the ability to take calculated risks and accept the realities of change and uncertainty (based on Financial Times Lexicon).

**Entrepreneurial pedagogy pillars** – co-operative learning, experiential learning and reflective learning<sup>6</sup>.

**Entrepreneurship** – The capacity and willingness to develop, organize and manage a business venture along with any of its risks in order to make a profit. The most obvious example of entrepreneurship is the starting of new businesses. In economics, entrepreneurship combined with land, labor, natural resources and capital can produce profit. Entrepreneurial spirit is characterized by innovation and risk-taking, and is an essential part of a nation's ability to succeed in an ever changing and increasingly competitive global marketplace.<sup>7</sup>

**Entrepreneurial university** – three meanings: the university itself, as an organization, becomes entrepreneurial; the members of the university - faculty, students, employees are becoming entrepreneurial; and the interaction of the university with the environment, the “structural coupling” between university and region, that follows an entrepreneurial pattern.<sup>8</sup>

**ECF** – European Competence Framework.

**Extracurricular** – additional activities, for the purpose of this research particularly in the area of entrepreneurship, available to the public and not necessarily linked to the activity of the higher education institution. The activities may be business incubation, Garage48, Demola, masterclasses and others.

**EU** – the European Union.

**HEI** – higher education institution.

**Industry 4.0** – the emergence of “smart factories”, that are connected to production facility Cyber-physical systems by using the Internet of Things, the Internet of Services and the Internet of People.

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4 Startup Commons, 2019, available: <https://www.startupcommons.org/what-is-startup-ecosystem.html>

5 EntreComp: The Entrepreneurship Competence Framework, 2016, Available: <https://ec.europa.eu/jrc/en/entrecomp>

6 Supporting Entrepreneurship and Innovation in Higher Education in the Netherlands, OECD Skills Studies, OECD Publishing, Paris/EU, Brussels, 2018., 60.p.

7 Business dictionary, 2019, available: <http://www.businessdictionary.com/definition/entrepreneurship.html>

8 Röpke, 1998

Industry 4.0 imposes that Education 4.0 applies virtual learning environments to combine real and virtual world information.<sup>9</sup>

**Industry needs** – high growth startup and SME environment needs for specific competences and skills rather than employer needs.

**Intrapreneurship** – refers to a system that allows an employee to act like an entrepreneur within a company or other organization. Intrapreneurs are self-motivated, proactive, and action-oriented people who take the initiative to pursue an innovative product or service. An intrapreneur knows failure, but does not have a personal cost such as an entrepreneur, since the organization absorbs losses that arise from failure.<sup>10</sup>

**Knowledge** - In the context of European Qualifications Framework<sup>11</sup> knowledge is theoretical and/or factual.

**NGO** – non-governmental organization.

**Pedagogy** – the teaching and learning methods, for the purpose of this research the focus is particularly on entrepreneurship education pedagogy.

**Research** – the result of the research carried out as Intellectual Output 2 that is based on the proposed content and structure hereto.

**Scientific publication** – a scholarly article published in cited databases.

**Skills** – practical knowledge necessary for success in entrepreneurship such as marketing, selling techniques, communication, accounting and administration, how to write a business plan and develop a personal business project<sup>12</sup>. Skills are also entailed in the European Qualifications Framework.

**SME** – small and medium-sized enterprises, hereafter relative to this research, that are innovation-oriented and scalable based on the intrapreneurial approach within all levels of the entity.

**Start-up** – an SME in its first five years of existence that corresponds to the above mentioned definition of a SME.

**TETM** – transdisciplinary entrepreneurship training methodology.

**Trends** – dynamic and changing trends of the entrepreneurship ecosystem rather than classic trends of the business environment.

**Triple Helix** – The Triple Helix thesis is that the potential for innovation and economic development in a Knowledge Society lies in a more prominent role for the university and in the hybridisation of elements from university, industry and government to generate new institutional and social formats for the production, transfer and application of knowledge.<sup>13</sup>

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9 Requirements for Education and Qualification of People in Industry 4.0, A. Benešová & J. Tupa, ScienceDirect, 2017

10 Investopedia, 2019, available: <https://www.investopedia.com/terms/i/intrapreneurship.asp>

11 European Qualifications Framework: Analysis and overview of NQF level descriptors in European countries, 2018. Available: <http://www.cedefop.europa.eu/en/publications-and-resources/publications/5566>

12 ENTREPRENEURIAL DIVERSITY IN A UNIFIED EUROPE Ethnic Minority Entrepreneurship/ Migrant Entrepreneurship, commissioned by the Directorate General Enterprise and Industry of the European Commission, 2008. Available: <https://ec.europa.eu/docsroom/documents/2367/attachments/1/translations/en/renditions/pdf>

13 Triple Helix Research Group at Stanford University. Available: [https://triplehelix.stanford.edu/3helix\\_concept](https://triplehelix.stanford.edu/3helix_concept)

## Overview of Four European Entrepreneurship Ecosystems

This chapter is dedicated to understanding the entrepreneurship ecosystems in the countries of the Consortium: Finland, The United Kingdom, Latvia, the Netherlands. Each subchapter presents an overview of the major actors within the particular ecosystem and the recent activities that were carried out to encourage and support entrepreneurship on a national level, including state policy changes, establishment of entrepreneurship supporting institutions, events and others. Entrepreneurship research models underlying the analysis are: Ecosystem Lifecycle Model (Startup Genome, 2019) and Domains of the Entrepreneurship Ecosystem (D.Isenberg, 2011).

The terms used in this chapter are: ecosystem, business ecosystem, entrepreneurship ecosystem, innovation ecosystem and start-up ecosystem. The ecosystem is a set of elements that have a system of relationships affecting a specific area. The business ecosystem is an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. The entrepreneurship ecosystem is an environment that aims to foster entrepreneurship within a given territory, and it consists of a horizontal network, a vertical network, business supporting institutions, research organizations, business consotriums. The innovation ecosystem describes stakeholders of the entrepreneurship ecosystem that are crucial for innovation development. Lastly, the start-up ecosystem is formed by people, startups in their various stages, and various types of organizations in a specific location, interacting as a system to create new startup companies, and working in specific development stages of the start-ups.

Both concepts – the entrepreneurship ecosystem and the start-up ecosystem - are focused on a particular territory of a country. However, the project “European Entrepreneurship Training Community”, which is lead by a competent and evolving entrepreneurial university Consortium, challenges this view and suggests the development of collaborative opportunities among ecosystems via this partnership to minimise territorial limitations among the ecosystems. This can be achieved by involving associated partners of the Consortium, which in turn are important actors of the ecosystems, such as industry hubs and associations, business incubators, state institutions, investors and others, while executing the common transdisciplinary entrepreneurship training curricula within this project.

In this way, the concept of the entrepreneurship university among partners of the Consortium can evolve on an international level through expanded collaboration among entrepreneurship ecosystem actors of other countries. The current understanding of the entrepreneurial university is related to the areas of innovation creation, knowledge commercialization, entrepreneurial support (curricular and extracurricular activities, business incubators, science parks and other incentives), socio-economic development through partnerships of the entrepreneurship ecosystem in a particular region. Hence, the Consortium could follow the lifecycle of start-ups and initiate opportunities for scalability.

International expansion of entrepreneurial university activities could correspond to the Ecosystem Lifecycle Model (Startup Genome, 2019), that is illustrated in Figure 2, and in turn could respond better to the needs of Startup Development Phases (Startup Commons, 2019), that are visualized in Figure 3, due to the ability to foster scalability and globalization of a start-up through presence in an international entrepreneurship ecosystem. Such practice has been carried out in the past few years by the Consortium partner “South-Eastern Finland University of Applied Sciences” and it is mentioned in the corresponding subchapter “The Entrepreneurship Ecosystem in Finland”.



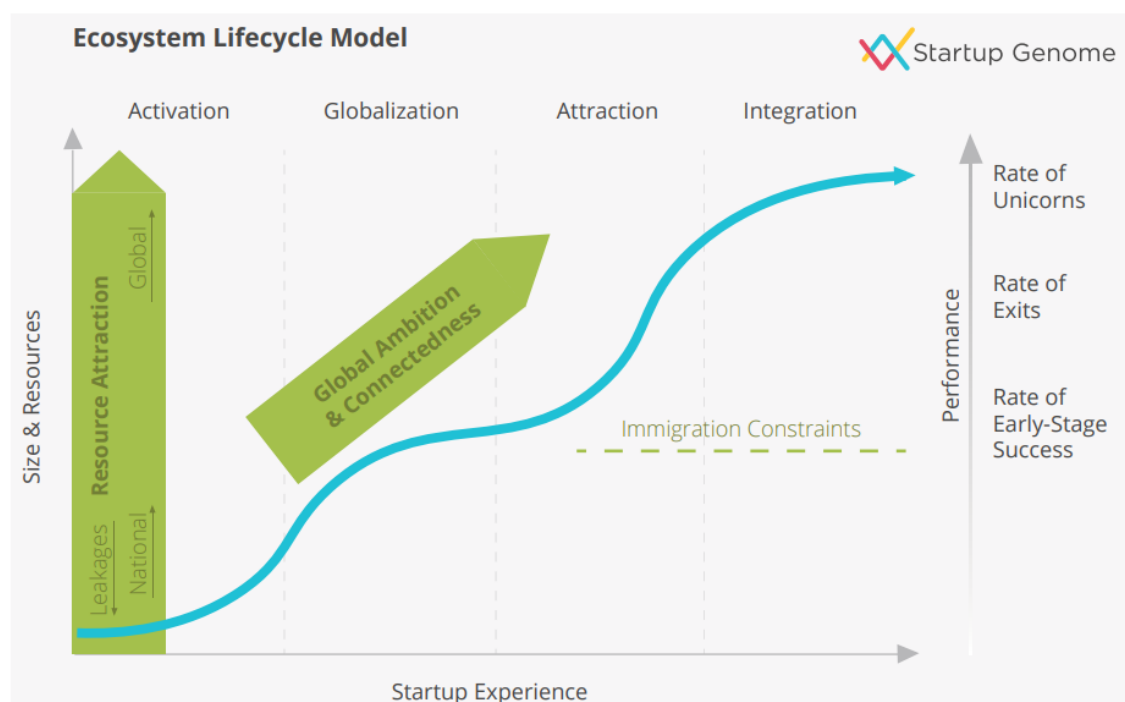


Figure 2: Ecosystem Lifecycle Model, Startup Genome, 2019

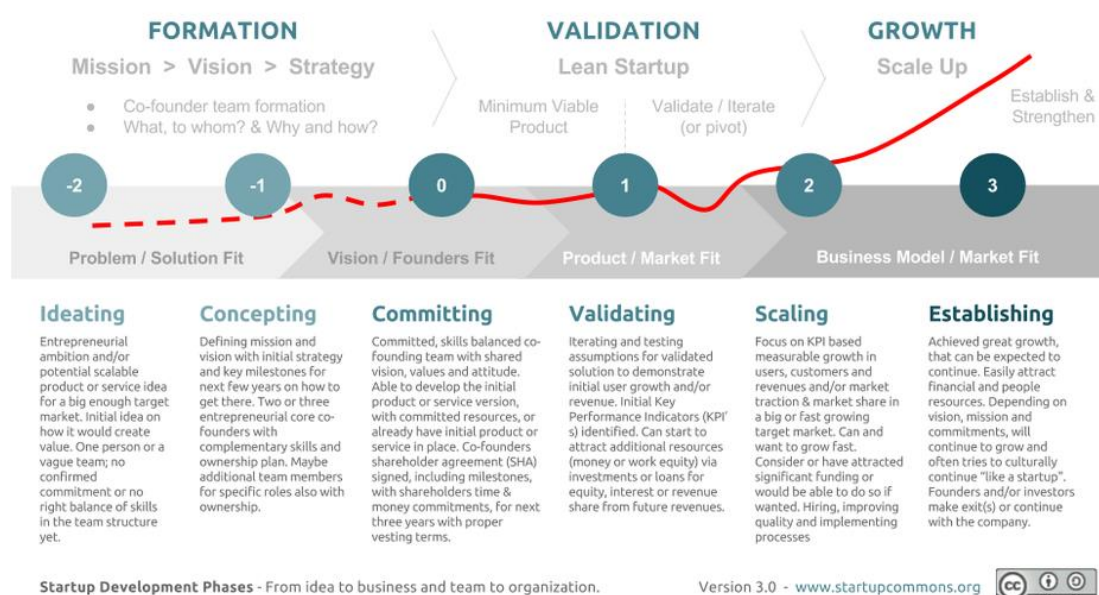


Figure 3: Startup Development Phases, Startup Commons, 2019

The analysis of Entrepreneurship ecosystems in the Consortium countries is based on Isenberg's Entrepreneurship Ecosystem model due to its recognition, wide reference and universal application in research and practice. This model contains six main domains that are crucial in maintaining sustainable and developing entrepreneurship ecosystems: policy, finance, culture, supports, human capital and markets (see Figure 4). Each domain has a list of the main elements that characterize necessary components of each domain that in turn contribute to the success of entrepreneurs in a given ecosystem. This model is comprehensive, holistic, and the ability to visualize complex structures aids in understanding connections among main elements of a particular ecosystem and possible associations with other ecosystems and their actors.

## Domains of the Entrepreneurship Ecosystem

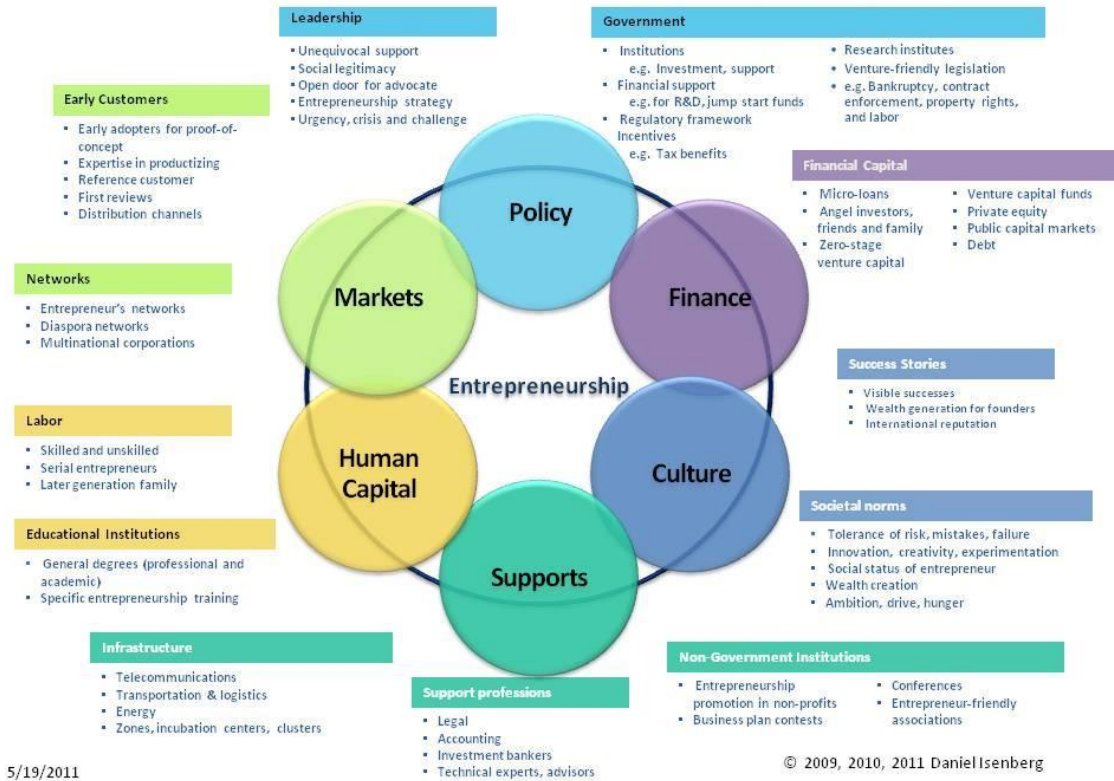


Figure 4: Domains of the Entrepreneurship Ecosystem, D.Isenberg, 2011

## The Entrepreneurship Ecosystem of Finland

To understand the existing entrepreneurship ecosystem, its advantages and challenges, the following source has been analysed: “Migratory pathways for start-ups and innovative entrepreneurs in the EU and Norway FI 2019”<sup>14</sup>. This following subchapter highlights the main activities of the entrepreneurship scene in Finland, addresses challenges and good practice.

The majority of Finnish companies belong to so-called micro-businesses with the number of employees up to 10. Among 2014, 2016 and 2017 the percentage of such micro-businesses is a bit above 93% out of all businesses in Finland. In the absolute meaning, the total amount of such micro-businesses grew by almost 1500 from 2014 to 2017 and reached the total number of 286 934.<sup>15</sup> There is also the general positive growth tendency in the number of medium and large companies with the number of employees between 20 and 49 and over 50 respectively.<sup>16</sup>

In terms of companies’ closures and registrations, more companies opened rather than closed in 2018. However, almost equal numbers (28 582 of closed companies and 28 802 of registered companies) among the closed and registered companies prevailed. According to Statistics Finland, 35,300 start-ups started in 2018. The number of start-ups was 17 per cent, or 5,000, more than in 2017. Start-ups accounted for 8.9 per cent of the total enterprise stock. The highest number of start-ups was in professional, scientific and technical activities, with 5,800 start-ups, or 16% of all start-ups in 2018. In 2018, 20,100 companies closed down. There were fewer enterprise closures than in previous years. Enterprise closures accounted for 5.1 per cent of the total enterprise stock. As in previous years, the number of enterprise closures was highest in the trade sector, which accounted for 3,600 enterprises, or 18% of all enterprise closures in 2018.<sup>17</sup>

Important recent activities that sustain and develop the entrepreneurship ecosystem in Finland:

- 2017: Talent Boost Programme (aimed at attracting foreign investment and talent).
- 2018: New residence permit category for third country residents-start-up entrepreneurs with IT and technology expertise (initiative by Business Finland and Finnish Immigration Service) and simple registration process for EU residents.
- 2018: Legal definition ‘Startup entrepreneur’ within the Finnish alien’s act.
- 2018: Establishment of two entities: the government agency “Innovaatorahoituskeskus (Innovation funding center) Business Finland” and “Business Finland Oy”, a government-owned corporation controlled by the agency (administered by the Finnish Ministry of Employment and the Economy).

Three main obstacles that are identified in the “Migratory pathways for start-ups and innovative entrepreneurs in the EU and Norway FI 2019”, that are certain within the Finnish entrepreneurship ecosystem and that are a common challenge across entrepreneurship ecosystem stakeholders are: 1) lack of funding, 2) challenging competition environment, and 3) a lack of supply of qualified employees in the labor market.

To address these challenges, the government of Finland has dedicated much effort and resources by setting up a government agency “Business Finland” to foster startups, to attract international talent or retain existing talents that consist of international university graduates, to support research and development, and to provide expert services and information on export as its offices are located in 40 countries. Moreover, a successful initiative is administered by the Employment Office of Finland – a start-

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14 Available: [https://ec.europa.eu/home-affairs/what-we-do/networks/european\\_migration\\_network/reports/studies\\_en](https://ec.europa.eu/home-affairs/what-we-do/networks/european_migration_network/reports/studies_en)

15 Company structure in Finland (2017). Entrepreneurship statistics. WWW-document: [https://www.yrittajat.fi/sites/default/files/yrittajyvystilastot2019\\_en.pdf](https://www.yrittajat.fi/sites/default/files/yrittajyvystilastot2019_en.pdf)

16 Yrittäjyys Suomessa (2017). WWW-document: <https://www.yrittajat.fi/suomen-yrittajat/yrittajyys-suomessa-316363>

17 Tilastokeskus (2019). Aloittaneet ja lopettaneet yritykset toimialoitain vuonna 2018. WWW-document: [http://www.stat.fi/til/aly/2018/aly\\_2018\\_2019-10-31\\_tie\\_001\\_fi.html](http://www.stat.fi/til/aly/2018/aly_2018_2019-10-31_tie_001_fi.html)

up grant for business activity establishment amounting to EUR 32.40 a day for up to 12 months. Business Finland also has compiled all relevant information for start-up entrepreneurs in the form of an interactive Startup Kit. The government of Finland has allocated a minimum of 1 million euros on supporting startup entrepreneurship as part of the 2017-2018 growth program of Team Finland (the Finnish government's business promotion network), and in 2018 eight ESF/ERDF projects were launched in growth cities of Finland to attract and retain international talent.

A legal definition has been defined for 'startup entrepreneur' in the Finnish alien's act with reference to the residence permit process to enable talent attraction. Section 47 of the Aliens' act defines a startup entrepreneur as follows: "A growth entrepreneur (startup entrepreneur) is a foreigner, whose purpose is to act full-time in a position of responsibility in a company registered in Finland, whose business model and the individual qualifications of the staff fulfil the conditions set by the innovation funding centre Business Finland for the funding of early-stage innovative rapid growth companies."<sup>18</sup> There is no specific definition of "innovative entrepreneur" as it is not a commonly used term in Finland. The preferred term is "startup entrepreneur" or "growth entrepreneur". According to Business Finland, in terms of public innovation funding, a startup is also a company's age of less than 5 years.

Finland is rich in the volume of activity among stakeholders from the public sector, especially cities and municipalities that have developed their business hubs, accelerators and co-working spaces. At Helsinki a former hospital was converted to a start-up co-working space "Maria 01" and is planned to be developed as a research and development centre. Many major cities boost innovation and the local start-up community with establishing business hubs: Helsinki region hosts Helsinki Business Hub, Newco, International House Helsinki, Maria 01, Aalto Entrepreneurship Society, A-grid; Tampere hosts Business Tampere, Tribe Tampere; Turku hosts Turku Science Park, SparkUp; Oulu hosts Business Oulu.

Entrepreneurial universities play a pivotal role in sustaining the entrepreneurship environment as this is the place where many famous entrepreneurship event ideas have been borne. Aalto University campus in the city of Espoo has its own startup community "A-grid" with about 140 startups and a strong network to support startup growth, including Business Espoo, TE-office, Chamber of commerce, Design Factory, Aalto Startup Center, Aalto Entrepreneurship Society, Startup Sauna and Slush. "Aalto Ventures Program" provides students with courses, orientation, training, workshops, a startup ecosystem, mentors and a network necessary to build new scalable businesses as startups or in established organizations. "Kiuas startup accelerator" by Aalto University offers coaching, networks, tools, free office spaces, and a startup community. They run three batches a year within two core programs (2 x Kiuas Start & 1 x Kiuas Accelerator), helping over 50 companies a year.

Another initiative based in the higher education level is "StartUp School" – a program set up the Haaga-Helia University of Applied Sciences that offers courses and activities for students who are interested in entrepreneurship and supports students who already have their own businesses. The program offers hands-on assistance, courses and events, and students can also earn credits while working on their startup.

Three higher education institutions in a common region – Tampere University, Tampere University of Technology and Tampere University of Applied Sciences – established a platform "Y-Kampus" that provides students, researchers and teachers with sparring services, networks, and other tools to develop companies and business ideas.

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<sup>18</sup> Section 47 of the Aliens' act of Finland

Lastly, University of Turku has its Entrepreneurial University strategy for entrepreneurial training and entrepreneurship, which incorporates goals for enhancing entrepreneurial attitudes, behaviour, and culture across the entire university and various activities.

Other business supporting organizations worth noting are ELY Centres (Centre for Economic Development, Transport and the Environment), TE-offices (Employment and Economic Development Offices), Finnvera plc and Finnish Industry Investment Ltd that provide public financing, expert and networking services for launching and developing business operations. ELY Centres provide different types of support and advice for enterprises at the establishment and startup stage. ELY Centres seek and evaluate inventions and innovative ideas by private individuals and startup enterprises and assist in the efforts to commercialise them. Finnvera provides SMEs with working capital and export funding and helps with investments. It offers venture capital for new innovative enterprises. Finnish Industry Investment promotes the growth and internationalisation of enterprises by means of capital investments and through international networks.

Many global activities have been developed in non-profit environments with the aim of improving the general attitude towards entrepreneurship such as “Slush” and hackathon event “Junction”. The initial student-driven conference “Slush” has grown from 300 local attendees to over 20 000 attendees around the globe and is now being organized in Tokyo, Shanghai, Singapore and Helsinki. Other leading start-up events are: the annual “Talent Boost Summit” in Tampere organized by Business Finland, “Finnish Business Angel Network conference”, the annual “Arctic15 startup networking conference” in Helsinki organized by the Arcticstartup startup network.

The funding mechanisms work well for scaling startups in Finland. A number of 107 accelerator and incubation programmes operate in 24 major cities of Finland. The Finnish Business Angels Network provides an extensive list of these activities.<sup>19</sup> Angel investors and venture capitalists are present in the ecosystem along with well-established networks and associations, however, Business Finland operates as the most important public funding agency for research, in which investors do not tend to place their investments, it is also responsible for Business Finland Venture Capital fund management. Overall, Finland has had an active and rapidly growing startup ecosystem, which has also attracted foreign investments. The ministry of employment and economic affairs estimates that equity startup investments in Finland have nearly quadrupled between 2010-2018. According to the annual statistics collected by Finnish Business Angels Network and Finnish Venture Capital Association a record-high figure of 479 million euros was invested into startups and early stage growth companies in Finland in 2018. Of the total sum, foreign investments accounted for 291 million euros. Popular start-up fields with intensive financial support in Finland are: IT, digital services, Cryptocurrencies, software, hardware, AI, Blockchain, IoT, Gaming, AR/VR, Energy and Environment, Health, Education.

Although the business environment seems to be vital and active, migration trends are changing and the ability to retain talented human resources affects the success of entrepreneurs. Talent retention by large is possible by strengthening cooperation among higher education institutions, government and municipal organizations, as well as active private actors in the entrepreneurship ecosystem. Therefore, best practices of collaborative efforts among ecosystem stakeholders have been listed by the Ministry of Economic Affairs and Employment in their Talent Boost Cook Book. It is meant to serve as a practical guide for those working with international talent attraction and retention and those who wish to learn about the international talent scene in Finland. The Talent Attraction Management model is an integrated approach that sees talent attraction and retention as the management of four interrelated types of activities visualized in Figure 5 below.

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<sup>19</sup> The Finnish Business Angels Network list of incubation and acceleration programmes are available at <https://www.fiban.org/accelerators.html>



1. Talent attraction – marketing and recruitment activities.
2. Reception – welcoming and ‘soft landing’ activities.
3. Integration – activities and established networks aimed at helping talent to settle in and prosper in the longer term.
4. Reputation – place and employer branding efforts and ambassador models.
5. Management of ecosystem –orchestration of different stakeholders in a quadruple helix environment.

Figure 5: Talent Attraction Management model<sup>20</sup>

The Talent Attraction Management model can be applied both on the micro and macro scale of the entrepreneurship ecosystem, however, significant success can be attained on the micro level only with collaborative activities on the macro level. In example, collaborative initiatives among state, higher education and industry can lead to talent attraction and retention by providing consecutive opportunities for talent retention in the format of, for instance, supportive policies for foreign immigrants and startup growth funding such as the start-up grant for business activity establishment administered by the Employment Office of Finland.

This is one of the many examples of the collaborative initiatives between different actors of the entrepreneurship ecosystem in Finland that have been described in this subchapter. By taking into consideration the role and involvement of the aforementioned actors, the authors of this Research propose Figure 6 below as a visual representation of the main drivers of the Finnish entrepreneurship ecosystem. The main drivers of the start-up environment in Finland are: the public sector consisting of government-led incentives and active municipalities, higher education institutions that create start-up communities around their locations and develop future talent, and financial capital in the form of business angel investors, accelerators and venture capital funds.

<sup>20</sup> Talent Boost Cook Book, Ministry of Economic Affairs and Employment, 2019, p.10. Available: [https://tem.fi/en/article/-/asset\\_publisher/talent-boost-cookbook-reseptaja-kansainvalisiin-osaajiin-liittyvaan-tyohon](https://tem.fi/en/article/-/asset_publisher/talent-boost-cookbook-reseptaja-kansainvalisiin-osaajiin-liittyvaan-tyohon)



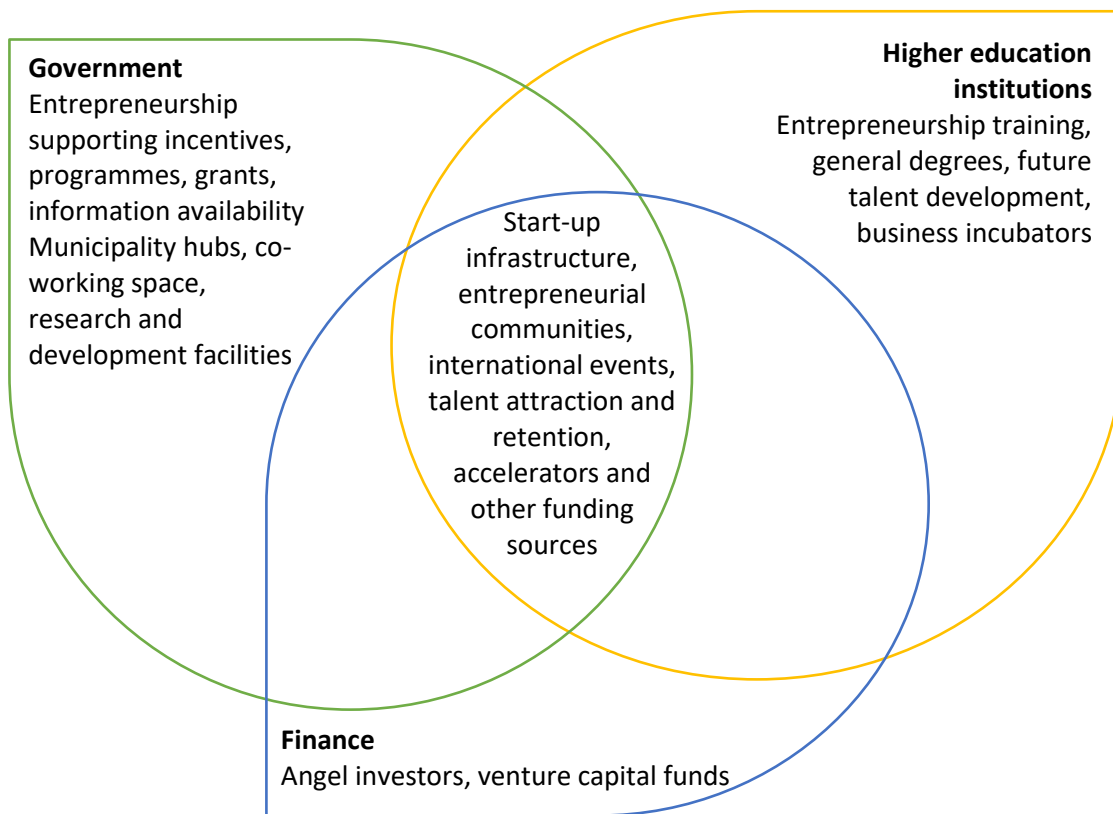


Figure 6: The main drivers of the entrepreneurship ecosystem in Finland

## The Entrepreneurship Ecosystem of Latvia

The main actors of the entrepreneurship ecosystem in Latvia – government, academia and capital– have been greatly focused on supporting growth of the start-up ecosystem due to the increasing role of start-ups in national economy. Support of innovative companies is one of the priorities of the government, which is defined in the national level planning documents such as the Sustainable Development Strategy of Latvia until 2030, National Development Plan 2014-2020, and the Government Action Plan.

The Ministry of Economics in Latvia is the main driver of entrepreneurship relating to policy actions and funding management to business supporting institutions – both state and private organizations. The European Regional Development Fund is one of the financial instruments that the Ministry of Economics has been attracting and that the Investment and Development Agency of Latvia has been implementing in a highly effective manner to strengthen the entrepreneurship ecosystem. The list below highlights important activities carried out by the Ministry of Economics in partnership with academia and private industry actors to increase the sustainability of the entrepreneurship ecosystem.

- 2013 - Guidelines of the National Industrial Policy for 2014 – 2020.
- Since 2015 - implementation of the Smart Specialization Strategy (RIS3) (focused on: knowledge-intensive bio economy, biomedicine and biotechnologies, smart materials, smart power industry, ICT).
- 2016 - Establishment of the Startup association Startin and signed Memorandum of Understanding with the Ministry of Economics.
- 2016 - establishment of 15 regional state-led business incubators.
- Since 2016 - implementation of the activity “Innovation motivation programme”, controlled by the Ministry of Economics, coordinated by the Investment and Development Agency of Latvia (aims at informing the general public about the importance of business and innovation, encouraging them to become entrepreneurs and practically involve them in the development of innovative ideas and solutions. Total funding EUR 5.3 million for activities during 2016-2023).
- 2017 - establishment of a team of technology scouts whose responsibility is to consult existing and potential entrepreneurs about existing research organizations and available state support for technology development (Investment and Development Agency).
- 2017 - Law on Aid for the Activities of Start-up Companies (offers start-up companies to receive allowances of the personal income tax and support for attraction of highly qualified employees. Start-up companies may also apply for aid for participation in exhibitions, conferences and investor contact exchanges).
- By the end of 2018 three acceleration funds commenced their work and provided early stage development and seed money investments up to EUR 150 000.
- 2018 - a representative office of the Investment and Development Agency of Latvia was established in the USA, San Francisco to facilitate opportunities of the Latvian entrepreneurs in the Silicon Valley.
- 2018 - innovation vouchers and support for participation in international exhibitions or direct visits to potential investors abroad (up to EUR 4000 per company, available twice a year), administered by the Investment and Development Agency of Latvia.
- 2019 - Ministry of Economics recommendations for Plan of Measures for Improvement of the Entrepreneurship (Start-up) Environment.

These activities are forming a society that is more involved in and educated about the start-up processes. In the beginning of 2019 in Latvia, there were 346 start-ups (established businesses until their



fifth year of existence or older businesses that have a highly innovative product/service)<sup>21</sup>. However the number could be greater as not all start-ups are registered yet, not all start-ups are equally active in the entrepreneurship ecosystem, and many establishments may not be in tact with all start-up criteria<sup>22</sup>. The main industries the identified start-ups represent are digital technologies (27%), AI, BIG data and analysis (15%), sustainable solutions in energy, water, transport, farming and production industries (10%), smart technologies and robotics (9%). Other popular areas are FinTech, advertising, health, consumer electronics. Less popularity is in the industries of chemistry, videogaming, and digital technology application in health and science.

During January 2012 to January 2019 there have been 12 start-up buyout exits of which the value is public in four cases and is worth EUR 252 ML. The largest buyout was of the FinTech online credit business “4Finance” – EUR 172,9 ML<sup>23</sup>. Buyout activities have been increasing since 2017 due to several new accelerators, from which cooperation with venture capital funds and business angels has also increased. In total there are 18 funding sources that have their portfolios focused on IT services (FinTech, ICT, mobile technologies, SaaS), Deep-tech (scientific technologies), IT/Deep-tech (programming, health, energy, medical technology), specific industries (“clean” technology for climate change), other industries (healthcare, TMT, energy, production, business service, food produce, engineering). Increasing cooperation with accelerators and investors is leading to the development of innovations and scalable businesses in a more rapid rate.

A positive perception of entrepreneurship in society is formed with the help of regular, public events such as Techchill, Digital Freedom Festival, iNOVUSS. Public competitions for early-stage business ideas to encourage entrepreneurship in any member of the society are “Idea Cup”, “Rigas Drosmes grants”. Municipalities stimulate talent development by introducing regional incentives such as business support centres or industrial zones and organizing grant competitions for business idea development and establishment in the municipality (Ventspils, Madona, Liepaja, Cesis, Riga). Nevertheless, 87%<sup>24</sup> of companies operate in the capital city, Riga. The capital city also offers the most possibilities in terms of co-working, having the largest concentration of the population living, studying and working there. At least ten co-working spaces are available to the entrepreneurship community, some of them are “TechHub Riga”, “The Mill”, “DoBe”, “Oracule Tang Space”, “People Work”, “Teikums”, “Coworking Liepaja”.

Access to finance has been enhanced in recent years. The Development Financial Institution (ALTUM) has established a set of government loans to entrepreneurs: export credit guarantees, portfolio guarantees, micro crediting and start loans, parallel loans (including mezzanine loans), and seed capital, start capital and growth capital funds. Moreover, there are four accelerators operating on a regular basis in Latvia, mainly in the capital city of which three are public – “Commercialization Reactor”, “Overkill Ventures”, “BuildIt”, one is private – “StartUp Wise Guys”.

The government institutions involved in the entrepreneurship ecosystem and responsible for public services related to business establishment and growth are: Ministry of Economics, Ministry of Internal Affairs, Ministry of Justice, Ministry of Finance, Ministry of Education. Public bodies that constitute financial support to entrepreneurs are the above mentioned organizations: Development Financial Institution (ALTUM), three public acceleration funds, two venture capital funds, and one capital

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21 Study “Assessment of Latvian startup ecosystem, identification of current status and development of recommendations on the basis of it”, Ministry of Economics of the Republic of Latvia, 2019, p.18. Available: [https://em.gov.lv/files/attachments/2019-03-27\\_11\\_46\\_18\\_Jaunuznemumu\\_petijums.pdf](https://em.gov.lv/files/attachments/2019-03-27_11_46_18_Jaunuznemumu_petijums.pdf)

22 Ibid., p.18.

23 Ibid. p.44.

24 National Report “Migratory pathways for start-ups and innovative entrepreneurs in the EU and Norway. Latvia”, Office of Citizenship and Migration Affairs of the Republic of Latvia, 2019, p.13. Available: [https://ec.europa.eu/home-affairs/what-we-do/networks/european\\_migration\\_network/reports/studies\\_en](https://ec.europa.eu/home-affairs/what-we-do/networks/european_migration_network/reports/studies_en)

growth risk capital fund. The schema of ensured public services for entrepreneurs is presented in Figure 7 below.

Support to entrepreneurship by government institutions							
Ministries		Ministry of Economics	Ministry of Internal Affaris	Ministry of Justice		Ministry of Finance	Ministry of Education
Institutions	Development Financial Institution (ALTUM)	Investment and Development Agency of Latvia	Office of Citizenship and Migration Affairs	Register of Enterprises	Patent Office	State Revenue Service	State Education Development Agency
Start-up support programmes	Three public acceleration funds	Start-up law	Start-up visa				
		Participation in exhibitions, visits abroad					
Entrepreneurship encouragement, support and control	Two venture capital funds for seed and start-up phases	Innovation vouchers					
	One capital growth risk capital fund	Business incubators					

Figure 7: Support to entrepreneurship by government institutions<sup>25</sup>

Education institutions support and encourage entrepreneurship from the school seat to university and even after graduation. At primary and secondary school the Junior Achievement Latvia programmes are a common practice across cities and regions. At universities entrepreneurship is integrated in transdisciplinary curricula or in extracurricular activities. After graduation university alumni and others interested in business are invited to take part in business incubator and accelerator activities.

Six universities, 21 higher education institutions and academies, 19 colleges, six university or university agencies and two foreign university branches operate in Latvia in 2019. 16 of these higher education institutions are state-owned and the majority of them cover entrepreneurship as part of their curricula either as a separate study program or including it as a part of a cross-disciplinary program.<sup>26</sup> There are eight technology transfer centres located within universities accross Latvia and 59 scientific institutions of which 48 are private and 21 are financed by the state.<sup>27</sup>

Business incubators are great contributors to the growth of the entrepreneurial spirit in the main regions of Latvia. In total there are over 25 business incubators of which 15 are government-led, 11 are under the umbrella of universities, and there are four private business incubators of which three are “Kurzemes Business incubator” that are located in western Latvia and one operates within “Ventspils HighTech Park”.

The 15 state-funded regional business incubators are managed by the Investment and Development Agency of Latvia, funded by the Regional Development Fund of the European Union. 14 of

25 Study “Assessment of Latvian startup ecosystem, identification of current status and development of recommendations on the basis of it”, Ministry of Economics of the Republic of Latvia, 2019, p.132.

26 List of higher education institutions in the country, The Ministry of Education of the Republic of Latvia, available at: <https://www.izm.gov.lv/izglitiba/augstaka-izglitiba/augstakas-izglitibas-iestades>

27 Study “Assessment of Latvian startup ecosystem, identification of current status and development of recommendations on the basis of it”, Ministry of Economics of the Republic of Latvia, 2019, p.107.



ecosystem are the government and higher education institutions. These two sectors organize various evolving, successive events that encourage entrepreneurship, form and maintain the networks and micro ecosystems around them, educate prospective entrepreneurs, provide useful material and financial support, and guide entrepreneurs with business ideas in various development phases towards the next steps. The individual and common responsibilities of these two domains are represented in Figure 9 below.

Another important actor in the Latvian entrepreneurship ecosystem is financial capital that is growing in volume and capacity. Financial opportunities are becoming more accessible in the form of micro loans, grants, seed capital, angel investors, venture capital, and acceleration programmes. The government together with private financial capital institutions manage the most capital available to entrepreneurs. The only form of independent financial capital is angel investment. The relationships between the domains of the ecosystem are visualized in Figure 9 below.

Upon taking into consideration existing initiatives aimed at strengthening the economic ecosystem and enhancing the volume of entrepreneurial activity in the society of Latvia that were highlighted in this subchapter, and comparing this information to the key pillars that define successful and sustainable entrepreneurship ecosystem models proposed by D.Isenberg, it is possible to distinguish the current state of the supply and/or lack of particular subdomains. There are two subdomains of great importance related to the rate and speed of success of new business enterprises that do not sufficiently exist in Latvia – 1) early customers that could enable effective product or service development, and 2) tolerance towards risk, mistakes and failure that is a cultural dimension rooted in the historical and political systems that continue to exist through the generations that experienced socialism until 1991 – current teachers at school that educate the young generations, and a large part of the ageing society.

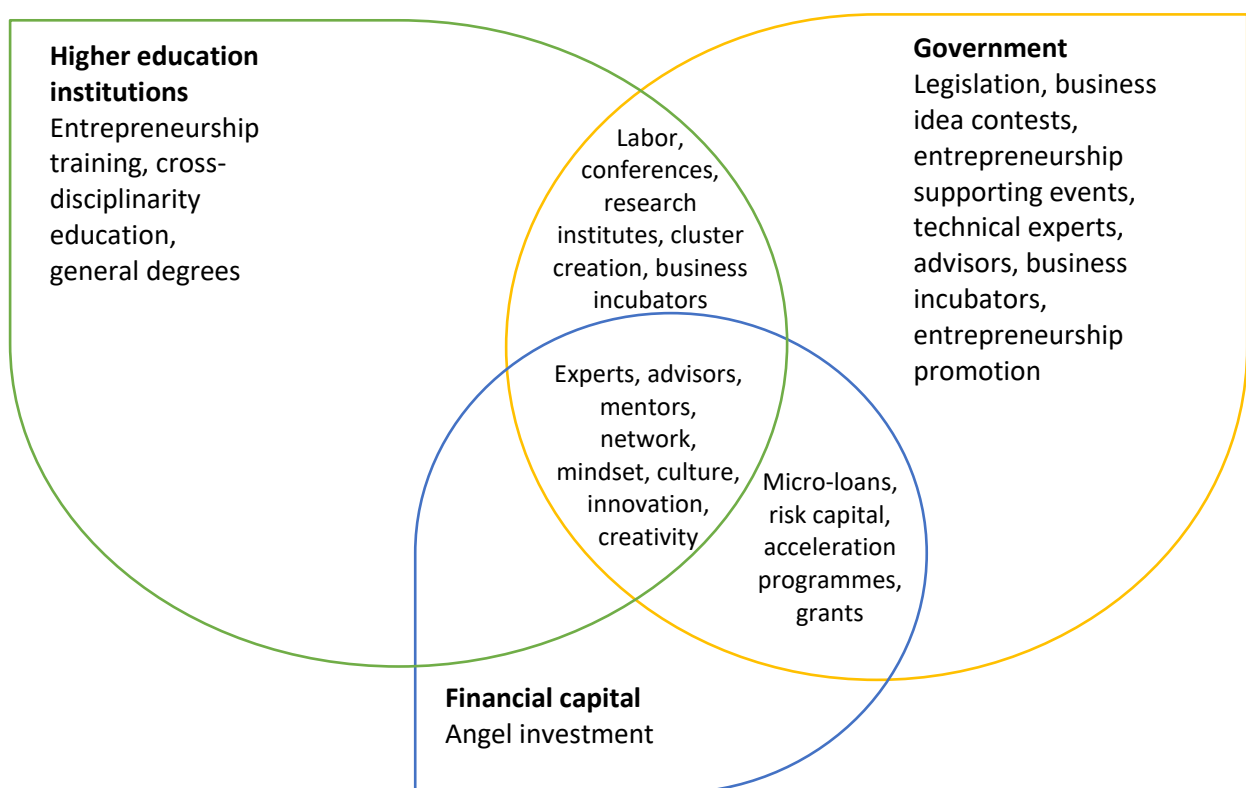


Figure 9: The main drivers of the entrepreneurship ecosystem in Latvia

## The Entrepreneurship Ecosystem of the Netherlands

The Netherlands has placed great currency on fostering entrepreneurship at all sectors, be it public (e.g. at schools and universities) or private (commercial entities), in order to strengthen the Netherlands' competitiveness internationally and to stimulate innovation. To that end, nearly all Dutch higher education institutions have developed specific entrepreneurial study programmes and modules, with a view to developing entrepreneurial competence and creating new businesses (thus bridging the traditional perceived gap between theory and practice). Despite these overarching (inter)national objectives, entrepreneurial training initiatives lie predominantly within the purview of local municipalities. Thus, there is no central organisation within the Netherlands that aggregates information about the entrepreneurship ecosystem as a whole. However, fragmented information is available, for instance, The Dutch Incubation Association, an informal community of practice, lists 54 incubators on their website (omitting several established incubation programmes associated with Dutch universities). Furthermore, this decentralized approach means that different institutions develop different entrepreneurial training methods and areas of expertise, including: (medical) technology, maritime, energy, water management and other fields.

Recent research on entrepreneurship education (Gulikers et al. 2018) points to the importance of developing innovative entrepreneurial training methods. However, for this to be actualized, closer cooperation and knowledge sharing between both enterprises and entrepreneurial training institutions must be effectuated. This finding was also reiterated by the respondents in the research on entrepreneurship competences (see Chapter 3.2, a subchapter about the analysis of entrepreneurship training practice in higher education institutions and business supporting institutions in the Netherlands). Furthermore, given its emphasis on value creation, entrepreneurship education differs from traditional education in the sense that it abandons more traditional modes of assessment and its attendant qualifying function, and places more emphasis on the individual development of learners. The development of entrepreneurial competence therefore receives considerable attention in entrepreneurial training programmes and is deemed important by entrepreneurs, although the competences themselves take on different meanings depending on the context in which individuals are working or learning.

Since 2014 there have been specific strategies and policies to attract and facilitate innovative entrepreneurs and start-up entrepreneurs in the Netherlands, as it is a national policy priority. Development of entrepreneurship education in Europe has been parallel with human capital skill policies of the European Commission, namely 'A New Skills Agenda for Europe: Working together to strengthen human capital, employability and competitiveness'. The response in 2016 was the "EntreComp: The Entrepreneurship Competence Model" which identified three competence areas: 'Ideas and opportunities', 'Resources' and 'Into action'<sup>30</sup>. The five separate competences in each area seem to be co-dependent and appear together at various stages and contexts in the entrepreneurial process. However, to gain a wider perspective and understand the existing entrepreneurship ecosystem in the Netherlands, the following source has been analysed "Migratory pathways for start-ups and innovative entrepreneurs in the EU and Norway: the Netherlands"<sup>31</sup>.

The entrepreneurship ecosystem in the Netherlands is well-established. The environment thrives on effective initiatives carried out by the private and the public sectors. However, the common challenge across the EU on retaining qualified and productive labor together with limited accessibility to financial capital still pose challenges to rapid growth and scalability of start-ups. The sustainability of the ecosystem is constantly responding to these and other challenges mentioned later in this subchapter, however many

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30 EntreComp: The Entrepreneurship Competence Framework, 2016, Available: <https://ec.europa.eu/jrc/en/entrecomp>

31 Report: Migratory pathways for start-ups and innovative entrepreneurs in the EU and Norway: the Netherlands, 2019. Available: [https://ec.europa.eu/home-affairs/what-we-do/networks/european\\_migration\\_network/reports/studies\\_en](https://ec.europa.eu/home-affairs/what-we-do/networks/european_migration_network/reports/studies_en)



activities have helped to continue the ambitious development of the start-up environment in the Netherlands:

- 2014: policy agenda “Ambitious Entrepreneurship: an agenda for starters and growers” with the programme “Ambitious Entrepreneurship25” and strategic plan “Ambitious Entrepreneurship Action Plan” to launch “StartupDelta” and encourage growth of ambitious entrepreneurs and start-ups.
- 2015: launch of the initiative “StartupDelta”,
- 2016: extension of “StartupDelta2020” in 14 innovation regions, focused on encouraging development from start-up to scale-up,
- 2017: Coalition Agreement “Trust in the Future” (2017-2021) aiming at limiting regulatory pressure and administrative burdens for entrepreneurs, and evaluating new rules by the business effects assessment and SME assessment.
- 2018: “State of Affairs: Start-up and scale-up policy”.

The two policy documents “Ambitious Entrepreneurship Action Plan” and the Coalition Agreement “Trust in the Future” are the cornerstones that set modern rules for entrepreneurship in the last decade and a half. The first initiates globalization of entrepreneurship by positioning the Netherlands as an ambassador of global entrepreneurship. The latter sets ground rules for attracting investment to generate a sufficient supply of financial capital.

The “Ambitious Entrepreneurship Action Plan” aims at stimulating the start-up environment in eight directions: 1) access to capital: access to (risk and growth) financing; 2) access to innovation: use of schemes; 3) access to knowledge; 4) entry into the Netherlands: attraction of international expertise and entrepreneurs; 5) access to the tax authorities: attractive tax preconditions for growth; 6) access to one another: the entrepreneur's social capital, the entrepreneur's own skills and how he/she deploys the human capital of the enterprise; 7) access to the world: access to international markets and customers/clients; 8) the preconditions within which the entrepreneur operates, such as laws and regulations.

In the Coalition Agreement “Trust in the Future”, priority is given particularly to: (i) investments in research and innovation in order to find the best solutions for digitisation and globalisation, (ii) fostering a good business establishment climate and (iii) making the financial investment climate as attractive as possible. The agreement fosters the development of nine top sectors in which the Netherlands excels internationally and which are knowledge-intensive, oriented to export, and can make an important contribution to resolving social issues worldwide. These sectors are: Horticulture and parent materials, Agri & Food, Water, Life Sciences & Health, Chemicals, High-tech, Energy, Logistics, and the Creative Industry. However, the organizations that work with the start-ups (mostly private, including “StartupDelta”) do not focus on these sectors, rather they are focused on encouraging growth of particular start-ups, regardless of the area, and provide necessary support. Such an approach is more tailored to the local dynamics and complements innovation, sustainability, and the creation of jobs. This corresponds with what Isenberg describes as important for policy in the contexts of other country entrepreneurship ecosystem analysis: “One of the underpinnings of Israel’s successful cultivation of broad-based entrepreneurship is that government has been explicitly sector agnostic for four decades. A top down analysis of Iceland’s comparative advantages are geothermal energy, natural beauty, and fish. Yet the successful ventures are in generic pharmaceuticals (Actavis), online gaming (CCP), and medical prosthetics (Ossur). You don’t need to tell entrepreneurs where the opportunities are—their job is to sniff them out and the very process of trying, failing, regrouping, sharpens and enhances entrepreneurship.”<sup>32</sup>

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32 Isenberg, D.J. (2011), The Entrepreneurship Ecosystem Strategy as a New Paradigm for Economic Policy: Principles for Cultivating Entrepreneurship, p.4. Retrieved from <http://www.innovationamerica.us/images/stories/2011/The-entrepreneurship-ecosystem-strategy-for-economic-growth-policy-20110620183915.pdf>

Funding is available to start-ups, and the Dutch government invests in start-ups through various programmes rather than directly. Support is conducted at three levels. “Proof-of-concept funding” is a loan from the Proof-of-concept fund for starters and SME companies. The aim of the loan is to provide resources for testing the idea in the market by getting from the idea phase to the start-up phase. In the “Seed Capital scheme” the government helps entrepreneurs obtain venture capital. It is particularly focused on innovative entrepreneurship in technical and creative sectors. The aim of the “Seed Business Angel scheme” is to enable investment of capital in young, fast-growing businesses. Via the scheme, private funds consisting of two investors can borrow a maximum of 1 million euros from the government. One regional event worth noting that helps to build a network between entrepreneurs and investors is “Amsterdam Capital Week”. It hosts over 40 events and brings together at least 3000 start-ups/scale-ups and 500+ investors.

Several tax incentives are available to entrepreneurs in general, meaning they are not tailored to start-ups. These include: a 30% tax facility scheme, the self-employed deduction scheme with opportunity of tax return, and the scheme for moving from the start-up scheme to the self-employment scheme in three years' time (one year under the start-up scheme and two years under the self-employment scheme) during start-up growth, where an interim evaluation is held after the first year.

There are also events for scale-ups such as “NLGroeit” that supports entrepreneurs with a turnover ranging between 1 and 100 million euros by organising events, peer-learning, trainings, webinars, and expert sessions and matching them with mentors who are already a few steps further. This is one of the few examples of government involvement as it is co-organized by the Ministry of Economic Affairs and the Chamber of Commerce. Several other examples of government involvement in entrepreneurship-supporting activities are the “StartUp Information Desk”, an initial point of contact for start-ups, “Startupbox” as a tool to facilitate access to government schemes, “Startup Officers” who work at ministries, (large) municipalities, provinces and implementing organisations that help start-ups with information and show the way when young entrepreneurs are seeking to cooperate with the government, and “Startup in Residence Programme” (an initiative by StartupAmsterdam – Municipality of Amsterdam, Economic Affairs Department), which is an extensive six-month programme that provides access to pools of knowledge, experts, and experienced mentors for start-ups, scale-ups, innovative SMEs, and social entrepreneurs who have been registered for a maximum of five years.

Space for entrepreneurial activity is present in universities and private organisations. Rotterdam hosts the largest international co-working space, the “Cambridge Innovation Centre” in the very heart of the city. Another concept that is open particularly to foreigners is (colorfully named) “The StartUp Orgy” in Amsterdam, a private initiative in which members who join it can work and meet one another. However the government does not facilitate any co-working activities.

Hubs are a supportive driver for entrepreneurs due to the developed infrastructure and necessary support focused on entrepreneurs. The largest hub is “StartupDelta”, which has eight regional hubs with partners from knowledge and education institutions, regional development corporations and local authorities. The hub’s mission is to initiate, connect, and scale up the main start-up and scale-up initiatives in the Netherlands by using a flexible, action-driven approach with significant involvement of major parties (private and public). The Amsterdam region has a strong position in creative and digital start-ups as the municipality’s policy focuses on tech start-ups and fast growers. One of the largest events in this hub is “StartupAmsterdam” which is a public-private partnership initiative in cooperation with around 150 start-ups and “StartupDelta”. The Hague with its “The Hague Security Delta” (HSD) concentrates on cyber security, national and urban security, protection of vital infrastructure, and forensics. The “Brainport Development” initiative in Eindhoven is a partnership of businesses, knowledge institutions, and local authorities that aim to position the area as a top technology region. Finally, Groningen has a strong position in data services and energy.

Universities are becoming more entrepreneurial by creating open spaces for interaction among students and staff, and the business incubators within universities are open to interested persons. There are also many transdisciplinary courses in entrepreneurship that are constantly being developed and introduced to students of various study areas. There are several acceleration activities for start-up founders such as “Startupbootcamp”, “YES! Delft”, and “Rockstart”. These are primarily private initiatives in which entrepreneurial universities are involved.

Despite recent government-initiated activities to enhance the entrepreneurship environment and growth of start-ups, many bottlenecks that are common to the existing economic situation in Europe present challenges to the Netherlands as well. There are three main barriers which affect the continuation of start-up and scale-up growth. The first is attracting sufficient technical talent and qualified personnel, which particularly affects small and medium-sized enterprises. The second challenge is the accessibility of capital. Despite the increased supply of risk capital due to various government interventions, the capital invested per start-up is relatively low. The Netherlands remains behind mainly as far as investments in the early stage are concerned, but the later financing rounds also remain a point of concern. The last is a limiting factor – a small local market which is good only for field testing, but not suitable for fast growing start-ups. Thus, entrepreneurs are encouraged to focus on the international market.

In conclusion, taking into account the current entrepreneurship ecosystem of the Netherlands, various activities hosted by the private sector and higher education institutions, and the previously mentioned challenges that are in fact common to the analyzed entrepreneurship ecosystems in this chapter (and there is evidence that this is a global challenge as well), the ecosystem has proven itself to be highly effective and self-sustaining. The main drivers of the start-up environment in the Netherlands are the private organizations and higher education institutions. These two sectors maintain entrepreneurship training programmes, provide physical working space, and manage networks and support programmes tailored to the needs of new entrepreneurs. Moreover, these two sectors are most flexible towards change and respond effectively to the changes and developments in the global entrepreneurship arena.

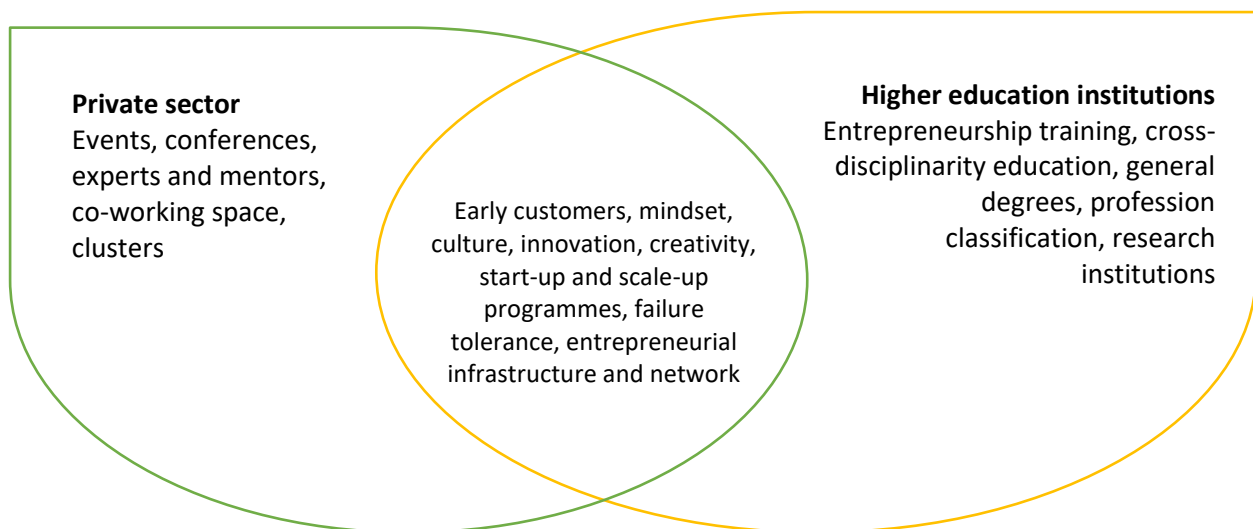


Figure 10: The main drivers of the entrepreneurship ecosystem in the Netherlands

It is worth noting that there have been relatively recent developments in entrepreneurship ecosystem mapping that have been initiated by Halbe & Koenraads since April 2018 – “Startup Entrepreneurship Diagram”. It is an interactive tool that is co-created with various actors from entrepreneurship ecosystems worldwide. It is based on five key pillars: network, talent, support, capital and expertise. The tool helps to identify the actors that shape the ecosystem and determine its infrastructure and development. Although the tool is focused on the startup ecosystem, it reveals



## Research on Transdisciplinary Entrepreneurship Training

important information about the entrepreneurship ecosystem in a country in general, as an entrepreneurship ecosystem cannot function without the necessary infrastructure for new enterprise encouragement and development. Figure 11 illustrates the Dutch Startup Ecosystem in 2018.<sup>33</sup>

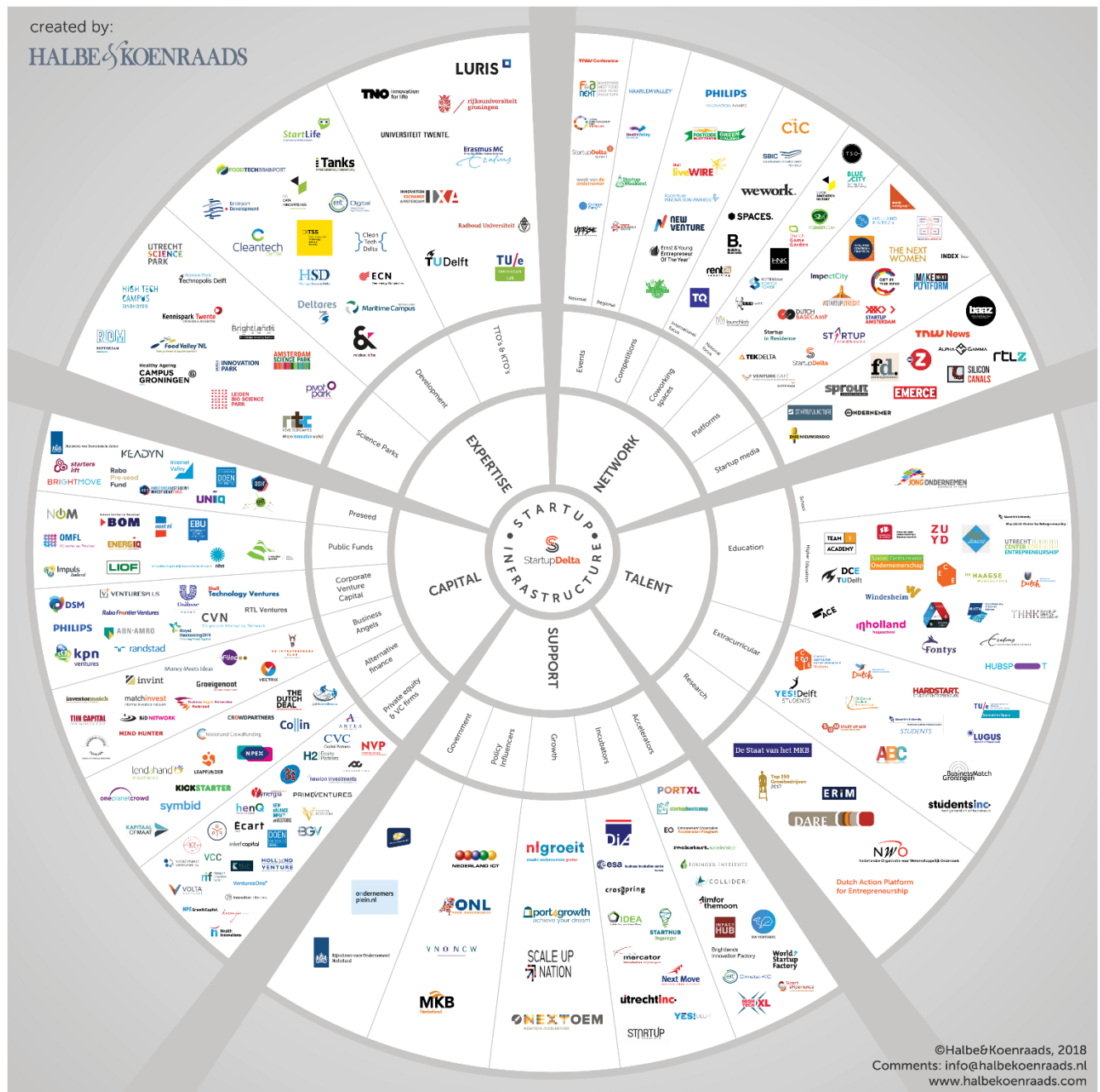


Figure 11: The Dutch Startup Ecosystem, 2018

<sup>33</sup> Startup Infrastructure Diagram, Mapping Ecosystems Worldwide, Halbe&Koenraads, 2018, available: [https://halbekoenraads.com/wp-content/uploads/2018/04/Concept-SID-standard\\_april-2018.pdf](https://halbekoenraads.com/wp-content/uploads/2018/04/Concept-SID-standard_april-2018.pdf)

## The Entrepreneurship Ecosystem of the United Kingdom

### Company Context

By March 2019, including non-registered firms, there were estimated to be 5.9 million UK private sector businesses of which 1.4 million had employees and 4.5 million had none. London (1.1 million) and the South East (940,000) had the most private sector businesses, accounting for 35% of the UK business population, while the North East had 152,000 private sector businesses, the least of any English region.

There were 4,202,044 companies on the UK Companies House Register by March 2019, an increase of 4.2% compared to the previous year. An estimated half million businesses of the 4.2 million are set up to achieve social, charitable or community-based aims, likewise they are founded as limited companies, charities, charitable incorporated organisations (CIO), co-operatives, community interest companies (CIC), sole traders or business partnerships. Social enterprises contribute an estimated £60 billion to the UK economy<sup>34</sup> on an annual basis.

These are illustrated by Figure 12 showing the distribution of these companies across the UK. This regional variation was also seen in dissolution of businesses. Between 2018-19, there were 508,865 dissolutions, with the highest rate of increase in dissolutions compared to 2017-18 in Northern Ireland (12.1%), followed by Scotland (7.4%) and England and Wales (3.4%).

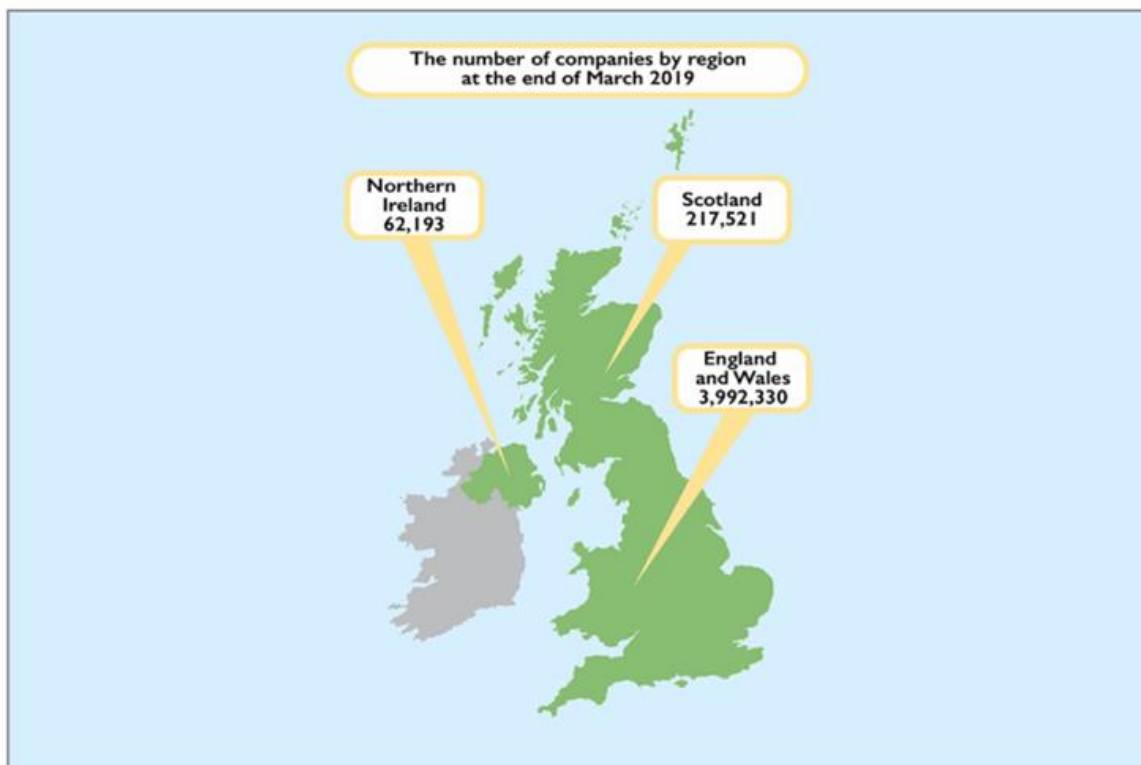


Figure 12: The number of companies by region at the end of March 2019<sup>35</sup>

The average age of UK companies on the total register in 2018-2019 was 8.5 years. Over half of these companies were aged under 5 years (51.6% for the total register), while over two-thirds (72.1% for

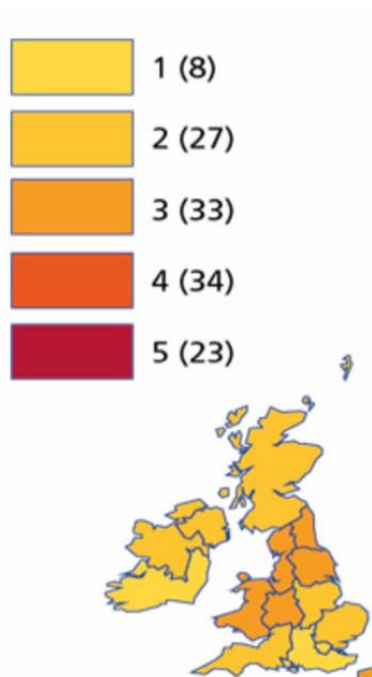
34 Social Enterprise UK 2018. Hidden Revolution, available: <https://www.socialenterprise.org.uk/wp-content/uploads/2019>

35 The UK Companies House Register from 2018 to 2019, 2019. Companies House. 2019. Available: <https://www.gov.uk/government/publications/companies-register-activities-statistical-release-2018-to-2019/companies-register-activities-2018-to-2019>

the total register) were under 10 years, and less than one in ten companies had been in business for more than 20 years.<sup>36</sup>

There were 5.82 million small businesses (with 0 to 49 employees) at the start of 2019, an increase of 3.5% (+200,000 businesses) since the beginning of 2017. Small firms represented 99.3% of the total business population (5.9 million businesses) and accounted for 60% of the employment and around 50% of turnover in the UK private sector. Hence, total employment in SMEs was 16.6 million (60% of the total), whilst turnover was estimated at £2.2 trillion (52%).<sup>37</sup>

Focusing on startups, the number of UK business births remained broadly similar to 2017-2018, moving from 382,000 to 381,000, a birth rate of 12.9% in 2018 compared to 13.1% in 2017. However, the number of UK business deaths decreased from 362,000 in 2017-18 to 336,000, a death rate of 11.4% compared to 12.4% in 2017. The transport and storage (including postal) industry had both the highest business birth and death rates, at 17.8% and 16.5% respectively.<sup>38</sup>



As Figure 13 shows, the UK has a relatively good performance of entrepreneurial activity but shows regional variation, as seen in the variable shading, where lighter shades imply higher levels of entrepreneurial activity in a region.<sup>39</sup> Similarly, when mapping startups across the UK, regional variation is clear. In 2017-2018, London had the highest business birth rate at 15.9%, whereas the North West had the highest death rate at 13.5%.

Using the employer business rate where the business has one or more employees, London had the highest birth rate in 2018 at 16.2%, an increase of 0.7% from 2017.<sup>40</sup> The South West had the lowest employee business birth rate at 10.8%, an increase of 0.1 from 2017.<sup>41</sup> The highest employer business birth rate was in business administration and support services at 17.9%, followed by retail at 17.8%. Retail was the industry where the employee business birth rate increased the most 2017- 2018.

Figure 13: Regional entrepreneurial activity in the UK<sup>42</sup>

### Survival, growth and business death

**Survival** - The UK five-year survival rate for businesses born in 2013 and still active in 2018 was 42.4%. Since 2013, the region with the highest five-year survival rate has been the English South West at 45.6%. In 2018, overall, the industry with the highest five-year survival rate was education at 49.5%.

**High growth** - 14,000 or 5% out of 282,000 businesses in 2018 that have 10 or more employees were classified as being high growth. The number has increased by 0.3 percentage points compared with

36 ONS, 2018. Business demography, UK: 2018, Office for National Statistics, <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/businessdemography/2018#which-regions-have-the-highest-business-births-and-deaths>

37 UK Small Business Statistics, Federation of Small Businesses, 2018. Available: <https://www.fsb.org.uk/media-centre/small-business-statistics>

38 ONS, 2018. Business demography, UK: 2018, Office for National Statistics

39 Sanders, M., Dunstan, J., Estrin, S., Herrmann, A., Pager, B., Szerb, L. and Terragno Bogliaccini, E., 2018. FIRES-reform strategy for the UK.

40 Eurostat, 2017

41 ONS, 2018. Business demography, UK: 2018, Office for National Statistics, 8Bt

42 Estrin, S., 2018. UK entrepreneurship is doing well, but key constraints need to be addressed. LSE Business Review. <https://blogs.lse.ac.uk/management/2018/07/02/entrepreneurial-activity-in-the-uk-is-strong-but-regionally-unbalanced/>

the previous year. Here high growth includes all businesses with an average growth in employment of more than 20% per year over a three-year period (between 2015 and 2018). The size threshold used to identify these businesses is the number of employees – at least 10.

It is important to note that there were regional differences based on the location of the high growth businesses. During the period 2015-2018, London was the region with the largest number of businesses showing high growth measured by employment, totalling to 2,850 or 5.8%. The South East had the second-largest high growth level at 2,030 businesses or 5.1%. Northern Ireland had the smallest number of high growth businesses at 320 or 4.3%.<sup>43</sup> There was also a sectoral variation. Information and communication had the highest percentage of businesses in high growth 8.5%, followed by finance and insurance at 8.0%. The smallest percentage of high growth businesses was property at 3.4%.<sup>44</sup>

*Business Death* - The North West had the highest death rate in 2018 at 13.6%, a 1.6 % increase since 2017. Northern Ireland had the lowest death rate at 8.1%, an increase of 0.1% compared with 2017. Also the highest employer business death rate for 2018 was in transport and storage (including postal) at 16.5%, followed by business administration and support services at 15.7%. Retail was the industry where the death rate increased the most, from 9.5% in 2017 to 11.9% in 2018.<sup>45</sup>

### Features of the ecosystem

Entrepreneurial ecosystems explain how system conditions influence the entrepreneurial agency of actors to create value<sup>46</sup>, with entrepreneurs in startups being the prime actors. There are various measures and monitors of this ecosystem. The Global Entrepreneurship Index for instance, measures a country's entrepreneurial ecosystem through 14 pillars by combining individual data. These are some of the notable pillars: opportunity recognition, risk acceptance, urbanization, education, economic freedom, digital governance, digital marketplace, digital business. The Index indicates the importance of the ability to distinguish self-employment and replicative entrepreneurship "from the innovative, productive and rapidly growing entrepreneurial ventures that drive real economic growth".<sup>47</sup>

Using GEM reporting, the UK total early-stage entrepreneurial activity (TEA – the sum of the nascent entrepreneurship rate and the new business owner-manager rate – without double counting) in the UK was 7.9% in 2018. In total, 20% of individuals of working age in the UK either intended to start doing business in the next three years or were involved in commercial activity, while 4% of the working age adult population were owner-managers of a business that was 4 to 42 months old (new business owner-managers).<sup>48</sup>

The GEM System shows the trends of all the measures of entrepreneurial activity, which have not changed since 2017. TEA rates in 2018 were similar across Wales (6.9%), Scotland (6.3%) and Northern Ireland (6.5%), and the highest rate was in England – 8.1%. More than four-fifths of those involved in early stage entrepreneurial activity in the UK were *opportunity-motivated*, which was not significantly different from 2017, while the necessity rate was identical to 2017 at 1.1%. Employees engaged in entrepreneurial activity on behalf of their employers stood at 5.7% in 2018.<sup>49</sup>

Some of the regional differences seen in levels of entrepreneurial activity reflect attitudes towards entrepreneurship, where positive attitudes towards entrepreneurship (seeing entrepreneurship as desirable, feasible and socially beneficial, and requiring greater average risk appetite) correlate with

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43 ONS, 2018. Business demography, UK: 2018, Office for National Statistics, 7.p.

44 Ibid., 8.p.

45 Ibid.

46 Ács et al., 2014 ; Stam, 2015

47 GEDI.2018. The 2018 Global Entrepreneurship Index <https://thegedi.org/2018-global-entrepreneurship-index-2/>

48 Hart, M., Bonner, K., Heery, L., Prashar, N. and Levie, J., 2018. Global Entrepreneurship Monitor United Kingdom 2018.Monitoring Report. Available: <https://www.gemconsortium.org/report/gem-uk-2018-monitoring-report>

49 Hart, M., Bonner, K., Heery, L., Prashar, N. and Levie, J., 2018. Global Entrepreneurship Monitor United Kingdom 2018.Monitoring Report.

greater levels of entrepreneurship. This may deter potential entrepreneurs from acting on their ideas and prevent some entrepreneurs from scaling their businesses further.<sup>50</sup>

Recent reports show year on year growth in the numbers of entrepreneurial start-ups, with the UK ranked 4th globally on the GEDI behind the USA, Switzerland and Canada. Nevertheless, there are still gaps. As one example, the Treasury recently commissioned an independent review of female entrepreneurship, which identified the barriers faced by women starting and growing businesses and recommended ways of unlocking untapped talent. In response, the UK government announced the aim to increase the number of female entrepreneurs by half by 2030, equivalent to nearly 600,000 additional female entrepreneurs.<sup>51</sup>

Another weakness within the entrepreneurial ecosystem continues to be enterprise education in schools. Schools used their curriculum to prepare pupils for the world of work only when school leaders considered it a priority. Upon delivering enterprise education, there were too few measures to determine the impact on pupils' knowledge, understanding and skills. Less than 25% of schools formally assessed pupils' learning of the subject and even fewer used external validation, such as accredited award schemes, to verify pupils' achievement.<sup>52</sup> As a result, the UK ranks 12th in the Global Entrepreneurship Monitor's 2018 review of basic school enterprise education.<sup>53</sup>

### Financial schemes that encourage entrepreneurship

Successive UK governments have attempted to provide an effective entrepreneurial ecosystem through measures in the business environment and in education. The UK has one of the lowest corporation tax rates in the G20 Trading economics list in 2019<sup>54</sup>, with the ability to register a company within 48 hours, gain government support for start-ups and entrepreneurs and access the second largest labour force in Europe. It has offered particular support for entrepreneurs starting or moving their business to the UK, with a current focus on tech entrepreneurs.<sup>55</sup>

Current schemes include the Start Up Loans programme, a government-backed scheme helping individuals start or grow a business in the UK. Alongside the low-interest loan, successful applicants can access free mentoring from experienced advisers to start or grow a new business. Potential business startups can borrow up to £25,000 (the average loan amount is £7,200) with a fixed interest rate of 6% per annum and a 1-5 year loan repayment term. There are no set up or early repayment fees, but 12 months free pre-loan and post-loan support is available in addition to mentoring and practical help with business plans, cash flow forecasts, and online resources. So far over 63,000 business ideas have been supported with more than £500 million worth of loans.

Other national financial measures include investment schemes, research and development tax credits and external funding sources. The Seed Enterprise Investment Scheme offers tax relief to individual investors that are buying new shares in a company. The Research and Development tax credit scheme allows companies to claim back research and development costs up to two years after the end of the accounting period the costs relates to. Lastly, EU's Horizon 2020 programme to which UK companies may still have access to after Brexit.

Regionally, inducements are offered through Local Enterprise Partnerships and a Growth Hubs, with competition to attract technology based businesses and start ups. In London, startups can access the London Co-Investment Fund, for investment in seed rounds of between £250,000 to £1 million. Further,

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50 NESTA, 2018., Motivation to scale, <https://www.nesta.org.uk/report/motivations-to-scale/>

51 Rose Report. 2019. The Alison Rose Review of Female Entrepreneurship, <https://www.gov.uk/government/publications/the-alison-rose-review-of-female-entrepreneurship>

52 Ofsted, 2016. Getting ready for work, 24 November, Ofsted Report <https://www.gov.uk/government/publications/enterprise-education-how-secondary-schools-prepare-young-people-for-work>, 7.p

53 NESTA, 2018., Motivation to scale, <https://www.nesta.org.uk/report/motivations-to-scale/>

54 Trading economics database, available: <https://tradingeconomics.com/country-list/corporate-tax-rate?continent=g20>

55 The Global Entrepreneur Programme, UK Government, 2019



## Research on Transdisciplinary Entrepreneurship Training

Tech.London provides local workspaces, events, mentorship programmes, job boards and funding tips, as part of a collaboration between the Mayor of London, investor portal Gust and lead sponsor IBM. London & Partners also offers support and advice for scale-up companies looking to set up shop in the capital.

### Technology startups

While the Start Up Loan scheme covers a range of new business ideas, technology startups are a critical target for government, supported through a range of measures delivered nationally through Innovate UK, the network of Growth Hubs, and through measures in education including UK universities.

Innovate UK offers funds and connects UK startups and businesses to develop new products, processes and services across designated critical technology areas that are stated in the Industrial Strategy. Since 2007, around £2.5 billion has been invested to help businesses across the country to innovate, this amount is valued at double with match funding at above £4.3 billion. 8,500 organisations have been supported, 70,000 jobs have been created and £18 billion of value has been brought to the UK economy. Innovate UK has the aim of identifying and backing potential high-growth businesses with a focus on scaling-up businesses. Through its competitions, direct links and the Catapult programme, universities work with Innovate UK to develop entrepreneurs that have technology-based startups. Support includes business growth experts across England, Northern Ireland and Wales, as well as an aligned network in Scotland. The Enterprise Europe Network signposts further support and offers coaching and mentoring as part of the Innovate 2 Succeed programme. Since 2010, Innovate UK has co-funded 264 companies that are now high-growth firms by using a new tailored approach to scale up through innovation that was codesigned with the Scaleup Institute.<sup>56</sup>

Innovate UK aims to work with universities through:

- ✓ The Catalyst programme with funding to commercialise activities to researchers, startups and businesses working in specific sectors or technologies,
- ✓ Knowledge Transfer Partnerships to build partnerships between businesses looking to address specific problems or opportunities and researchers in academia with relevant skills and expertise,
- ✓ Innovation and Knowledge Centres to provide a shared space and entrepreneurial environment for academia and businesses to work together on commercialisation,
- ✓ The Innovation and Commercialisation of University Research programme to reduce barriers to the commercialisation of university research, to help determine the appropriate path to commercialisation: through licensing, spinning out or conducting further research to make an idea market-ready.

### Foreign talent

Overseas entrepreneurs can seek free guidance from the Department for International Trade Global Entrepreneur Programme, while startups in the capital can apply for Techstars London, an accelerator that provides access to investment, mentorship and collaboration with other top entrepreneurs. Furthermore, government-funded Tech Nation provides schemes including the Future Fifty, where digital startups/companies can gain access to expertise across both public and private sectors, and the Digital Business Academy, a free online learning platform for pairing tech entrepreneurs to learn the skills they need to start, grow or join a digital business.

Attracting talent to the UK is a consistent aim. In March, two visa routes with no limit on the possible number of applicants came into effect: the Start-up visa and the Innovator visa. Foreign workers who want to run a business in the UK can apply for an Innovator visa. The prerequisites for applying are

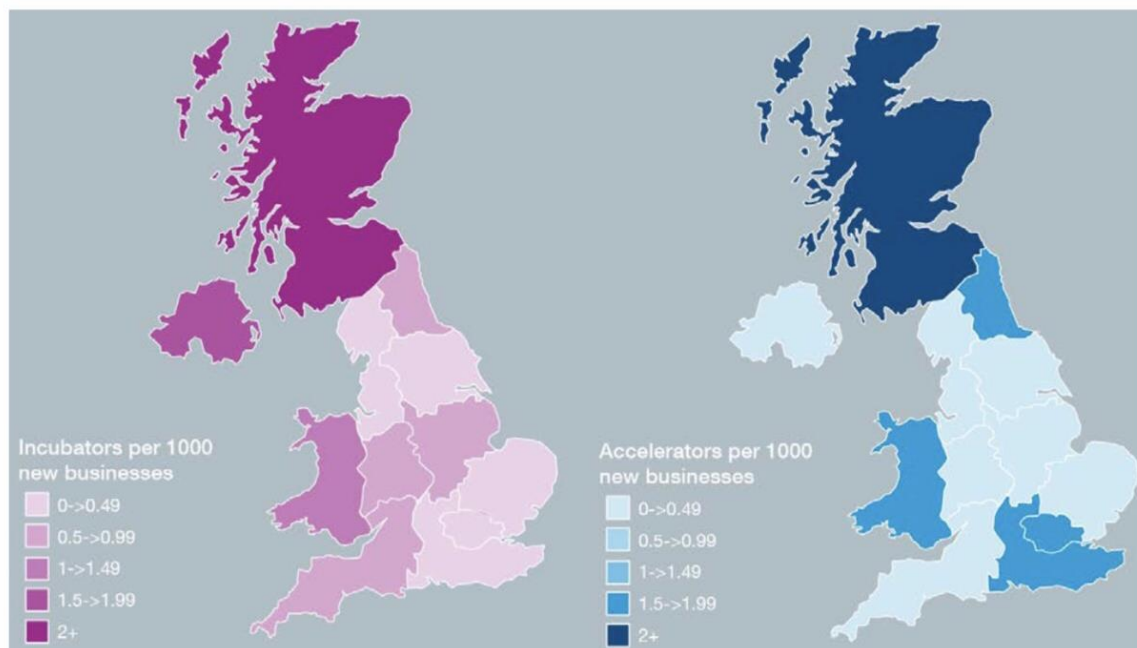
as follows. Firstly, the idea should be endorsed by an approved body – a UK higher education institution or a business organisation with a history of supporting UK entrepreneurs. Pre-Brexit, they should be from outside the European Economic Area and Switzerland, and they meet the remaining eligibility requirements. They must also have at least £50,000 in investment funds for a new business, but do not need this if their business is already established and endorsed for an earlier visa.

In 2018, the government outlined plans to address patchy digital broadband coverage across the UK, aiming to give the majority of the UK population access to 5G, connect 15 million premises to full fibre broadband by 2025, and provide full fibre broadband coverage across all of the UK by 2033.

### Entrepreneurial Spaces: hatcheries, incubators, accelerators

The number of business incubators and accelerators in the UK has grown rapidly over the last few years, much of it is facilitated by public funding. Between £20-30 million of public funding that is comprised of UK and EU funding sources is being spent on UK incubators and accelerators per year. In 2017, 205 incubators, 163 accelerators, 11 pre-accelerators, 7 virtual accelerators and 4 virtual incubators were reported as active in the UK, together with a number of related organisations, such as coworking spaces, active venture capital funds and makerspaces. All incubators provide businesses with office/work space, but accelerators emphasise direct funding and the majority offers some form of financial support to startups. Most accelerators and incubators have either a broad focus on digital technology or no sectoral preference, while incubators are much more likely to focus on businesses that are active in science-based areas, such as health and life sciences, than on accelerators.<sup>57</sup>

As is seen in the previous illustrations of the entrepreneurial ecosystem in the UK in this section, there is significant regional variation both across the nations comprising the UK and within individual countries, as seen in Figure 14.



Business birth rates for different regions were obtained for 2015 from the Office of National Statistics and are based on new registrations for VAT and PAYE across all business sectors.

Figure 14: Map of incubator and accelerator density (per 1000 new businesses) in the UK

Over half the accelerators were London-based, and incubators were evenly spread throughout the UK. Scotland, Wales and Northern Ireland have a higher concentration of both incubators and

<sup>57</sup> Bone, Jonathan, Olivia Allen, and Christopher Haley. 2017. "Business Incubators and Accelerators: The National Picture (BEIS Research Paper No. 7)." Available: BEIS.[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/608409/business-incubators-accelerators-uk-report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/608409/business-incubators-accelerators-uk-report.pdf)

accelerators, relative to the number of new businesses, than England. This is also true for funding. While accelerators and those accelerators and incubators supporting startups in Edtech and Fintech tend to rely on corporate and nonpublic sources for funding, incubators rely on public funds. All incubators in the North East, along with more than 35% in Wales, Scotland and the West Midlands are entirely public/university funded.<sup>58</sup>

A recent survey of 428 startups showed that most startups consider the contribution of the incubator or accelerator they attended to have been significant or even vital to their success. Those that attended an incubator are slightly more likely (73%) to report attendance as being significant or vital to their success than those that attended an accelerator (64%). Similarly, attending accelerators is positively associated with three outcome measures: 1) survival that is measured by continued online presence, 2) employee growth, and 3) funds raised.<sup>59</sup> The survey reveals direct funding to be the most useful support. It is followed by access to office space, lab space and technical equipment. Most types of support have a significant positive association with at least one of the outcome measures above, but there was little consistency across the measures. The survey found strongest evidence for positive impacts from access to investors, access to peers, help with team formation, direct funding from the programme.

### Summary

The entrepreneurial ecosystem in the United Kingdom is the result of varying influences, similar to the results of other country ecosystem research. The government, education institutions, private sector, as well as combined efforts from the education and private sectors, form the necessary infrastructure, build networks and communities and provide research and innovation opportunities for the entrepreneurs. This is summarised in Figure 15.<sup>60 61 62</sup>

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58 Bone, Jonathan, Olivia Allen, and Christopher Haley. 2017. "Business Incubators and Accelerators: The National Picture (BEIS Research Paper No. 7)."

59 Bone, J, Gonzalez-Uribe, J., Haley C. and H. Lahr. 2019. THE IMPACT OF BUSINESS ACCELERATORS AND INCUBATORS IN THE UK, BEIS Research Paper Number 2019/009, Department for Business, Energy, Industrial Strategy, available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/839755/The\\_impact\\_of\\_business\\_accelerators\\_and\\_incubators\\_in\\_the\\_UK.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/839755/The_impact_of_business_accelerators_and_incubators_in_the_UK.pdf)

60 UK Government. 2019. Get support to move your tech business to the UK <https://www.great.gov.uk/international/content/how-to-setup-in-the-uk/global-entrepreneur-program/>

61 Wright, M., Siegel, D.S. and Mustar, P., 2017. An emerging ecosystem for student start-ups. *The Journal of Technology Transfer*, 42(4), pp.909-922.

62 van Rijnsoever, F.J., 2020. Meeting, mating, and intermediating: How incubators can overcome weak network problems in entrepreneurial ecosystems. *Research Policy*, 49(1), p.103884.



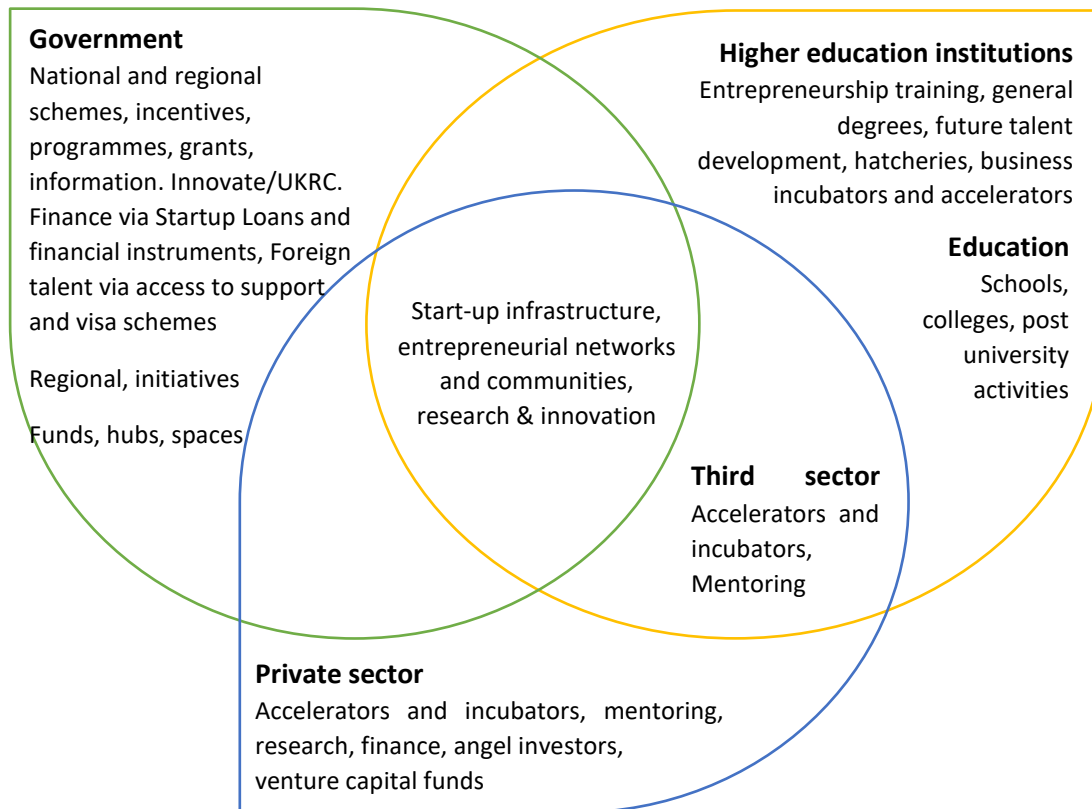


Figure 15: The main drivers of the entrepreneurship ecosystem in the United Kingdom

## Identification of Trends in Entrepreneurial Competences

To identify trends of entrepreneurial competences in the international startup environment a literature review was conducted. The review answers these questions: whether there is change and a development trend in entrepreneurial knowledge, skills sets, and competencies, and whether there is a method to train and assess them in the real business environment. For the purpose of the content analysis academic sources in the EBSCO database within the period from 2015 to 2018 were reviewed. Initially 98 articles were selected according to the keywords “entrepreneurial skills”, “entrepreneurial competences”, “entrepreneur + competence”. For analysis 70 articles were chosen where entrepreneurs were considered as subjects for research on entrepreneurial competences, whereas those studies where organizations were assumed as subjects for research were excluded from the content analysis.

There are many competences such as taking the initiative, creativity, result orientation, capacity for reflection and interpersonal skills, active problem seeking and problem-solving, and risk appetite that are considered by many researchers to be typical for entrepreneurs (Baert & Camertijn, 2007; Gibb, 2008; Laevers & Bertrands, 2004; Van den Berghe, 2007; Van der Kuip & Verheul, 2004, Schelfhout et al., 2016). At the same time, modern environment and policy makers are interested in the approximation of managerial and entrepreneurial competences. Higher education institutions (hereinafter – HEI) are concerned with developing not only skills but attitude that shapes the action of the workforce turning towards proactive entrepreneurial behaviour.

A positive entrepreneurial attitude can be formed in many ways, likewise a neglecting reaction towards entrepreneurship is equally present in society and affects the common perception. The literature review revealed that educational programs reported positive outcomes of skill-based training, although those students who came from entrepreneurial families demonstrated higher aspiration to education. Furthermore, one study revealed that earlier orientation of students significantly influences the outcomes of the course (Mets et al., 2017). An interesting fact is that another study reported that entrepreneurial skills, such as creativity, openness to risk-taking, negotiations skills, technical knowledge and skills, and marketing, are passed from generation to generation in case of a family SME (Letonja et al., 2016). Another study in the Baltics discovered that creativity, communication, organiser and project manager skills, ability to plan and ability to take risk, entrepreneurial ability, helps act in a more opportunistic manner to acquire knowledge that in turn is a skillset for start-upers. In contrast to the previous study, students in Latvia have less knowledge about entrepreneurship and the demands of the labour market (Bikse et al., 2017). Similar findings were reported by researchers from Poland stating that people tend to see themselves as employees not employers, they are not willing to take risks, undertake the initiative, or demonstrate creativity (Igielski, 2017). When investigating the need of entrepreneurial competences for managers and leaders a researcher discovered that entrepreneurial competences are more important for those who “need to deal with risks and challenges” (Postuła and Majczyk, 2018). Other researchers agree by pointing out that there are differences in the entrepreneurial competences among countries depending on the economic climate, i.e. a passive or an opportunity-scanning environment (Taipale-Erävala et al, 2014).

On a wider scale, a researcher from Finland emphasizes the significant role of social skills in the sense of supporting and serving the society that is a powerful driver to raise a responsible citizen that in turn leads to responsible entrepreneurial behaviour (Laalo and Heinonen, 2016). Other researchers recognize the importance of network development, i.e. development of transactional and relational competences (Maksimov, 2017). There is a correlation between strong partnership management skills and sales and marketing skills (Khalid, 2015). Similar observations were made in the Netherlands where an empirical study among master students revealed that social competence and social capital influences the level of entrepreneurial ambition. It was stated that social competence is a cornerstone for various opportunities for early-stage entrepreneurs that are forming a social capital (Lans et al., 2015).

Dealing with uncertain situations requires a competence of crisis management; application of the competence to the context of entrepreneurial crises, such as resource shortage, dissatisfied clients or an incorrect overview of the financial perspective of the new venture, demands fostering the entrepreneurial competences of perceiving critical incidents and coping with them (Heinrichs, 2016). Intriguing findings were reported by a Lithuanian researcher who proposed the Technology Entrepreneurship education method that was developed at Kaunas University of Technology in Lithuania. In the application of this method the technology entrepreneurship competence is understood as a sum of knowledge, skills and abilities that are necessary when searching for problems or applications for a particular technology, launching new ventures, introducing new applications, and exploring and exploiting opportunities that rely on scientific and technical knowledge (Juceviciene et al., 2015). The method combines techniques for launching a new business and products, as well as exploring opportunities in the field of technical knowledge and science. Hereafter, it is suggested to train engineers in lean start-up methodology, business modelling, intellectual property protection and funding for a start-up in the same way that future managers and entrepreneurs are usually trained (Juceviciene et al., 2015). The author referred to previous studies (Pretorius et al., 2005) where competencies related to business management were set as complementary for an overall entrepreneurial competence. Researchers emphasize the importance of both the entrepreneurial and technical competence as preconditions for innovation and a successful launch and further growth of a new SME (Ng et al., 2016). As SMEs usually operate with limited access to resources, the enterprises benefit from professional technical expertise and experience of their owners, e.g. receiving a grant at the beginning of business activities (Stenholm and Renko, 2016). Similarly with the previous studies, some researchers are convinced that the abilities to plan and organize work, supervise tasks and manage people are perceived as the most important both for managers and owners of internationalized SMEs (Korsakiene, 2015).

Interestingly, the idea of gaining benefits from academic entrepreneurship, cross-disciplinary studies, entrepreneurial and operational activities is supported by researchers who write about the entrepreneurial ecosystem and beneficial location of the clusters where HEIs and start-ups are collocated (Rasmussen 2011, Rao and Mulloth, 2017). Researchers (Bohdziewicz, 2016, Tuononen et al., 2016; Bravo et al., 2017; Sales et al., 2017) who explore entrepreneurial and managerial competences, refer to the concept of Career Anchors by Edgar Schein (Schein, 1985) that describes an individual's personal identity or self-image with many facets including among others technical and functional, general management and entrepreneurial creativity. When comparing the entrepreneurial orientation with the managerial orientation, there is much overlapping in the criterion variables to which each is related, hence the main difference between these two dimensions of career orientation is the desire for upward movement within the organization in the managerial orientation in contrast to dedication for the creation of new products or processes for the entrepreneurial orientation (Bravo et al., 2017).

### Entrepreneurial competence categories

There are many categorizations for entrepreneurial competences, some researchers (Bird, 2002; Man et al., 2002,) divided them as 1) market exploiting opportunities; 2) interpersonal relationships; 3) conceptual abilities, such as decision-making, understanding of complex situations and innovativeness; 4) organizational skills; 5) strategic skills; 6) belonging and leading. There is another approach proposed by Le Deist and Winterton (2005) in the context of entrepreneurial educational program development that defines entrepreneurial competence as a combination of 1) knowledge-related cognitive competences; 2) entrepreneurial skills and know-how or functional competence; 3) behavioural competence.

Another division of entrepreneurial competences that has been chosen as the benchmark for comparison throughout this review is "EntreComp: The Entrepreneurship Competence Framework" that was developed in response to 'A New Skills Agenda for Europe: Working together to strengthen human capital, employability and competitiveness' by the European Commission. It describes entrepreneurship as a transversal competence, which can be applied by citizens to all spheres of life from nurturing personal

development, to actively participating in society, to (re)entering the job market as an employee or as a self-employed person, and to starting up ventures (cultural, social or commercial). It is made up of three competence areas: 'Ideas and opportunities', 'Resources' and 'Into action'. Each area includes five competences, which, together, are the building blocks of entrepreneurship as a competence.<sup>63</sup> The literature review concluded in an entrepreneurial and managerial competence assessment is presented in Table 1 below.

Table 1: Comparison of Entrepreneur's and Manager's Competences<sup>64</sup>

EntreComp (2018)	Entrepreneurial Competences	Entrepreneurial Competences since 2015	Managerial Competences
Creativity	Creativity, creative and lateral thinking	Creativity and creative thinking	Creativity
Coping with uncertainty, ambiguity and risk	Managing uncertainty	Managing uncertainty	Ability to react and divide risks
Working with others	Team and individual work	Team and individual work	Teamwork
Self-awareness and self-efficacy	Capacity for reflection	Self-awareness	Self-organization
Mobilizing others	Interpersonal skills, incl. conflict resolution and negotiation	People management incl. Communication and Social skills, network development, partnership management, social competence	Ability for collaboration and forming relationship
Motivation and perseverance	Motivating others	Motivating others	n/a
Taking the initiative	Initiative taking	Initiative taking	n/a
Planning and management	Business planning, modelling organization, project management	Business modelling, organizing incl. specialized techniques, e.g. Lean start-up methodology	n/a
Spotting opportunities, Valuing ideas and Vision	Entrepreneurial ability	Entrepreneurial ability	n/a
Learning through experience	n/a	Ability to acquire knowledge	Willingness to learn and Erudition
n/a	Leadership	Leadership	Leadership

63 EntreComp: The Entrepreneurship Competence Framework, 2016, Available: <https://ec.europa.eu/jrc/en/entrecomp>

64 Today's Business and Entrepreneurship Development: Knowledge Dynamics and Competences of Managers and Entrepreneurs, T.Nikitina & I.Lapina, 2019.

Three competences – creativity, managing uncertainty, teamwork, ability for self-awareness and self-organization and strong people management competences – are relevant for all researchable groups: for modern managers, entrepreneurs and the entrepreneurial educational standard as well. It is important to note that when describing entrepreneurs in the last three years researchers pay great attention to the investigation of social competence, communication and social skills, network development, and partnership management – that is a mirror image of the manager's collaboration ability and competence to form internal and external relationships.

The next group of the entrepreneurial competences among entrepreneurs in the last decades, including the last three years, and included in the EntreComp framework are: the ability to motivate others, the ability to take the initiative, competence in business planning and management, and the ability to spot opportunities. A thought-provoking finding is that during the last couple of years entrepreneurial competences tend to be very specific, for example, competence in business modelling, organizing, incl. specialised techniques such as the lean start-up methodology. The researchers assume that the change might be caused by the increasing role of start-ups as a form of SMEs and a rise in the number of business accelerators and incubators. Moreover, academics utterly emphasize the significance of a) technical knowledge and skills; b) technology entrepreneurship; c) knowledge on intellectual property protection; d) competence in funding for start-ups. These findings may be linked with digital entrepreneurship and the notable role of ICT in the modern environment. Figure 16 provides division of competences based on the trends that have been analysed in the literature review.

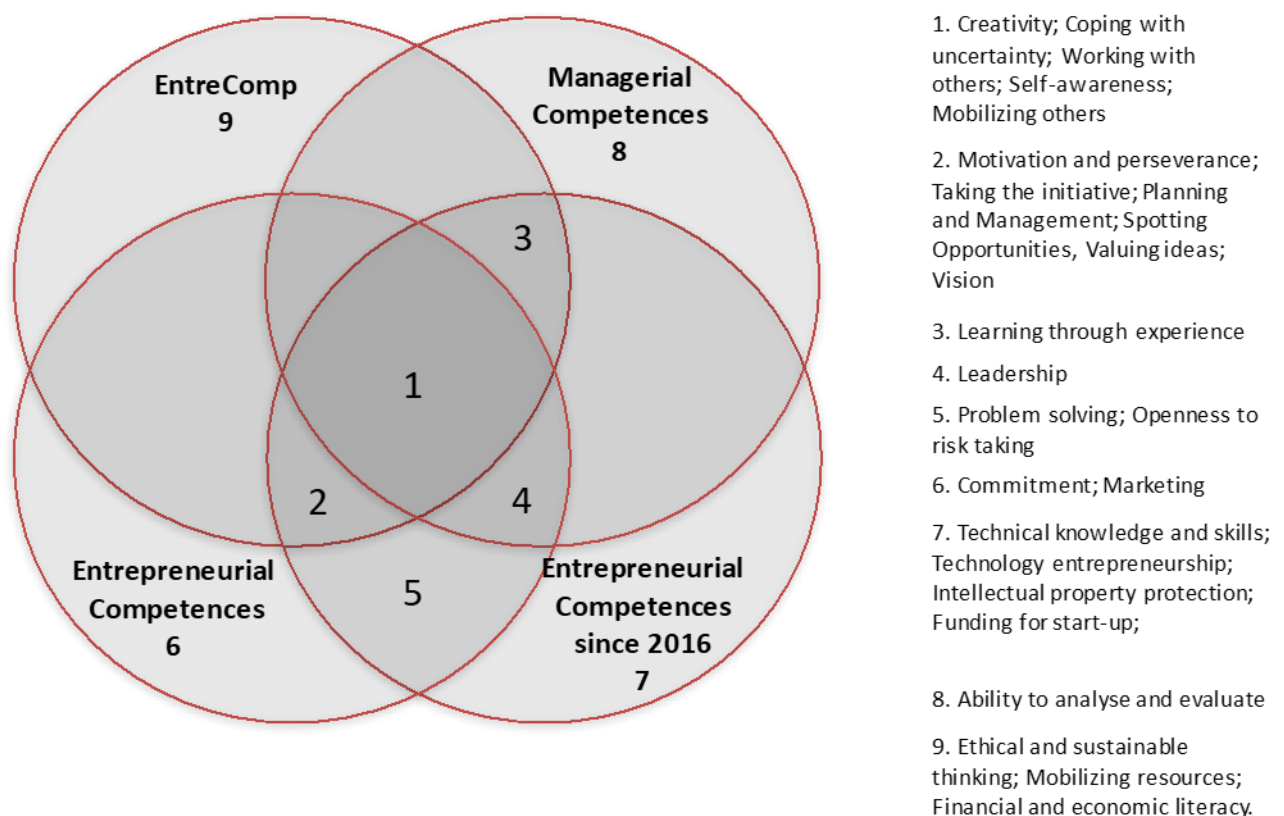


Figure 16: Entrepreneurial and Managerial Competences Model<sup>65</sup>

There are several findings worth noting: the leadership competence, which for many years was considered as an undivided cornerstone for leaders and managers, is not included in the EntreComp framework, however, the ability to acquire new knowledge, which is demanded for modern

<sup>65</sup> Ibid.

entrepreneurs and managers is a novelty for academic research that is appearing recently and it is likewise included in the EntreComp framework. There are two competence sets that have not been reflected either in EntreComp or in managerial skill models as their meanings are broader than those described in these models: 1) solving problems / dealing with critical incidents; 2) risk appetite and openness to risk taking / risk taking. At the same time, there are entrepreneurial skills that were discussed extensively earlier but have not been very popular in academic discussion during the last three years; they are result orientation and commitment, as well as marketing competence. Lastly, the EntreComp framework includes competences that have not been widely discussed by researchers, they are: ethical and sustainable thinking; mobilizing resources; financial and economic literacy, which are crucial for sustainable and scalable entrepreneurship.

## Entrepreneurship competence training trends in higher education

Disruptive technologies have provoked alterations in the business environment: the entrepreneurial knowledge sets, skills and competences have changed and developed. Over the past decade, there have been distinct technology shifts also in the realm of higher education. The fourth industrial revolution, i.e. Industry 4.0, manifests the emergence of “smart factories”, that are connected to production facility Cyber-physical systems by using the Internet of Things, the Internet of Services and the Internet of People. Industry 4.0 imposes that Education 4.0 applies virtual learning environments to combine real and virtual world information.<sup>66</sup> Therefore, the skills and competences in Education 4.0 are focused on innovation producing education, virtual learning environments and demanded skills emerging from the fourth industrial revolution. The concepts evolves from Education 3.0 – known as knowledge producing education that was initiated by the demanded skills from the industry (Industry 3.0).

Education 4.0 has brought pivotal changes to the existing models of higher education, which aim to respond to the emerging business needs. Drivers of Education 4.0 are social progress, talent investment, millennial mindset, shared economy and open innovations, digitalization and disruptive technologies. The present study reveals trends in higher education, such as digital transformation, cross-sectoral education, and problem based learning, etc. in response to the business and society needs. Arisen changes in the entrepreneurial higher education are the focus of the present study.

This chapter is based on the review of 35 sources: scientific articles, European Commission and OECD guidelines, policies, reports and strategy plans concerning higher education. A cross-country comparison of The United Kingdom, Finland, The Netherlands and Latvia has been conducted. Scientific articles selection has been limited to the years of 2016 – 2019.

The present study is divided into two main parts: part I presents detection of innovations and trends in the higher education in response to the business needs, part II examines roles and models of entrepreneurship education in the chosen countries and the EU. The results of the study can be used for enhancement of existing higher education entrepreneurship training models among countries of the EU.

In the last decade, all global industries have faced technological changes brought by Industry 4.0. Higher education institutions are no exception, they now are challenged to maintain flexibility and responsiveness under unforeseen circumstances in the rapidly changing world, respond to the evolving needs of the labour market, arising social and economic needs of society. Among higher education, entrepreneurial education is getting more and more attention everywhere in the world, because entrepreneurship is seen as the major engine for economic growth and job creation.

Exponential technologies creating a paradigm shift in the way that manufacturing operates. The future workplace and society are still being moulded and technology is one of the main pillars in shaping

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66 Requirements for Education and Qualification of People in Industry 4.0, A. Benešová & J. Tupa, ScienceDirect, 2017



the future. The globalized workplace of the future requires individuals and organizations in society to be increasingly equipped with entrepreneurial competencies. HEI, for their part, are challenged to develop among their students' these competences, especially digital skills, creativity, collaboration communication and critical thinking. Besides economic growth, entrepreneurship plays a crucial role in taking on important societal challenges, creating social value for the public good, and improving society welfare. Drivers of Education 4.0 are social progress, talent investment, the millennial mindset, shared economy and open innovations, digitalization and disruptive technologies. It is characterized by the approach of 'anywhere anytime', it is personal, flexible, practical, modular, based on project learning, cross-sector education and many new learning approaches that are analysed in this paper. To successfully meet the arising needs and respond in time to emerging challenges the present paper identifies new trends and approaches in higher education.

### Premises of higher education paradigm shift

Intense and structured cooperation among European HEI's started around 30 years ago when the Erasmus programme was launched. As the demand for student mobility grew rapidly, the Bologna Process, starting with the Sorbonne and Bologna Declarations in 1999, was the response of national governments to the challenges arising from the increased mobility of students and alumni. The process aimed to bring more coherence to higher education models across Europe, to make education more inclusive and accessible, and to enhance the attractiveness and competitiveness of higher education in Europe worldwide. In line with the goal of the EU to create a Europe Education Area by 2025 the Process called for an inclusive and innovative approach in higher education, for integrated transnational cooperation and Cross-sector education, research and innovation, for securing a sustainable future and general welfare through higher education.<sup>67</sup>

In its turn, the Industrial Revolution 4.0 has influenced major industries and jobs by the introduction of such technologies as the Internet of Things (IoT), Big Data, and Artificial Intelligence (AI). Industry 4.0 not only has affected industries, but is also transforming the way education is seen. In result, we are witnessing the evolution of Education 4.0. European University Association in *Trends 2018*<sup>68</sup> and European Political Strategy Centre in *10 Trends Transforming Education*<sup>69</sup> mention the following changes in higher education:

*Diverse time and place* – Education 4.0 enabled learning anytime, anywhere as the e-learning tools and applications provided opportunities for remote, self-paced learning. Thus, theoretical knowledge is being learned outside the classroom, in turn experiential knowledge is imparted face-to-face. Remote or distance learning is now the subject of HEI wishing to expand their curriculum offerings.

*Digital literacy* – the application of digital technologies in education activities, the implementation of digital literacy in learning content, the creation and usage of electronic media to enable the possibilities of learning with no boundaries in the terms of time or location, the ability to effectively acquire information, new skills and knowledge by accessing digital tools, knowing how to apply digital tools in diverse industries, thus resulting in a more skillful future employees.

*Personalized learning or individualised learning paths* – depending on student individual capabilities, Education 4.0 enables a personalised learning approach. As students are able to learn at their pace, their understanding of the concept and overall results are improving.

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<sup>67</sup> [https://ec.europa.eu/education/policies/higher-education/bologna-process-and-european-higher-education-area\\_en](https://ec.europa.eu/education/policies/higher-education/bologna-process-and-european-higher-education-area_en)

<sup>68</sup> Michael Gaebel and Thérèse Zhang *Trends 2018: Learning and teaching in the European Higher Education Area*, ISBN : 9789078997658 European University Association. Available: <https://eua.eu/downloads/publications/trends-2018-learning-and-teaching-in-the-european-higher-education-area.pdf>

<sup>69</sup> European Commission, 10 May 2017, 'ICT for Work: Digital Skills in the Workplace'. Available: <https://ec.europa.eu/digital-single-market/en/news/new-report-shows-digital-skills-are-required-all-types-jobs>

*Project based learning* - careers are adapting to the future freelance economy, furthermore millennials and the following generations do not stick to one position for long<sup>70</sup>. Thus, students of today need to adapt project-based learning in order to be able to apply their skills as per situation, this approach helps to acquire organisational skills, time management and collaborative skills.

*Field experience or experience based learning* – students are provided with the opportunity to obtain real-world skills that are relevant to prospecting job requirements, this also plays an important role for trans-sectoral education.

The changes are discussed and analysed further in this chapter.

### Trends and changes in higher education

Rapid changes in the labour market as well as expansion of globalisation and the development of the information society have made the operational environment of higher education more complex.<sup>71</sup> Universities have obtained a new task - commercialization of new knowledge for economic development.<sup>72</sup> However, the challenge for the HEIs in the rapidly changing entrepreneurship environment is that it is impossible to predict what type of competencies will be required in the future.

Higher education (HE) can play a crucial role in both taking advantage of the opportunities and responding to the challenges presented by the economic and social changes. As countries struggle to respond to economic, environmental and social transformations – including technological advances, climate change and migration – intellectual capital has become the most valuable asset of our time.<sup>73</sup> HE is equipping coming generations with the necessary skills, high-value knowledge and competencies to thrive in their modern personal and professional lives. Higher education graduates gain significant economic benefit compared to those who do not obtain tertiary education, such as higher employment rates, higher earning and faster earning progression.<sup>74</sup> The employment rate of adults with a tertiary degree is about 9 percentage points higher than for those with upper secondary education only, and they earn on average 57% more. Tertiary-educated adults are also more likely to be in good health, take care of the environment, or participate in public life.<sup>75</sup>

In most OECD countries, higher education is the core provider of R&D, which produces the necessary knowledge required for innovation. HEIs play an important role in the development of their respective regions by contributing knowledge, insights and inspiration in political, cultural, social and economic domains. HEIs can help improve general well-being and produce better social and health outcomes, cultural capital, urban and rural regeneration and environmental sustainability<sup>76</sup> through the promotion and facilitation of citizen participation and involvement in these processes. The human capital is believed to be the main driver of economic development: a better-educated workforce increases the return in the research and development, and ensures more flexible inclusion in the economic structure, thus increasing the economic growth.<sup>77</sup>

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70 Ibid.

71 Jääskelä, P., Nykänen, S., Tynjälä, P. 2016. Models for the development of generic skills in Finnish higher education. *Journal of Further and Higher Education*, 42 (1): 130-142

72 Bikse, V., Lusena-Ezera, I., Rivza, B., Volkova, T. 2016. The Transformation of Traditional Universities into Entrepreneurial Universities to Ensure Sustainable Higher Education. *Journal of Teacher Education for Sustainability* 18 (2): 75-88.3.

73 Education at a Glance, OECD, 2019. Available: [https://www.oecd-ilibrary.org/sites/f8d7880d-en/1/1/2/index.html?itemId=/content/publication/f8d7880d-en&\\_csp\\_=b2d87f13821f45339443c7ca94aafe46&itemIGO=oecd&itemContentType=book](https://www.oecd-ilibrary.org/sites/f8d7880d-en/1/1/2/index.html?itemId=/content/publication/f8d7880d-en&_csp_=b2d87f13821f45339443c7ca94aafe46&itemIGO=oecd&itemContentType=book)

74 Education at a Glance, OECD, 2018. Available: <https://www.oecd-ilibrary.org/docserver/eag-2018-en.pdf?expires=1567486214&id=id&accname=guest&checksum=4C073C0D92072B6095FCCF216F0FF541>

75 Education at a Glance, OECD, 2019.

76 Benchmarking Higher Education System Performance, OECD, 2019. Available: [https://www.oecd-ilibrary.org/education/benchmarking-higher-education-system-performance\\_be5514d7-en](https://www.oecd-ilibrary.org/education/benchmarking-higher-education-system-performance_be5514d7-en)

77 Grizane, T., Sannikova, A., Jasaitis, J. 2017. Impact of Regional Higher Education Institutions on the converge of the regions. *Proceeding of the 2017, International Conference Economic Science for Rural Development*



The changing philosophy of acquiring entrepreneurship competences through higher education is that students need to be trained and not taught. Information needs to be made accessible and students need to learn how to find it rather than the teacher offering it to them in a rigid structure. Changes in higher education models are related to the social, political, economic and technological transformations.<sup>78</sup> Respectively, the major catalysts are globalisation and new patterns of life (increased mobility, ageing society and millennial generation), cross-sector collaborations, economic growth and technological development. The changes in HE are further reflected in this section.

Globalisation facilitates the emergence of transnational networks and trade, in turn higher education systems face the challenge of responding coherently to the continued increase in demand from a complex student population and increased student mobility.<sup>79</sup> Together with digital transformation, globalisation has resulted in “borderless education” which became a key enabler for the paradigm shift in knowledge creation.<sup>80</sup> Due to globalisation the student groups become more international, students’ motivation differs, as well as learning styles, needs and competencies, thus a one-size-fits-all approach to education is no longer acceptable to students. There emerges a need for a more diverse and flexible higher education provision.

*Student Centred Learning (SCL)* as we know it today became a matter of talk in the mid 1970’s, but only in 2016 became widely implemented.<sup>81</sup> SCL is broadly based on constructivism as a theory of learning, which is built on the idea that learners must construct and reconstruct knowledge in order to learn effectively; it focuses on enhancing and empowering the learner, developing their critical ability. In SCL philosophy students are given the opportunity to be involved in the design of courses, curricula and their evaluation, they are seen as active partners who have a stake in the way that higher education functions. The SCL approach aims to give the student greater responsibility enabling the student to think, process, analyse, synthesise, criticise, apply, solve problems, etcetera. The philosophy of SCL sees learning as a constructive interaction between students and teachers.<sup>82</sup> The SCL approach empowers students, gives them the chance to make decisions, and takes into account their needs first. It is a fundamental basis for lifelong and personalized learning. It prioritizes the needs of individual students when developing curricula and learning materials. Students and teachers engage one-to-one or in small groups.

Innovations and disruptive technologies offer great opportunities to increase business efficiency, but at the same time bring challenges that entrepreneurs must overcome in order to keep their market position. Numerous different interests, political and social factors, such as changing social values, corporate and organizational goals, constantly influence further, contemporary business needs. HEI are challenged to prepare professionals who are able to adapt to the arising changes. As the European Commission argues that “Europe’s future economic growth and the employment of its citizens will depend on innovation in products, services and business models”<sup>83</sup>, Education 4.0 has to meet the challenges of preparing the future entrepreneurial society and responding to emerging business needs. The UK Department for Business, Innovation & Skills defines entrepreneurship education as “the application of creative ideas and innovations to practical situations with enterprise education aiming to produce individuals with the mindset and skills to respond to opportunities, needs and shortfalls, with key skills including taking the initiative, decision making, problem solving, networking, identifying opportunities

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78 Trends Shaping Education 2019, [https://read.oecd-ilibrary.org/education/trends-shaping-education-2019\\_trends\\_edu-2019-en#page12](https://read.oecd-ilibrary.org/education/trends-shaping-education-2019_trends_edu-2019-en#page12)  
[https://doi.org/10.1787/trends\\_edu-2019-en](https://doi.org/10.1787/trends_edu-2019-en)

79 Education at a Glance 2019: OECD Indicators.

80 A review of the Concept and its Relevance Today. The Entrepreneurial and Innovative Higher Education Institution, 2018. Available: [https://heinnovate.eu/sites/default/files/heinnovate\\_concept\\_note.pdf](https://heinnovate.eu/sites/default/files/heinnovate_concept_note.pdf)

81 Kaput.K., Evidence for Student-Centered Learning, Education Evolving, 2019. Available: <https://files.eric.ed.gov/fulltext/ED581111.pdf>

82 Student-Centered Learning – Toolkit for students, staff and higher education institutions, Brussels, 2010. Available: [http://www.aic.lv/bolona/2010/Reports/SCL\\_toolkit\\_ESU\\_EI.pdf](http://www.aic.lv/bolona/2010/Reports/SCL_toolkit_ESU_EI.pdf)

83 HORIZON 2020 Work Programme 2014 – 2015. Available: [http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014\\_2015/main/h2020-wp1415-societies\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-societies_en.pdf)

and personal effectiveness.”<sup>84</sup> The OECD argues that entrepreneurship competencies need to be developed over the full course of education, with students should be encouraged to start-up a business in later years of their studies<sup>85</sup> to have experiential knowledge, often stated as 'learning by doing'. As for entrepreneurial education it is vital to teach the ability to adopt and react. In order to prepare students for labour market requirements and provide the experience-based knowledge universities of Latvia organise business incubators providing services to students, as well cooperation between local governments and entrepreneurs.<sup>86</sup>

Digitalisation in higher education learning and teaching stands high on policy agendas, both at European and national levels, and for higher education institutions. The Netherlands as several other EU countries have a specific strategy on the use of digitally based teaching and learning methods in higher education. The European Commission higher education agenda 2017<sup>87</sup> emphasizes the need for HEIs to obtain opportunities provided by the digital transformation, implement digital learning strategies, and exploit the potential of technology to the benefit of their staff and students. In 2018 the European Commission adopted a Digital Education Action Plan which launched 11 initiatives to support technology use and the development of digital competences in education.<sup>88</sup> The initiatives address three major priorities, which are of high importance for inclusive, connected, effective and efficient higher education systems: 1) making better use of digital technology for teaching and learning, 2) developing the relevant digital skills and competences, 3) improving education systems through better data analysis and foresight.

By responding to the labour market needs individuals are required to adapt to business and customer awareness, problem solving, teamwork, communication and literacy, application of numeracy and information technology, and demonstrate creativity as well as openness to new ideas and the drive to create value from these. By providing new learning environments and teaching strategies, which are required to achieve learning outcomes mentioned before, digital technologies offer more students opportunities to experience and exploit tacit knowledge and skills. Another benefit of smart technologies is that they make learning more accessible to more people and tailor it to individual needs, this corresponds with the philosophy of Student Centred Learning.

Digitalisation has drawn attention to gamification, “the use of game design elements in non-game contexts”. These are cases where the game elements are not employed to develop a proper entertainment game, but rather to stimulate user engagement by promoting emotional, cognitive and behavioural connection. It has been agreed that gamification promotes collaboration, interactivity and active learning. Augmented, virtual, and mixed reality have the potential to increase visual and technology literacy, and the attention of the audience. Virtual games are designed to provide immediate feedback, students are intrinsically motivated to keep playing them, honing skills throughout, applying new knowledge, making mission-critical decisions while identifying obstacles, considering multiple perspectives, and experiencing various situations.

Taking these major challenges into consideration it is important to understand which higher education learning methods are most suitable in the contexts of these different influential changes. Table 2 below presents the trending methods in higher education that are a response to a changing demand, technological and societal developments, and recommendations by the OECD and the European Commission.

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84 Departmental Sustainability Overview. Department for Business, Innovation & Skills. Briefing for the House of Commons Environmental Audit Committee, 2013. Available: [http://www.nao.org.uk/wp-content/uploads/2013/07/BIS-SUSTAINABILITY-BRIEFING\\_17-07\\_Final-2.pdf](http://www.nao.org.uk/wp-content/uploads/2013/07/BIS-SUSTAINABILITY-BRIEFING_17-07_Final-2.pdf)

85 OECD, 2018, Developing entrepreneurship competencies Parallel session 3, SME Ministerial Conference, Mexico City, available: <https://www.oecd.org/cfe/smes/ministerial/documents/2018-SME-Ministerial-Conference-Parallel-Session-3.pdf>

86 Titareva T., Development Trends in the Higher Education Industry (HEI) in Latvia, 2017. Available: [https://www.academia.edu/35728436/DEVELOPMENT\\_TRENDS\\_IN\\_THE\\_HIGHER\\_EDUCATION\\_INDUSTRY\\_HEI\\_IN\\_LATVIA](https://www.academia.edu/35728436/DEVELOPMENT_TRENDS_IN_THE_HIGHER_EDUCATION_INDUSTRY_HEI_IN_LATVIA)

87 European Commission, 2017

88 [https://ec.europa.eu/education-in-the-eu/digital-education-action-plan\\_en](https://ec.europa.eu/education-in-the-eu/digital-education-action-plan_en)

Table 2: Trending methods in higher education

Learning method	Premises	Description
<i>Problem based learning (PBL)</i>	Competency-based education; student-centred approach	Students apply the knowledge to new situations; when faced with contextualized, structured problems the students are asked to investigate and discover meaningful solutions by using action. Problem-based learning involves students working in small teams on real-life problems.
<i>Blended learning</i> <sup>89</sup>	Personalised approach, evidence-based education <sup>90</sup>	Blended learning involves less direct instruction from the teacher and more discovery-based methods of learning. BL has been defined as a combination of face-to-face and online learning instructional models. <sup>91</sup>
<i>Experiential Learning</i>	Simulation and gamification, learning by doing <sup>92</sup> , emerging of serious games, collaborative learning, entrepreneurial pedagogy pillars	Opportunities for practice with immediate feedback.
<i>Cooperative learning (CL)</i>	Soft skill development	Social skills are promoted and enhanced in the task oriented group environment, students are able to exercise their leadership skills, communication, trust-building and conflict resolution skills. CL positively impacts students' abilities to deal with the needs, diversity, and interpersonal demands of the twenty-first century and help them deal with arising challenges successfully. <sup>93</sup>
<i>Reflective learning</i> <sup>94</sup>		The sequenced process of reflection, anticipation and action helps to develop competencies necessary for the labour market. Reflective practice is the ability to take a critical stance when deciding, choosing and acting, by stepping back from what is known or assumed and looking at a situation from other, different perspectives. <sup>95</sup>

89 Haukijärvi I., Strategizing Digitalization in a Finnish Higher Education Institution, 2016. Available: <https://pdfs.semanticscholar.org/a16a/e118fb7533f34f255709a72ba688d92dfaf6.pdf>

90 Martin Lackeus, 2015, Entrepreneurship in Education What, Why, When, How, available: [https://www.oecd.org/cfe/leed/BGP\\_Entrepreneurship-in-Education.pdf](https://www.oecd.org/cfe/leed/BGP_Entrepreneurship-in-Education.pdf)

91 Graham C.R., Woodfield W., & Harrison B., 2013. A framework for institutional adoption and implementation of blended learning in higher education. The Internet and Higher Education, 18, 4–14. doi:10.1016/j.iheduc.2012.09.003.

92 Fanning, R. M., & Gaba, D. M. (2007). The Role of Debriefing in Simulation-Based Learning. Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare, 2(2), 115–125. Doi:10.1097/sih.0b013e3180315539

93 Estébanez, R. P. (2016). An Approachment to Cooperative Learning in Higher Education: Comparative Study of Teaching Methods in Engineering. EURASIA Journal of Mathematics, Science and Technology Education, 13(5), 1331–1340. Doi:10.12973/eurasia.2017.00673a

94 THE FUTURE OF EDUCATION AND SKILLS Education 2030, available: [https://www.oecd.org/education/2030/E2030%20Position%20Paper%20\(05.04.2018\).pdf](https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf)

95 Ibid.

<i>e-learning</i>	Digital transformation, Online Program Manager <sup>96</sup> , computer simulation of business games, massive open online courses (MOOC) <sup>97</sup>	Massive development of knowledge and certain competences among adult learners' showing enough motivation, self-regulation and cognitive quality time to engage, and succeed in online courses. MOOC permits to engage a large number of student in an open online course. <sup>98</sup>
<i>Project-based learning</i> <sup>99</sup>	Competency-based education; student-centred approach; response to the business needs.	Project-based learning ensures active learning, entrepreneurial skills, and encourages the acquisition of important skills (communication, time management, problem-solving and team work).

These learning methods are transforming the perception and quality of higher education. A most positive outcome is the sustainability and adaptability of HEI's that are facing the discussed modern changes imposed by Industry 4.0 and are moving towards Education 4.0. Sustainability is about meeting the real-world needs in time. No longer are structures of HEI able to correspond to all of the current and emerging challenges from a singular disciplinary source. Traditional HE models are preventing research and education from evolving. Interdisciplinary approaches to research and training are essential underpinnings to best meet the dynamic needs of today's labour market.<sup>100</sup> The interdisciplinary approach in higher education refers to the integration of two or more disciplines or fields of study simultaneously. Interdisciplinary can exist within a single HEI or between two or more HEIs.<sup>101</sup> The Faculty of Management and Law at Bradford University (The United Kingdom) is following these initiatives. They are removing departmental divisions and restructuring research methodologies.<sup>102</sup> If this activity was not encouraged, departments could continue to create limitations for academics to push boundaries as they struggle to find new intellectual homes for ideas that don't fit neatly into disciplinary boxes. Likewise, students could lose out too: poorly managed course development across disciplines can lead to a joint degree that is two mealy halves joined together rather than a seamless matrix of ideas and challenges. Therefore, a more integrated and mutually beneficial approach is cross-disciplinary where courses are developed within one discipline learning from the perspective of another, or interdisciplinary, where the disciplines are integrated, allows for more context-specific programmes that better suit the industry and prepare students for emerging needs of the modern labour market.

96 Dusst E. & Winthrop R., Top 6 trends in higher education, 2019. Available: <https://www.brookings.edu/blog/education-plus-development/2019/01/10/top-6-trends-in-higher-education/>

97 Cirulli, F., Elia, G., Lorenzo, G., Margherita, A., Solazzo, G.: The use of moocs to support personalized learning: an application in the technology entrepreneurship field. Knowl.Manage. E-Learning (2016).[https://doi.org/10.1007/978-3-642-40790-1\\_21](https://doi.org/10.1007/978-3-642-40790-1_21)

98 Milian, R.P., Gurrisi, M: Educ. + Train.59(9), 990–1006 (2017).<https://doi.org/10.1108/ET-12-2016-0183>

99 Huber, Hadas & Maciejowska, Iwona. (2017). Project based learning in higher education: From theory to practice.

100 James Jacob, W. (2015). Interdisciplinary trends in higher education. Palgrave Communications, 1(1). doi:10.1057/palcomms.2015.1

101 Chavarro D, Tang P and Rafols I (2014) Interdisciplinarity and research on local issues: Evidence from a developing country. Research Evaluation; 23 (3): 195–209.

102 Irani Z., The university of the future will be interdisciplinary, 2018. Available: <https://www.theguardian.com/higher-education-network/2018/jan/24/the-university-of-the-future-will-be-interdisciplinary>

## Identification of good entrepreneurship training practice

Good practice of entrepreneurship training activities in the countries of the Consortium has been analyzed in three phases by involving three main stakeholder groups of the Entrepreneurship Ecosystem: entrepreneurs and start-up entrepreneurs, higher education institutions, entrepreneurship supporting institutions such as business incubators, accelerators and co-working spaces.

The first phase was carried out in the format of a focus group activity or interviews based on the availability of the participants with the first stakeholder group – entrepreneurs. The aim was to identify the current and emerging demanded competences of entrepreneurs. The second and third phases involved the corresponding stakeholder groups via interviews. The aim of interviewing higher education institution representatives, program directors or lecturers was to understand the best entrepreneurship training methodology they practice. The aim of interviewing entrepreneurship supporting institutions was to understand which entrepreneurship training activities were carried out at various levels of business idea development, i.e. preincubation, incubation and acceleration phase. Both latter activities also measured the performance levels of training the previously identified entrepreneurship competences.

The activities resulted in a comprehensive Importance-Performance Analysis (Martilla & James, 1977) regarding start-up entrepreneurship competences. The framework of the analysis is illustrated in Figure 17. The analysis reflected the current performance levels of training entrepreneurship competences in both higher education institutions and entrepreneurship supporting institutions. It revealed areas for improvement to suit the unmet needs of the changing, dynamic Entrepreneurship Ecosystem. The field research activities also complemented the chapter on entrepreneurship ecosystems of the Consortium countries as the diverse perception of entrepreneurship competences and their prioritization were given by stakeholders of the entrepreneurship ecosystems.

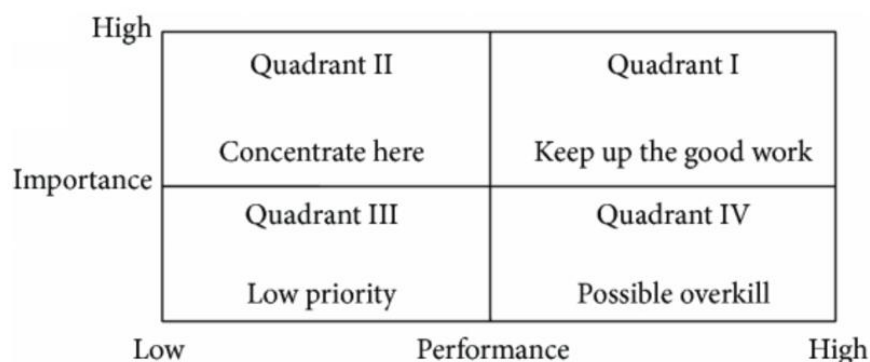


Figure 17: Importance-Performance Analysis Framework (Martilla & James, 1977)

### Focus group activity to evaluate the demand of entrepreneurship competences

The focus group activity was carried out in three corresponding steps:

1. Brainstorming to generate entrepreneurship competences that are necessary at the early stage of business concept development until the “Go-Go” stage of the Adizes Corporate Lifecycle model<sup>103</sup>.
2. Identifying which of the generated competences are listed in the EntreComp model and which are new.
3. Evaluating the importance of the existing 15 EntreComp competences and of newly identified competences.

<sup>103</sup> Managing Corporate Lifecycles, I. Adizes, Adizes Institute, 2004.

The Adizes Corporate Lifecycle model provides a comprehensive explanation to the events during the lifecycle of an entity. There are ten stages in the lifetime of an entity, and the beginning is recognized in the very early stage of an idea or dream, named “Courtship” by I. Adizes. The second stage is “Infancy” where the founders build the company around initial operating capital and a team and strive to gain stability in cash flow and business operations. Companies at the third stage “Go-Go” have gained recognition, demand for their product and/or service, and a sound cash flow. The next stages of the Adizes Corporate Lifecycle model explain the events that can lead towards falling and the death of the company. However, the focus of entrepreneurship training methodology within this project is limited to the first three stages of the model. The Corporate Lifecycle model is illustrated in Figure 18 below.

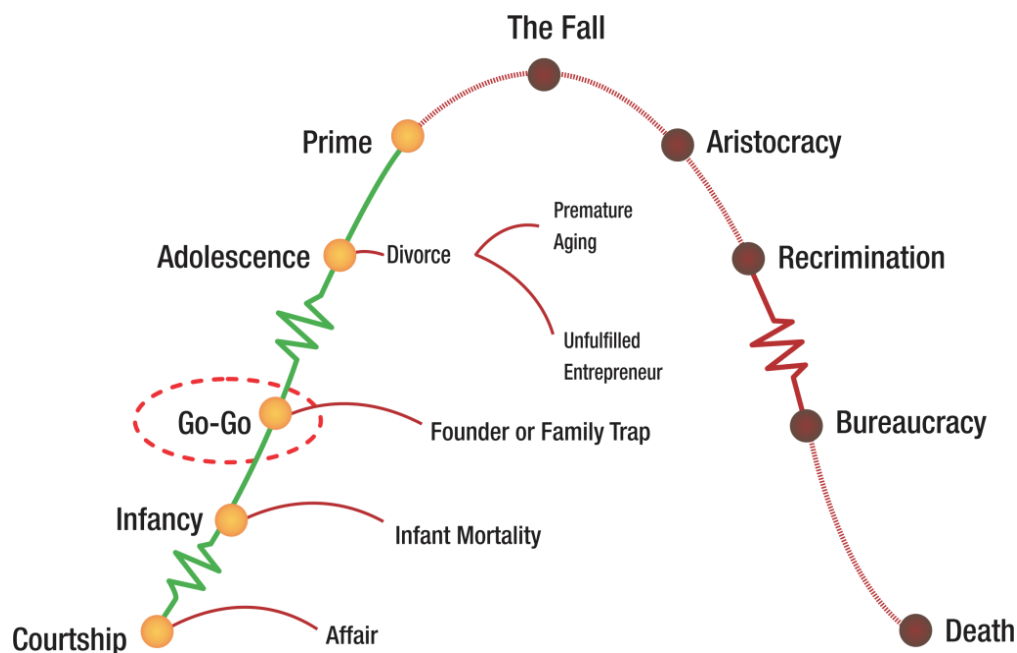


Figure 18: Go-Go stage of the Adizes Corporate Lifecycle model<sup>104</sup>

Each of the Adizes Corporate Lifecycle stages require a different set of entrepreneurial competences that are in reality built on a set of fundamental and theoretic skills and knowledge that in turn result in competences through experience, trial and error, failure or success. These competences can be gained in various ways during different periods of the person’s lifecycle. However, an effective means of attaining entrepreneurial success is via higher education that develops a comprehensive understanding of entrepreneurship, offers a ‘sandbox’ for trial and error, and develops a vast set of skills to enable acquisition of important entrepreneurial competences. Important competences are listed in EntreComp: The Entrepreneurship Competence Framework that are illustrated in Figure 19 in the next two pages of this review.

EntreComp is an entrepreneurial competence model developed in response to ‘A New Skills Agenda for Europe: Working together to strengthen human capital, employability and competitiveness’ by the European Commission. It describes entrepreneurship as a transversal competence, which can be applied by citizens to all spheres of life from nurturing personal development, to actively participating in society, to (re)entering the job market as an employee or as a self-employed person, and to starting up ventures (cultural, social or commercial). It is made up of

<sup>104</sup> Adizes Corporate Lifecycle model, Adizes Institute webpage. Available: <https://adizes.com/go-go/>



three competence areas: 'Ideas and opportunities', 'Resources' and 'Into action'. Each area includes five competences, which, together, are the building blocks of entrepreneurship as a competence.<sup>105</sup>

Areas	Competences	Hints	Descriptors
1. Ideas and opportunities	<b>1.1 Spotting opportunities</b>	Use your <sup>5</sup> imagination and abilities to identify opportunities for creating value	<ul style="list-style-type: none"> <li>Identify and seize opportunities to create value by exploring the social, cultural and economic landscape</li> <li>Identify needs and challenges that need to be met</li> <li>Establish new connections and bring together scattered elements of the landscape to create opportunities to create value</li> </ul>
	<b>1.2 Creativity</b>	Develop creative and purposeful ideas	<ul style="list-style-type: none"> <li>Develop several ideas and opportunities to create value, including better solutions to existing and new challenges</li> <li>Explore and experiment with innovative approaches</li> <li>Combine knowledge and resources to achieve valuable effects</li> </ul>
	<b>1.3. Vision</b>	Work towards your vision of the future	<ul style="list-style-type: none"> <li>Imagine the future</li> <li>Develop a vision to turn ideas into action</li> <li>Visualise future scenarios to help guide effort and action</li> </ul>
	<b>1.4 Valuing ideas</b>	Make the most of ideas and opportunities	<ul style="list-style-type: none"> <li>Judge what value is in social, cultural and economic terms</li> <li>Recognise the potential an idea has for creating value and identify suitable ways of making the most out of it</li> </ul>
	<b>1.5 Ethical and sustainable thinking</b>	Assess the consequences and impact of ideas, opportunities and actions	<ul style="list-style-type: none"> <li>Assess the consequences of ideas that bring value and the effect of entrepreneurial action on the target community, the market, society and the environment</li> <li>Reflect on how sustainable long-term social, cultural and economic goals are, and the course of action chosen</li> <li>Act responsibly</li> </ul>
2. Resources	<b>2.1 Self-awareness and self-efficacy</b>	Believe in yourself and keep developing	<ul style="list-style-type: none"> <li>Reflect on your needs, aspirations and wants in the short, medium and long term</li> <li>Identify and assess your individual and group strengths and weaknesses</li> <li>Believe in your ability to influence the course of events, despite uncertainty, setbacks and temporary failures</li> </ul>
	<b>2.2 Motivation and perseverance</b>	Stay focused and don't give up	<ul style="list-style-type: none"> <li>Be determined to turn ideas into action and satisfy your need to achieve</li> <li>Be prepared to be patient and keep trying to achieve your long-term individual or group aims</li> <li>Be resilient under pressure, adversity, and temporary failure</li> </ul>
	<b>2.3 Mobilizing resources</b>	Gather and manage the resources you need	<ul style="list-style-type: none"> <li>Get and manage the material, non-material and digital resources needed to turn ideas into action</li> <li>Make the most of limited resources</li> <li>Get and manage the competences needed at any stage, including technical, legal, tax and digital competences</li> </ul>
	<b>2.4 Financial and economic literacy</b>	Develop financial and economic know how	<ul style="list-style-type: none"> <li>Estimate the cost of turning an idea into a value-creating activity</li> <li>Plan, put in place and evaluate financial decisions over time</li> <li>Manage financing to make sure my value-creating activity can last over the long term</li> </ul>

	<b>2.5. Mobilizing others</b>	Inspire, enthuse and get others on board	<ul style="list-style-type: none"> <li>• Inspire and enthuse relevant stakeholders</li> <li>• Get the support needed to achieve valuable outcomes</li> <li>• Demonstrate effective communication, persuasion, negotiation and leadership</li> </ul>
<b>3. Into action</b>	<b>3.1 Taking the initiative</b>	Go for it	<ul style="list-style-type: none"> <li>• Initiate processes that create value</li> <li>• Take up challenges</li> <li>• Act and work independently to achieve goals, stick to intentions and carry out planned tasks</li> </ul>
	<b>3.2 Planning and management</b>	Prioritize, organize and follow-up	<ul style="list-style-type: none"> <li>• Set long-, medium- and short-term goals</li> <li>• Define priorities and action plans</li> <li>• Adapt to unforeseen changes</li> </ul>
	<b>3.3 Coping with uncertainty, ambiguity and risk</b>	Make decisions dealing with uncertainty, ambiguity and risk	<ul style="list-style-type: none"> <li>• Make decisions when the result of that decision is uncertain, when the information available is partial or ambiguous, or when there is a risk of unintended outcomes</li> <li>• Within the value-creating process, include structured ways of testing ideas and prototypes from the early stages, to reduce risks of failing</li> <li>• Handle fast-moving situations promptly and flexibly</li> </ul>
	<b>3.4 Working with others</b>	Team up, collaborate and network	<ul style="list-style-type: none"> <li>• Work together and co-operate with others to develop ideas and turn them into action</li> <li>• Network</li> <li>• Solve conflicts and face up to competition positively when necessary</li> </ul>
	<b>3.5. Learning through experience</b>	Learn by doing	<ul style="list-style-type: none"> <li>• Use any initiative for value creation as a learning opportunity</li> <li>• Learn with others, including peers and mentors</li> <li>• Reflect and learn from both success and failure (your own and other people's)</li> </ul>

Figure 19: The EntreComp conceptual model<sup>106</sup>

Lastly, during this phase of research, the importance of the competences was evaluated by start-ups, educators and representatives of business supporting organizations in the range of 1 to 4, correspondingly from less important to most important. The number of evaluations in each particular importance level was then multiplied by a weight equalling the range. Lastly, the weighed cumulative sums were calculated for each competence to gain an overview of their importance in the current entrepreneurship environment in each of the Consortium countries. The main findings from each of the activities that were carried out by the Consortium are explained in detail in the following subchapters.

<sup>106</sup> M. Bacigalupo, P. Kampylis, Y. Punie, G. Van den Brande, EntreComp: The Entrepreneurship Competence Framework, Joint Research Centre, 2016. Available: <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC101581/Ifna27939enn.pdf>

### Finland

Five Finnish entrepreneurs took part in the interview sessions. The first entrepreneur has an Austrian and Finnish background. The second entrepreneur has a Danish and Finnish background. The third entrepreneur has a Welsh and Finnish background. The fourth entrepreneur, although a Finn, has a highly intercultural work and life background. The fifth entrepreneur has a Russian, Finnish and Dutch background. Finland is an appealing space for small-scale and tech-entrepreneurship. Cultures mix in the Finnish business environment. It was decided to focus on the multiculturalism aspect of all five interviewees.

During the focus group interviews within this research, management competences and leadership skills were identified as the most important skills in business. All interviewed entrepreneurs had a high intercultural profile – sharing Finnish and other nations' background, being actively involved in entrepreneurship development of the Kymenlaakso region (i.e. where Kouvola city is located). Entrepreneurs mainly pointed at the necessity to learn openly, to identify personality issues when leading others or learning from others. At the same time, some entrepreneurs mentioned that passion helps to minimise moral exhaustion and boredom related to the daily routine. Both hard (e.g. ICT skills) and soft skills (i.e. people skills) were reflected by the focus group as necessary.

Although all five entrepreneurs deal with intercultural products and cross-national clients, they all pointed valuing ideas and ethical and sustainable thinking as less important (or unimportant) compared to creativity and vision. Since most entrepreneurs are small-scale entrepreneurs or individual entrepreneurs, mobilizing others, as the competence does not apply fully to their business profiles.

### Unlisted entrepreneurship competences

The respondents highlighted nineteen competences that were different from those described in the EntreComp Framework. Some of the competences had a slight relation to one or several of the EntreComp competences and this was indicated in the explanations below.

1. Commitment: sticking to one's plan and being attached to one's team, as the entrepreneur and team have the same common goal.
2. Time management skills: focused on priorities and daily achievements.
3. Teamwork skills: communication comes first as it is the most essential part in entrepreneurial activities. This competence is interconnected with 'Working with others' of EntreComp.
4. Leadership: leading by example. It is interconnected with 'Mobilizing others' and 'Taking the initiative' of EntreComp.
5. Openness: listening and seeking for opportunities. It is related to 'Working with others' of EntreComp.
6. Problem solving skills: seeing the problems as a very positive situation and finding a solution which is beneficial for the project.
7. Management skills: acknowledgement of the team's skills and use of these skills wisely by challenging the team members and the entrepreneur him-/herself. This is interrelated to 'Planning and management' of EntreComp.
8. Workload sharing: equally sharing among the team. This is related to 'Working with others' of EntreComp.
9. Personality: possession of an attitude that conveys commitment, an open mind and the ability to communicate and listen.
10. Overview: the capability of seeing the big picture. This is interrelated to 'Vision' of EntreComp.
11. Passion: the ability to love and enjoy what one is doing. It is interconnected with 'Vision' of EntreComp.
12. IT literacy: the ability to use available IT tools in entrepreneurship activities.
13. Flexibility: the ability to be flexible and spontaneous 24/7. This is related to 'Taking the initiative' and 'Coping with uncertainty, ambiguity and risk' of EntreComp.
14. Assertiveness: the ability to work according to the plan, as well as maintain flexibility and react to changes to reach goals.
15. Proactiveness: the ability of the entrepreneur to activate the team, in some cases by acting in a highly proactive manner and inspiring others to act in a similar way.

16. Coordination skills: ability to effectively coordinate and manage activities in the entity. This is related to 'Mobilizing resources' of EntreComp.

17. Networking skills: this is closely related to communication skills, a courageous attitude and open mind. This is related to 'Working with others' of EntreComp.

18. Courage: this is an attitude that conveys activity rather than only mere conversations about ideas.

19. Customer feeling: the ability to fully understand the customers in different situations from purchasing behaviour to customer satisfaction, as well as their characteristics. This is related to 'Spotting opportunities' of EntreComp.

### Level of importance of competences

Due to the fact that the activity was carried out in individual interviews with each respondent, it was not possible to evaluate all newly identified competences, thus the level of importance of the EntreComp competences was taken into consideration. Therefore, the findings from the importance analysis are as follows: the most demanded competences (top 3 with highest weighted rank) were 1) Vision; 2-3) Creativity; 2-3) Spotting Opportunities, however the least demanded competences (top 3 with lowest weighted rank) were 1) Financial and economic literacy; 2-3) Mobilizing others; 2-3) Ethical and sustainable thinking.

Table 3: Competence importance in Finland

Areas	Competences	Cumulative, weighed
Ideas and Opportunities	Spotting opportunities	21
Ideas and Opportunities	Creativity	21
Ideas and Opportunities	Vision	23
Ideas and Opportunities	Valuing ideas	14
Resources	Ethical and sustainable thinking	13
Resources	Self-awareness and self-efficacy	17
Resources	Motivation and perseverance	20
Resources	Mobilizing resources	16
Resources	Financial and economic literacy	12
Resources	Mobilizing others	13
Into action	Taking the initiative	16
Into action	Planning and management	18
Into action	Coping with uncertainty, ambiguity and risk	18
Into action	Working with others	16
Into action	Learning through experience	19
Resources	Networking skills	4
Into action	Customer feeling	4
Ideas and Opportunities	Passion	4

## Latvia

Five entrepreneurs took part in the focus group activity. The fields the entrepreneurs represented were manufacturing, business consulting, IT, interior design.

### Unlisted entrepreneurship competences

One competence was separately distinguished from the EntreComp list – Activating the market – the ability to be able to create demand for the product, to be knowledgeable about the market and use this knowledge to benefit the start-up, it can also include disruptions in the market.

### Level of importance of competences

The most demanded competences (top 3 with highest weighted rank) were: 1) Motivation and perseverance, 2) Taking the initiative, 3) Coping with uncertainty, ambiguity and risk. The least demanded competences (top 3 with lowest weighted rank) were: 1) Ethical and sustainable thinking, 2) Financial and economic literacy, 3) Activating the market, which is among the newly identified competences. If solely EntreComp competences were evaluated, then the third least demanded one would be Creativity.

Table 4: Competence importance in Latvia

Areas	Competences	Cumulative, weighed
Ideas and Opportunities	Spotting opportunities	18
Ideas and Opportunities	Creativity	16
Ideas and Opportunities	Vision	17
Ideas and Opportunities	Valuing ideas	18
Resources	Ethical and sustainable thinking	14
Resources	Self-awareness and self-efficacy	17
Resources	Motivation and perseverance	20
Resources	Mobilizing resources	18
Resources	Financial and economic literacy	14
Resources	Mobilizing others	17
Into action	Taking the initiative	20
Into action	Planning and management	19
Into action	Coping with uncertainty, ambiguity and risk	20
Into action	Working with others	18
Into action	Learning through experience	18
Into action	Activating the market	15

### The Netherlands

Individual interviews were organized with four entrepreneurs. The fields represented by the entrepreneurs were consulting, food production, medical skincare, production of disinfecting solutions.

#### Unlisted entrepreneurship competences

Twelve unlisted competences were identified through the interviews. Most competences were closely linked to social skills and had slight nuances that differentiated them as separate competences that have an impact on general entrepreneurial competence. Moreover, when developing the list of competences, many entrepreneurs mentioned competences that were related, or inextricably bound up with other competences. For example, 'communication' was listed as a competence (which also entails 'comprehending'), and may be understood as an aspect of 'working with others' (for example, being 'authentic'). In that respect, many of the words used for the description of the competences are context-dependent and can take on different meanings. This, therefore, requires a more concrete interpretation of the competence by the entrepreneur. Many of the competences that are listed below are interrelated with those of the EntreComp Framework, as the entrepreneurs perceive them differently in the modern entrepreneurship setting and extend their meaning beyond what is mentioned in the Framework.

1. Empathy - the ability to understand others, listen well, enter into the perspectives of others, reflect approachability and openness towards others, thus building trust.
2. Balance between adaptability and authenticity – the ability to adapt while maintaining critical awareness and authenticity. This competence is interrelated with the EntreComp competences of 'Self-awareness and self-efficacy' and 'Communication'.



3. Approachability / being approachable – the ability to present yourself in a way to attract others. This competence is interrelated with the EntreComp competences ‘Mobilizing others’, but has also got something to do with ‘Empathy’ and ‘Communication’.
4. Concretize / make concrete – the ability to translate abstract concepts into concrete operational decisions (practice). This competence is linked to the EntreComp competence ‘Into action’ in its general meaning.
5. Communication – the ability to converse in an effective manner to gain trust and result in employees bringing in assignments. This competence is interrelated with the EntreComp competences ‘Mobilizing others’ and ‘Working with others’.
6. Passion and ambition – the ‘charisma’ of the entrepreneur that reflects the desire for achievement, it is an important condition for authenticity and persuasiveness. This competence is interrelated with the EntreComp competences ‘Vision’, ‘Self-awareness and self-efficacy’, ‘Motivation and perseverance’, and ‘Mobilizing others’.
7. Critical thinking – the ability to evaluate, analyse and argument choice in situations of decision making.
8. Maintaining curiosity – the ability to maintain flexibility and continue learning, seeking solutions, and acquiring knowledge and experience. This is linked to ‘Learning through experience’ of EntreComp.
9. Maintaining a focus – the ability to make decisions and assert specific and realistic goals in the long term while maintaining flexibility in the sense of taking advantage of opportunities. This competence forms part of ‘Motivation and perseverance’, but has also got something to do with ‘Planning and management’ of the EntreComp.
10. Trusting/distrusting others – the ability to position yourself between both extremes, to remain realistic and to (dare to) make decisions when trust is harmed. This is linked to ‘Working with others’ of EntreComp.
11. Comprehension – ability to thoroughly understand an issue or person through questioning and conversing. This is associated with ‘Communication’ of the newly-identified competences.
12. Making decisions – the ability to dare to make decisions that are based on vision and strategy. This competence forms part of ‘Motivation and perseverance’ of EntreComp.

#### Level of importance of competences

Due to the individual approach in the interviews, only the EntreComp competence importance was evaluated. Additionally, evaluation of two interrelated competences, communication and comprehension, were additionally calculated in this importance framework based on the context and importance the respondents gave to these interrelated competences in the interviews.

Table 5: Competence importance in the Netherlands

Areas	Competences	Cumulative, weighed
Ideas and Opportunities	Spotting opportunities	15
Ideas and Opportunities	Creativity	13
Ideas and Opportunities	Vision	15
Ideas and Opportunities	Valuing ideas	10
Resources	Ethical and sustainable thinking	9.5
Resources	Self-awareness and self-efficacy	14
Resources	Motivation and perseverance	16
Resources	Mobilizing resources	13
Resources	Financial and economic literacy	7
Resources	Mobilizing others	14
Into action	Taking the initiative	14
Into action	Planning and management	8
Into action	Coping with uncertainty, ambiguity and risk	13
Into action	Working with others	10



Into action	Learning through experience	14
Into action	Communication and comprehension	16

The most demanded competences (top 3 with highest weighted rank): 1/2) Motivation and perseverance, 1/2) Communication and comprehension, 2/3) Spotting opportunities, 2/3) Vision. The motivation for such a choice was based on the primary qualities an entrepreneur must have in order to achieve good results and success in business. Motivation and perseverance were complemented by passion and ambition that were additionally listed and highly valued by the respondents. Similarly, the competences that were related to communication, comprehension, trust, persuasiveness, if they were combined into one competence of communication and comprehension, would result in another most demanded competence with the weighted rank totalling to 16. Spotting opportunities was related to the ability to continually learn and acquire information, to understand when the time could be right for a business idea, and the ability to solve a problem in the form of entrepreneurship. Vision was important in terms of long-term strategy, decision making and maintaining a focus.

The least demanded competences (top 3 with lowest weighted rank): 1) Financial and economic literacy, 2) Planning and management, 3) Ethical and sustainable thinking. Financial and economic literacy was considered less relevant to the main business activities of the entrepreneur, thus having it outsourced from professionals in the specific field. Planning and management were seen as a broad term, the result of other prevailing competences such as vision, mobilizing resources and working with others. Ethical and sustainable thinking is a social norm in the Netherlands as opposed to other countries of the European Union. Business success relies on the ability to work within strict and ethical guidelines. Thus, it is not seen as an entrepreneurial competence that needs to be trained separately, however a combination of specific knowledge, skills and the competence 'Mobilizing others' may be necessary to be able to create solutions and/or products that meet ethical and/or environmental criteria.

### United Kingdom

Three focus group activities were carried out with incubator participants – start-up entrepreneurs, 19 in total. The first six participants were in the incubator for over 12 months with start-ups. All were British from different parts of The United Kingdom, three of them were second generation with Indian parents. Six other participants were in the incubator for over six months with start-ups. All were Brits from different parts of The United Kingdom, two of them were second generation with Chinese parents. The last seven participants were all in the pre-incubator nurturing ideas for start-ups at the end of their training sessions, ready to pitch for investment (training lasted over three months). Three of them were British, four from the EU (Spain, Ireland, Germany and Croatia).

### Unlisted entrepreneurship competences

Eight competences were identified as unlisted in the EntreComp model:

1. Marketing – evaluating the market, planning a marketing strategy, carrying it out and responding to data on its effectiveness.
2. Digital marketing – the ability to build a data driven business model with customers as a key component.
3. Business model awareness – the ability to understand the ways in which opportunities can be successfully carried out.
4. Agility – the ability to respond effectively to market changes, reforming the business model or operation in the process.
5. Starting close to market – forming products, services, timing and business market by being close to actual and potential markets, gathering and analysing data to target the best time and market.
6. Ability to adopt lean principles – the ability to fail fast, fail cheap, fail often – as a way of experimenting and learning to make ideas work in business.
7. Data analytics – the ability to use data and digital tools to develop products and the market.
8. Enacting opportunities – the ability not only to spot opportunities but stimulate them.

### Level of importance of competences

The most demanded competences (top 3 with highest weighted rank) were: 1) Mobilizing resources, 2) Mobilising others, 3) Taking the initiative/Planning and management. The least demanded competences (top 3 with lowest weighted rank) which were four had 50% evaluation as not/hardly important: 1) Valuing ideas, 2) Spotting opportunities, 3) Creativity and 4) Self-awareness and self-efficacy.

Most respondents felt that there were missing competences such as:

- Making things happen rather than just thinking about it,
- Being agile in transforming your business model to respond to markets etc.,
- Being able to recognise and use data as an engine in the business whatever its sector, which is interrelated to 'Spotting opportunities' of the EntreComp competences,
- Digital marketing,
- Data in business.

Table 6: Competence importance in the United Kingdom

Areas	Competences	Cumulative, weighed
Ideas and Opportunities	Spotting opportunities	19
Ideas and Opportunities	Creativity	19
Ideas and Opportunities	Vision	28
Ideas and Opportunities	Valuing ideas	15
Resources	Ethical and sustainable thinking	22
Resources	Self-awareness and self-efficacy	19
Resources	Motivation and perseverance	50
Resources	Mobilizing resources	56
Resources	Financial and economic literacy	22
Resources	Mobilizing others	56
Into action	Taking the initiative	56
Into action	Planning and management	56
Into action	Coping with uncertainty, ambiguity and risk	23
Into action	Working with others	45
Into action	Learning through experience	41
	Marketing	12
	Digital marketing	12
	Business model awareness	9
	Agility	12
	Close to market	12

## Conclusions from the Focus group activity

The activity proved to be useful in providing the researchers with new perceptions and contexts for each of the entrepreneurship competences. A total of 40 competences that were not listed in the EntreComp model were identified by the entrepreneurs. Many of the unlisted competences such as Commitment, Personality, Assertiveness, Courage, Empathy, Critical thinking, Agility and Enacting opportunities are linked to personal character traits of the individual. One can argue whether these fall under the meaning of competences, however it is worth noting that entrepreneurs stated these characteristics as meaningful when speaking of entrepreneurship competences in general and of successful outcomes of entrepreneurial activities.

Other competences such as Starting close to market, Activating the market, IT literacy, Data analytics, Marketing, Digital marketing, Business model awareness, and Ability to adopt lean principles are related to specific skills of the Industry 4.0. One can argue that these can be considered skills more than competences, however the respondents mentioned these to be crucial in carrying out successful and logical entrepreneurial activities.

The EntreComp framework competence importance evaluation results from the four country samples were combined into Table 7 (below) and reflect the average cumulative weight of competence importance. Five specific competences from the EntreComp model stood out: 1) Motivation and perseverance, 2) Vision/Taking the initiative, 3) Mobilizing resources/Learning through experience. The motivation for the results is based on the stage of the start-up and the necessary traits of the entrepreneur to succeed in achieving the Go-Go stage of the Adizes model. This is also based on the respondents' experience in founding one or more start-ups in their lives and experiencing various failures and successes on the way.

Three competences that were evaluated as least important stood out from the analysis: 1) Financial and economic literacy, 2) Ethical and sustainable thinking, 3) Valuing ideas. The motivation for such results lies in the entrepreneurial activities that need to be carried out in order to launch the start-up, and the burden that lies on the shoulders of the entrepreneurs, which are highlighted in the highly evaluated competences. Speaking of financial literacy, the general opinion of the respondents is that the entrepreneur must attract a team member who understands finance if he or she does not have this knowledge. However, the researchers of the consortium insist on training basic financial literacy to the entrepreneurs, so that they can understand their business through the numbers to maintain sustainability of the business and understand changes when they occur. Financial literacy is also important for entrepreneurs who are attracting investment, as the numbers must be realistic, the entrepreneur should be able to argument the financial outlook, and based on this should understand the value proposition he or she is selling to the investor.

Table 7: Average cumulative weight of competence importance in Finland, Latvia, the Netherlands and the United Kingdom

#### Average cumulative weight of competence importance per country

Area	Competence	FI	LV	NL	UK	TOTAL AVERAGE
Ideas and Opportunities	Spotting opportunities	4,2	3,0	3,8	1,0	3,0
Ideas and Opportunities	Creativity	4,2	2,7	3,3	1,0	2,8
Ideas and Opportunities	Vision	4,6	2,8	3,8	1,5	3,2
Ideas and Opportunities	Valuing ideas	2,8	3,0	2,5	0,8	2,3
Resources	Ethical and sustainable thinking	2,6	2,3	2,4	1,2	2,1
Resources	Self-awareness and self-efficacy	3,4	2,8	3,5	1,0	2,7

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Resources	Motivation and perseverance	4,0	3,3	4,0	2,6	3,5
Resources	Mobilizing resources	3,2	3,0	3,3	2,9	3,1
Resources	Financial and economic literacy	2,4	2,3	1,8	1,2	1,9
Resources	Mobilizing others	2,6	2,8	3,5	2,9	3,0
Into action	Taking the initiative	3,2	3,3	3,5	2,9	3,2
Into action	Planning and management	3,6	3,2	2,0	2,9	2,9
Into action	Coping with uncertainty, ambiguity and risk	3,6	3,3	3,3	1,2	2,8
Into action	Working with others	3,2	3,0	2,5	2,4	2,8
Into action	Learning through experience	3,8	3,0	3,5	2,2	3,1

### Analysis of good entrepreneurship training practice in higher education institutions and business supporting institutions

Each member of the Consortium conducted at least five interviews with higher education institutions (HEIs) and business supporting institutions (BSIs) such as business incubators, accelerators and co-working spaces, in order to gain a comprehensive overview of the existing best practices of training entrepreneurship among various disciplines, to understand the background of the training recipients, their entry and exit competences, and most importantly – the performance level of the EntreComp model competences, to be able to identify any gaps or unmet needs of entrepreneurs.

#### Finland

Three higher education institution (HEI) and six business supporting institution (BSI) representatives were interviewed for the purpose of gaining an insight to the best entrepreneurship training practice in each organization, as well as to gain an evaluation on the performance of trained entrepreneurship competences.

The higher education institutions apply modern teaching methods such as Problem-based learning, live case studies, and the lecturers have an increasing role of a mentor rather than that of a lecturer. Entrepreneurship is an obligatory topic to be taught at higher education institutions, as the gained skillset and competences are acknowledged as valuable assets in employer organizations, likewise they are vital in maintaining development of the entrepreneurship ecosystem.

In the activities of the pre-incubators, successful collaboration and co-learning processes happens usually in teams and across teams in the applied projects or online/face-to-face short-term courses. Business model canvas or other visual representation of the ideas and participants' ability to present their ideas represent the evaluated substance at the pre-incubator level.

While working in incubators, participants as business teams refined their earlier-presented business ideas, work with mentors continuously, set new regional and international contacts with the potential business partners and make their business offering more commercialized. First attracted public funding or venture capital represent the success indicator for participating teams/businesses.

At the accelerator level, internationalization of the participating businesses and its IPOs or ICOs can be considered as the success indicator. Mentors consult participating businesses, but more development responsibility is switched from mentors to businesses.

#### The level of performance

Answers from three HEIs and four of the six BSIs were analysed to gain an overview of the competence performance levels in their organizations. Each representative evaluated the competences on a scale 1 (the least performed) to 4 (highly performed), and could also reply non-applicable where the competence is not performed at all in the institution. The results were weighed based on the number of times it gained a particular evaluation on the scale from one to four. The total cumulative weight for each type of respondent organization and in total is presented in Table 8.

The least trained competences are: 1) Mobilizing others, 2-4) Self-awareness and self-efficacy / Mobilizing resources / Financial and economic literacy. The most trained competences are: 1) Working with others, 2-5) Spotting opportunities / Motivation and perseverance / Taking the initiative / Planning and management.

When this data is compared to the results of the demanded competences in Finland, two of the least trained competences are least demanded by entrepreneurs – Financial and economic literacy and Mobilizing others, although the competence of Ethical and sustainable thinking is not performed on a high level. Upon comparing the highest levels of importance and performance of the competences, only one competence matches this equilibrium – Spotting opportunities. Vision and creativity ranks on an average

performance scale based on the best practice carried out at the analysed HEIs and BSIs. All data are represented in Table 8 below.

Table 8: Competence performance levels in Finland

Areas	Competences	Cumulative, weighed in HEIs	Cumulative, weighed in BSIs	Cumulative, weighed, Total
Ideas and Opportunities	Spotting opportunities	9	<b>23</b>	<b>32</b>
Ideas and Opportunities	Creativity	9	21	30
Ideas and Opportunities	Vision	9	22	31
Ideas and Opportunities	Valuing ideas	<u>8</u>	21	29
Resources	Ethical and sustainable thinking	10	<u>19</u>	29
Resources	Self-awareness and self-efficacy	10	<u>18</u>	<u>28</u>
Resources	Motivation and perseverance	10	22	<b>32</b>
Resources	Mobilizing resources	9	<u>19</u>	<u>28</u>
Resources	Financial and economic literacy	<u>7</u>	21	<u>28</u>
Resources	Mobilizing others	9	<u>17</u>	<u>26</u>
Into action	Taking the initiative	<b>11</b>	21	<b>32</b>
Into action	Planning and management	9	<b>23</b>	<b>32</b>
Into action	Coping with uncertainty, ambiguity and risk	10	<u>19</u>	29
Into action	Working with others	10	<b>24</b>	<b>34</b>
Into action	Learning through experience	9	22	31

#### Overview of best practice in HEIs

Representatives from three higher education institutions School of Business and Economics of the University of Jyväskylä (SBE), South-Eastern Finland University of Applied Sciences (XAMK) and Turku School of Economics of the University of Turku (TSE) were interviewed for the purpose of understanding their approaches and best practice in entrepreneurship education.

Business courses and entrepreneurial teaching methods were considered highly important for the international success of the university degree programmes. All three interviewees described the basic



course of entrepreneurship for all undergraduate students. The students at the three institutions are not solely business-oriented, their study areas are a mixture of different specializations. SBE has the highest proportion of business students – 70%, however it is less from 30-50% at the other two organizations. Although all students are taught entrepreneurship, there is no assessment to whether after their graduation they establish an enterprise.

All three organizations provided information on curricular activities that were available to bachelor and master students, as well as were open to public as paid courses. Entrepreneurship education is being implemented in all levels and areas of studies at XAMK through its authorized best practice – Learning and competence Creating Ecosystem (LCCE) ©. Due to the development of other best practices – phenomenon-based learning, drama pedagogy and hands-on learning (with Lego Serious Play © and related methods), LCCE method is still applied, although not to a high degree. XAMK now applied entrepreneurial (international entrepreneurship) principles in various general courses including entrepreneurship, languages, social sciences etc. Moreover, to enhance entrepreneurialism among students, the course “From Idea to Innovation” is applied in all study areas, as well as creative methods of online and multi-mode teaching didactics to the largest extent possible. Furthermore, the lecturers apply co-teaching principles and entrepreneurial thinking methods in their specific subjects.

SBE applies entrepreneurship teaching principles in their activities, such as inquiry-based method, live case studies, and Start-Up teaching. The inquiry-based method enables learning through iterative discussions around various questions that are related to a particular subject. Start-Up teaching methods simulate startup environments through pitching and co-development activities.

TSE applies problem-based learning and entrepreneurial participative discussion to enhance learning opportunities for both the students and lecturers. Problem-based learning enables student interaction with real-life industry problems at enterprises and develop solutions to the sought issues. In addition, future research rhetoric is mostly pursued in Future Research Centre at University of Turku.

The three institutions have existing cooperation with the industry and this enables the students with the possibility to develop innovations closely interrelated to the industry’s needs, as well as to gain live case studies by learning about the business processes from within.

In order to sum up the direction and entrepreneurship pedagogy pillars, all three interviewees stressed the cooperative way of learning through and about entrepreneurship. Pedagogy itself includes various co-operative, experiential and reflective learning patterns that could be viewed in Table 9. The dual process of teachers’ and students’ learning is what unites all three HEIs. Teachers are no longer solo lecturers, but are well-assisted by students who prefer to learn in small teams rather than individually.

Learning outcomes can be measured by either developed business plans or generated creative business ideas pitched by student teams. In addition, solved case studies and multidisciplinary problems represent the eventual result of the student-teacher learning process. Teachers act more as mentors rather than lecturers. Learning outcomes are generally measured in ECTS study points.

The mentioned activities are divided into three categories based on the Entrepreneurial pedagogy pillars<sup>107</sup> (Co-operative: learning from each other; Experiential: based on Kolb’s learning cycle enabling students to practically implement and control the learning process; Reflective: reflexive thinking from experience) in Table 9.

Table 9: Entrepreneurship training activities in higher education institutions in Finland

Co-operative learning	Experiential learning	Reflective learning
LCCE (Learning and Competence Creating Ecosystem ©) as the authorized method of co-operative learning and teaching at XAMK	“From Idea to Innovation” -type of learning with students as the main creators of viable business ideas	Multidisciplinary learning of entrepreneurship and entrepreneurial ways of thinking in everyday life
Co-teaching in developing students’ business / innovative ideas	Learning by doing & hands-on experiences tested by students through Lego Serious Play © workshops	Phenomenon-based learning and drama pedagogy principles in business and multidisciplinary studies
Entrepreneurial participative discussion	Future research rhetoric	Problem-based learning principles in business and entrepreneurship studies
Small group dynamics: dual enrichment of students inside and between the groups	Learning through live cases by helping local and international businesses: businesses and its problems are considered as live experiences	Socratic rhetoric: learning through iterative discussion and questions; it is a simultaneous learning of teachers and students
Pitching and co-development of start-up ideas by students and teachers	Inquiry-based teaching of entrepreneurship and business	International case studies for theory courses on entrepreneurship and business

#### Overview of best practice in BSIs

Six institutions that support entrepreneurship were interviewed: XAMK Creative Business Generator (XCBG), Startup Passion of the South-Eastern Finland University of Applied Sciences (SP), ESA Business Incubation Centre Finland (ESA), and Humak University of Applied Sciences Creve Preincubator (CP), Creve Incubator (CI) and Creve Accelerator (CA). Three institutions provide pre-incubation, and the following, except CA, offer incubation programmes.

The background of participants enrolled in the activities of the institutions are various, i.e. the participants represent an average of 50% of different academic backgrounds, STEM is 25%, likewise business, except in ESA where the STEM speciality is among 75% of the participants and the business speciality is least represented.

Enrolment in the entrepreneurship training activities varies from shortest at preincubation phases to at least two years in acceleration. Preincubation is four weeks for two course completion at CP, four months with eight four-hour trainings at XCBG, and one year with six multi-day events at SP. Incubation is six months to two years at CI and on average one year at ESA. Acceleration is from two years onwards.

Entry competences are evaluated upon enrolment, and the level of entrepreneurship, ambition and scalability grow towards acceleration. Competences upon entering preincubation are mainly these: basic entrepreneurship, personal and team development, leadership, communication, openness to new ideas, risk taking competence. Existing competences in incubation are such: creativity, teamwork, innovation, co-creation, new product/service development, leadership, communication, scalability in international markets. Competences upon entering acceleration are these: ability to innovate in

international markets, commercialization, team-based business processes, national and international networking, venture capital, team co-creation, challenging the status quo of the business.

The institutions subsequently carry out entrepreneurship training activities based on the business development phase and necessary competences. Activities in preincubation are, for instance, mentoring, coaching group work, learning by doing, masterclasses, peer-to-peer cross-functionality learning (i.e. learning from experts from adjacent fields by taking and giving feedback and improving general performance), experience sharing guest lectures, hackathons, competitions, bootcamps, entrepreneurship course, business operation introductory course. Incubation activities cover these areas: mentoring, coaching, matchmaking, market testing, marketing consultations, laboratory co-creation (i.e. new projects and ideas emerging as the result of collective collaboration in the laboratory setting), team co-creation, work with national and international networks (business associations), start-up/entrepreneurship exchange programmes in the EU, United Kingdom, United States of America. The latter activity is also organized in acceleration phase in addition to mentoring and collaboration with business angel and venture capital financing programmes. The activities are mostly based on experiential learning, which has been identified as the key Entrepreneurship learning pillar. All activities are classified by the three pillars in the table below.

Table 10: Entrepreneurship training activities in business supporting institutions in Finland

Co-operative learning	Experiential learning	Reflective learning
Intensive bootcamps for team formation and business idea development	Learning by doing in a team	Coaching (entrepreneurial drive, start-up passion, creative industries, business forecasting, innovation)
Online Entrepreneurship course (internal entrepreneurship processes, business idea commercialization, ability to adapt to changing circumstances)	Guest lectures (experienced entrepreneurs encourage scalability to international markets and encourage finance attraction)	Team self-evaluation and self-development
Business operation introductory course (innovation, scalability, LEAN canvas, business idea development and commercialization in a team, problem-solving, and team self-evaluation)	Peer-to-peer networking and experience exchange	Consultations (marketing)
National and international network support in learning by doing and collaborating for business development, attracting finances	Masterclasses (storytelling and sales, customer profile, digital marketing, commercialization, service design)	Testing developed products/services
	Competitions (pitching, evaluations of business model canvas, team-driven business ideas, ability to apply for funding)	

	International start-up/ entrepreneurship exchange programmes (in EU, UK, USA from two to eight weeks)	
	<p>Mentoring in preincubation and incubation (start-up dynamics, entrepreneurship models and business processes, tech start-up development, industry-based mentoring)</p> <p>Mentoring in acceleration (cooperation with business angels, venture capital funds, business scalability, financing business operations)</p>	

The competitive environment and subsequent activities train entrepreneurial passion, motivation and ambition within the young entrepreneurs. The respondent institutions have a well-maintained entrepreneurship ecosystem that extends beyond the national level. Participants have the opportunity to access international markets instantly due to collaborative networks in the Baltic Sea Region, EU and the United States of America. Moreover, cooperation on the national level with other entrepreneurial universities, business centres and science parks that support business ideas in the fields of space technology, robotics, nanosatellites, augmented reality, marine and logistics is a key driver towards innovation development and emerging business opportunity creation on an international level. National and international business angel, venture capital fund and entrepreneurship community networks of the incubators and accelerators support commercialization and internationalization of the business ideas, thus resulting in high competitiveness and success of the entrepreneurs.

## Latvia

The researcher team previously conducted a focus group activity with six entrepreneurs to determine the demand for certain entrepreneurship competences listed in the EntreComp model, as well as to identify emerging demanded competences. The demand for the competences was limited to the Go-Go phase of the Adizes model. The result of this focus group activity reflected the need for training a newly defined competence not listed among the 15 EntreComp competences – activating the market, which enables the entrepreneur to disrupt or access the market effectively, thus resulting in defining 16 entrepreneurship competences. Another result was the identification of the lowest and highest demanded competences. Competences with lowest demand: 1) ethical and sustainable thinking, 2) financial and economic literacy, 3) creativity. Competences with highest demand: 1) motivation and perseverance, 2) taking the initiative, 3) coping with uncertainty, ambiguity and risk, 4) planning and management.

To determine the performance of demanded competences at higher education institutions and business supporting organisations, the researchers conducted interviews with entrepreneurship training institutions. The respondents were three higher education institution representatives whose competence cover the execution of entrepreneurship training curricula within the study programme, a course or extracurricular activity, especially regarded as best practice of this institution. To extend the research and understand entrepreneurship training within the entrepreneurship ecosystem, the researchers also conducted five interviews with entrepreneurship supporting organisations, i.e. business incubators, accelerators and one co-working space. In addition to understanding the entrepreneurship training methodology, the respondents were to evaluate the level of performance of training the 16 competences.

## The level of performance

The least trained competences: 1) ethical and sustainable thinking, 2) self-awareness and self-efficacy, 3) coping with uncertainty, ambiguity and risk. The most-trained competences: 1) learning through experience, 2) valuing ideas, 3) spotting opportunities.

A decreasing level of both demand and performance in training ethical and sustainable thinking and financial and economic literacy is established. The explanation can be due to the fact that the specific curricula and methods are devoted towards acquiring practical and demanded competences for short-term success that fulfil the role of enhancing experiential learning during and after the entrepreneurial training processes. However, upon analysing the actual demand for competences by entrepreneurs, there is a clear gap in performing training in enhancing the competence of coping with uncertainty, ambiguity and risk. This may lead to the conclusion that such competences with low demand are still present in university curricula with a lower emphasis, however not present at large in other entrepreneurship training incentives outside academia. Conclusively, it can be stated that a gap in these aforementioned competences may increase in the wider entrepreneurial public.

Table 11: Competence performance in Latvia

Areas	Competences	Cumulative, weighed in HEIs	Cumulative, weighed in BSIs	Cumulative, weighed, Total
Ideas and Opportunities	Spotting opportunities	12	25,5	37,5
Ideas and Opportunities	Creativity	12	21	33
Ideas and Opportunities	Vision	11	25	36
Ideas and Opportunities	Valuing ideas	12	27	39

Resources	Ethical and sustainable thinking	<u>9</u>	<u>14</u>	<u>23</u>
Resources	Self-awareness and self-efficacy	10	<u>17</u>	<u>27</u>
Resources	Motivation and perseverance	11	<u>20</u>	31
Resources	Mobilizing resources	11	23	34
Resources	Financial and economic literacy	<u>7</u>	22	29
Resources	Mobilizing others	10	21	31
Into action	Taking the initiative	10	24	34
Into action	Planning and management	11	<b>25,5</b>	36,5
Into action	Coping with uncertainty, ambiguity and risk	<u>7</u>	21	<u>28</u>
Into action	Working with others	11	23,5	34,5
Into action	Learning through experience	11	<b>28,5</b>	<b>39,5</b>

#### Overview of best practice in HEIs

Three representatives of Riga Technical University, Stockholm School of Economics in Riga and Turiba School of Business were interviewed in order to understand the main aspects of the best practices of entrepreneurship training. One educational activity was analysed per higher education institution. Riga Technical University provided information on the programme “International Latvian-Norwegian master program “Innovation and Entrepreneurship””, Stockholm School of Economics in Riga provided information on extracurricular activities and support offered to bachelor and master students in obtaining entrepreneurship, Turiba University provided information on their bachelor-level course “Design Thinking Approach”.

The direction of the activities is a combination of both entrepreneurship and management/administration. The target audience of the activities are mainly business students, except in the case of Riga Technical University that targets a mix of students including those with a technical background. Two activities cover the three Entrepreneurial pedagogy pillars<sup>108</sup> (Co-operative: learning from each other; Experiential: based on Kolb’s learning cycle enabling students to practically implement and control the learning process; Reflective: reflexive thinking from experience), except in the case of the study course “Design Thinking Approach” that is based solely on co-operative learning.

The activities cover a wide range of pedagogy methods. In the case of “Design Thinking Approach”, the methodology involves team building and exploration, awareness of new challenges or perspectives, defining challenges, modelling ideas, prototyping ideas, testing prototypes and using feedback to improve the prototype. Design Thinking tools and consumables are necessary to use Design

108 Supporting Entrepreneurship and Innovation in Higher Education in the Netherlands, OECD Skills Studies, OECD Publishing, Paris/EU, Brussels, 2018., 60.p.



Thinking methodology, and they are available to educators and students. Extracurricular activities are diverse to meet various demands of the students: faculty supported activities and student-led activities (hackathons and other initiatives), mentoring, international and national capacity building activities, research activities, events, open seminars on topical themes and lectures. Study programmes in Riga Technical University are led by faculty members who have practical business experience combined with pedagogical talent, and activities are led by combining theory and practice.

The learning outcomes cover similar incentives across academic activities: to equip students with knowledge, skills, know-how and a network, to enable students to think analytically, collaborate and work in a team, build customer profiles, to be able to visualize things, to mobilize and use resources, to explore innovative approaches, to identify and recognise opportunities and to create value, to turn ideas into action and to believe in one's ability to influence events.

The assessment of study programmes and courses is done in a classical manner: grading, peer evaluation, percentage of graduates that complete the programme, number or percentage of graduates that become entrepreneurs, number or percentage of students that take part in extracurricular activities, level of activity and motivation of students that enrol in business incubators and other projects of the institutions.

### Overview of best practice in BSIs

Seven business supporting institution (BSI) representatives were interviewed to identify best practices and entrepreneurship training outcomes in preincubation, incubation and acceleration programmes. These institutions were Riga Technical University Idea Lab (RTUIL), University of Latvia Student Business Incubator (ULSBI), Turība University Business Incubator (TUBI), Business Incubator of BA School of Business and Finance (BIBASBF), TechHub Riga (THR), Buildit Accelerator (BIA), Commercialization Reactor (CR).

The four business incubators offer preincubation, incubation and acceleration level support. The majority of the participants have a business background, however ULSBI has only approximately 30% business-focused participants, and the remaining 70% consist of STEM, technical and other field representatives. Participants at the RTUIL have a mix of backgrounds consisting of different specializations from business to sociohumanitarian. The minimum time of incubation varies from 1 month (TUBI positions itself also as a co-working space) to 3-24 months at ULSBI, 6-9 months at RTUIL, and up to four years at BIBASBF during the whole study period.

Entry level competences are measured at BIBASBF. The other incubators have an application form where the incubator managers determine the development phase of the business idea, experience and knowledge of the participant, whether the participant has a team and what support is necessary for the participant (interests, mentor, coaching, support, other). However, BIBASBF requires a presentation of the business idea or of the participant him-/herself to divide the participants into four groups as in Figure 20 below. The middle row contains the level of entrepreneurial development the participant has: from idea to company establishment. The bottom row contains clusters of needs for each of the stages the participants are in.

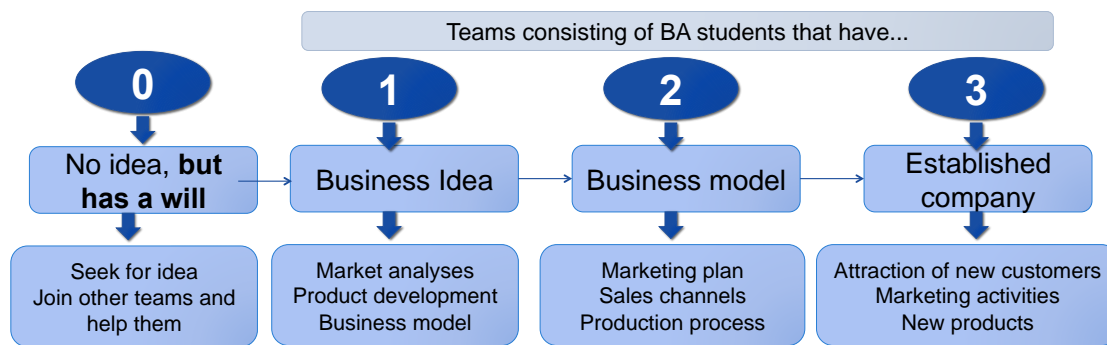


Figure 20: The division of business incubator participants at Business Incubator of BA School of Business and Finance

Entrepreneurial training methods follow common and popular practice that is recognized on an international level. Despite well-organized events and a wide range of opportunities provided to the participants, motivation and perseverance of the participants in a longer term is a common challenge all institutions strive to achieve to be able to celebrate the success of the young entrepreneurs. The entrepreneurial training methods are ordered based on the three Entrepreneurship pedagogy pillars in the table below.

Table 12: Entrepreneurship training activities in higher education institutions in Latvia

Co-operative learning	Experiential learning	Reflective learning
Lectures (entrepreneurship, marketing, finance, tax, pitching, sales skills, others and specific topics based on the needs of the participants, i.e. European funds, digital marketing, financial planning, GDPR and others)	Practical work on business idea development	Individual mentoring
Story-telling (sharing status updates among participants)	Business simulation game "Business 24 hours" (additionally with real business cases)	Consultations (on specific topics such as finances, marketing, sales, legal issues etc.)
Monthly meetup (status update and problem-solving with mentors)	Networking evenings (to enhance networking skills, learn about different networking formats)	Coaching: team and individual. Pre-incubation coaching focuses on the team's leader. Acceleration coaching focuses on the team's business goals.
MasterMind (participants share their success and challenges with other participants and various field experts)	Masterclasses (in topics such as LEAN, digital marketing that are carried out with practical implications)	
Established mentor association and its support to participants	Internship (participants with no business idea work on a university's product, service or event to gain experience)	
Experience exchange (mentors and experienced entrepreneurs)	LightningBusiness (open event during which participants	

freely share their experience from startup phase to liquidation, these events are most demanded by participants)	develop a real business from scratch in three days: day 1 – team formation, strategy design, material purchasing; day 2 – production and marketing planning, day 3 – product sales at a shopping mall)
Established co-working space enables co-operative learning among the participants	2-day practical seminars for particular topics (idea development phases, defining problems, developing and validating solutions, validating the customer and markets, prototyping, marketing, cash flows and business finances)

These entrepreneurship training activities are held on a regular basis to ensure development of the participant's business idea and his/her entrepreneurship competences. The business incubators maintain a network of incubator alumni, business experts and consultants, mentors in various fields to ensure support to the participants. The ULSBI has established a Business Idea fund that grants the best incubator participants with seed capital up to EUR 10 000.

The four business supporting institutions, Riga Technical University Idea Lab Accelerator (RTUILA), TechHub Riga (THR), Buildit Accelerator (BIA) and Commercialization Reactor (CR), offer a wide range of activities to enhance successful entrepreneurship in Latvia. Two of the institutions, BIA and CR, are accelerators and focus solely on relevant activities, however THR offers a wide range of incentives for entrepreneurs: preincubation and incubation, as well as co-working space. THR previously (until 2018) had pre-accelerator and accelerator activities but they are no longer organized since individual accelerators have been established.

The background of the participants varies among institutions. STEM participants are on average 30-70% and entrepreneurs form the remaining percentage. The institutions encourage formation of such mixed teams to enable a greater rate of development of STEM-based businesses. The period of participation in the institutions varies from a minimum of 1 month (tenancy in THR) to 3 months at BIA, and 6 months at RTUILA and CR (with additional pre-acceleration activities for team matchmaking one month prior to acceleration, moreover the acceleration programme is divided into two parts, each three months long: 1) entry-level start-up development and 2) advanced level start-up development).

All institutions carry out evaluation of the potential participants, each in a different manner with different aims. RTUIL measures entry level and exit level competences via a specially designed evaluation tool to determine the levels of over 30 different competences of the team in order to tailor the acceleration programme based on their needs, to identify risk zones for the teams and pair them with relevant experts, mentors, consultants. THR interviews potential tenants to understand the business idea, the needs of the person, whether he/she will fit in and applies to non-written ethical conditions, and in the case where the person applies with a company, THR checks whether the company exists. Freelancers are not accepted at THR. BIA has four criteria for evaluation: 1) relevant experience and understanding of the field the team plans to operate in; 2) Technology Readiness Level is at least 6-7 / it is a working technology or an MVP that requires the technology to make it work / the idea is in early stage however

the path to making a finished product is clear; 3) the team is aiming at scalability in the global market, ROI is achievable within six years, the cash flow predicts realistic profit margins, the ability to attract more investment is visible; 4) whether BIA can add more value to the business, whether investment, risks and business processes are transparent and understandable, whether there is no contradiction in enrolling the participants regarding their need to attract other investments/funds. CR applies rather detailed evaluation of the participants to enhance formation of balanced teams based on competences and personalities (by applying the personality evaluation tool “Predictive Index”). CR enrolls realistic business ideas, i.e. the team understands the business field, the vision of the idea’s potential and its development is clear, the team is motivated, and investment criteria are met.

Each institution has its focus. CR accelerates the business side of the team and helps entrepreneurs communicate with scientists rather than teaching entrepreneurship to scientists. On the other hand, BIA has a universal approach and addresses both entrepreneurs and scientists. THR has mainly entrepreneurship competence training activities. RTU/LA encourages activation of the market, business idea, customer, market and prototype validation, financial and economic literacy and opportunism for teams with mixed backgrounds. The entrepreneurial training methods are ordered based on the three Entrepreneurship pedagogy pillars in the table below.

Table 13: Entrepreneurship training activities in business supporting institutions in Latvia

Co-operative learning	Experiential learning	Reflective learning
Workshops for all teams with experts (business models, value proposition, presentation skills)	Seminars and lectures on demanded and relevant topics	Mentoring
Teamwork with technical experts (to eliminate mistakes as soon as possible, to raise productivity, and to minimise resource consumption in production)	Excursions to other neighbouring country cities (experience exchange, workshops)	Consultations of technical expertise, business expertise
Weekly PPPs (progress, plans and problems presented by teams to all participants, mentors and experts, as well as investors) to boost competition	Ignition events (for team matchmaking during pre-acceleration phase)	Weekly clinics (one hour intensive work with experts and entrepreneurs in residence to improve the business idea, model or processes)
Guest lectures and general lectures (deep tech, IP, communication, technology commercialization, team alignment, customer development, corporate management)	Start-up matchmaking (pitching to investors)	Coaching: team and individual. Pre-incubation coaching focuses on the team’s leader. Acceleration coaching focuses on the team’s business goals.
Monthly meetups (local and international lectures based on participant needs and to educate the general public on start-ups)	2-day practical seminars for particular topics (idea development phases, defining problems, developing and validating solutions, validating the customer and markets,	

prototyping, marketing, cash flows and business finances)		
Business breakfast (morning networking, encourages constructive criticism among participants)		

Experienced alumni of the institutions are actively involved in regular activities as mentors and consultants. In the case of BIA, at the beginning and at the end of the acceleration programme, the teams evaluate experts, and this evaluation helps to determine further cooperation with the experts. BIA also has an initiative to extend cooperation within the entrepreneurship ecosystem by developing products/services within existing large companies, however there have not been any homogeneous teams that could take part in such ventures yet. THR, as an active developer of the entrepreneurship ecosystem in Latvia, has a barter with some tenants at the co-working space, and they provide consultancy and outsourceable services to the other tenants; these are government agency consultants (Latvian Investment and Development Agency), legal service providers, designers and other necessary service providers. THR, as an active national and international partner within the entrepreneurship ecosystem, takes part in various entrepreneurship events and can offer its tenants discounts or can co-finance tickets at events such as Slush, Latitude 59, Startup Day and others. THR maintains excellent communication among entrepreneurship ecosystem participants through various digital platforms, events, newsletters and networks.

At the end of the acceleration programme at CR, the teams must reach individually set milestones to qualify for investment. The milestones can be administrative (shareholder agreement, established administrative structure), team alignment, defined IP positioning, customer development, first customer (can be test customer or test batch production). This is the only evaluation for teams, as each case is unique and universal scoring cannot be done. At the end of the acceleration programme, BIA in collaboration with experts evaluate the progress of the teams (transparent and clear due to weekly PPPs) and decide in which teams to invest up to EUR 20 000. The KPIs for the teams are: income during the acceleration phase, investment (obtained or have a soft commitment from an investor), titles gained at competitions, achievement reports of set key milestones, realistic business finance calculations (evaluation guidelines from “Invest Europe Investment Guidelines”). RTUILA accelerator programme provides an average of EUR 15 000 per team annually, the funding is granted based on the attainment of the precisely-defined milestones by the team.

## The Netherlands

The Netherlands has placed great currency on fostering entrepreneurship at all levels in society, be it public (e.g. at schools and universities) or private (commercial entities), in order to strengthen the Netherlands’ competitiveness internationally and stimulate innovation. To that end, nearly all Dutch tertiary education institutions have developed specific entrepreneurial study programmes and modules, with a view to developing entrepreneurial competence and creating new businesses (thus bridging the traditional perceived gap between theory and practice). Despite these overarching (inter)national objectives, entrepreneurial training initiatives lie predominantly within the purview of local municipalities. Thus, there is no central organisation within the Netherlands that aggregates information pertaining to the number, type, and scope of incubators and startups (see Format Data Collection, 3.1 and 3.2, The Netherlands). For example, The Dutch Incubation Association, an informal community of practice, lists 54 incubators on their website (omitting several established incubation programmes associated with Dutch

universities). Furthermore, this decentralized approach means that different institutions develop different entrepreneurial training methods and areas of expertise, including: (medical) technology, maritime, energy, water management etc.

Recent research on entrepreneurship education (Gulikers et al. 2018) points to the importance of developing innovative entrepreneurial training methods. However, for this to be actualized, closer cooperation and knowledge sharing between both enterprises and entrepreneurial training institutions must be effectuated. This finding was also reiterated by our respondents in our research on entrepreneurship competences (see Conclusions of the Interviews, p. 2). Further, given its emphasis on value creation, entrepreneurship education differs from traditional education in that it abandons more traditional modes of assessment and its attendant qualifying function, and places more emphasis on the individual development of learners. The development of entrepreneurial competence therefore receives considerable attention in entrepreneurial training programmes and is deemed important by entrepreneurs, although the competences themselves take on different meanings depending on the context in which individuals are working or learning. Thus, while the EntreComp framework lists these competences as individual and separate, many of them seem to be co-dependent and appear together at various stages and contexts in the entrepreneurial process.

References: Gulikers, J., Baggen, Y. Lans, T., & Christoffels, I. (2018). *Leren voor breed ondernemerschap: Analyse van leeruitkomsten en leeractiviteiten*. Eindrapportage NWO-PPO overzichtsstudie 405-17-715.

### The level of performance

The most performed/trained competences (top 3 with highest weighted rank) were 1) Working with others 2) Spotting opportunities as well as Valuing ideas, Taking the initiative and Learning through experience 3) Motivation and perseverance. The least performed/trained competences (top 3 with lowest weighted rank) were 1) Ethical and sustainable thinking 2) Financial and economic literacy 3) Creativity / Self-awareness and self-efficacy.

Table 14: Competence performance in the Netherlands

Areas	Competences	Cumulative, weighed in HEIs	Cumulative, weighed in BSIs	Cumulative, weighed, Total
Ideas and Opportunities	Spotting opportunities	<b>10</b>	10	<b>20</b>
Ideas and Opportunities	Creativity	7	<u>7</u>	14
Ideas and Opportunities	Vision	6	9	15
Ideas and Opportunities	Valuing ideas	<b>11</b>	9	<b>20</b>
Resources	Ethical and sustainable thinking	<u>4</u>	<u>4</u>	8
Resources	Self-awareness and self-efficacy	<u>5</u>	9	14
Resources	Motivation and perseverance	7	<b>11</b>	18
Resources	Mobilizing resources	9	8	17



Resources	Financial and economic literacy	7	<u>5</u>	12
Resources	Mobilizing others	7	8	15
Into action	Taking the initiative	8	<b>12</b>	<b>20</b>
Into action	Planning and management	9	<u>7</u>	16
Into action	Coping with uncertainty, ambiguity and risk	<u>5</u>	10	15
Into action	Working with others	<b>10</b>	<b>11</b>	<b>21</b>
Into action	Learning through experience	<b>10</b>	10	<b>20</b>

#### Overview of best practice in BSIs

Three organizations were interviewed: the Incubator Academy Rotterdam (IAR), PortXL (PXL) and the Erasmus Centre for Entrepreneurship (ECE). Each organization covers a different area of provided support to entrepreneurs, thus reflecting the coherent entrepreneurship training methods in The Netherlands: IAR offers incubation, PXL provides acceleration, and ECE covers the whole spectrum from preincubation and incubation with their Get Started (ECE-GS) programme and incubation to acceleration in their Get Business (ECE-GB) programme.

The optimal time for preincubation-incubation is from four weeks at ECE-GS, ten weeks at ECE-GB to 6-12 months at IAR. Acceleration is three months with an optional 100-day extension. Participant backgrounds are various and many industries are represented, except in the case of PXL that focuses on the maritime industry. In the cases of IAR and ECE, both are university-led initiatives that encourage participation of their students, alumni and other persons interested in entrepreneurship. In particular, IAR is founded on Rotterdam University of Applied Sciences' 'outside-in/inside-out' model, through which the university and regional businesses collaborate closely to identify key knowledge, skills, and competences, but also develop courses, case studies, partnerships, and exchanges to address important issues in the business environment and improve the interface between training and professional practice.

Upon applying to the programmes, the potential participants must submit a business idea. The formats are various depending on the organization. IAR requires an infographic or video that explains the business idea, reflects entrepreneurial competences/attitudes of the authors, and presents innovation, feasibility and scalability. PXL chooses its participants in a strict manner that starts from scouting promising start-ups based on entrepreneurial and technical experience/expertise in marine industries and ends with multiple validation and selection rounds led by financial, technical, business and maritime experts. ECE chooses potential participants based on their motivation and *coachability* via an interview process, however the ECE-GB programme is solely for university students and is extracurricular.

Entrepreneurship training methods differ based on the development level of the business idea and entrepreneur's competencies. In preincubation and incubation phases the learning methods are workshops, learning by doing, networking events, accountability sessions, coaching, and mentoring. However, during acceleration, the entrepreneurship training programmes are tailored to the needs of the participants as PXL organizes special courses on finance, business models, presentation skills, assigns dedicated mentors from relevant industries to the teams, and also provides consultations with financial, legal, and technical experts. Additionally, PXL organises Demo Days (demonstration events), also known

## Research on Transdisciplinary Entrepreneurship Training

as ‘shakedowns’ (a maritime term), where start-ups and scale-ups receive feedback from and attract potential investors.

Table 16: Entrepreneurship training activities in business supporting institutions in the Netherlands

Co-operative learning	Experiential learning	Reflective learning
Accountability sessions (presentations and discussions on participants’ progress and challenges) at the beginning and end of every day	Workshops (customer discovery, mapping the customer journey, value proposition design, etc.)	
Rotterdam Education Model of <i>outside-in/inside-out</i> pedagogy (cooperation with companies and established business professionals in knowledge and expertise exchange)	Learning through entrepreneurship (learning by doing: Lean startup method, Experimentation, Four-week sprints with testing and progress reporting)	Mentoring (one to two dedicated mentors with relevant expertise to boost the start-ups and scale-ups, and to provide access to their professional networks)
Demo Days (demonstration days to receive feedback from and attract investors)	Networking events and meetings with VIPs (potential business partners)	Consultations (financial, legal and technical experts)
	Guest lectures (via transdisciplinary cooperation within the university and other education and business organisations)	Coaching (business model development, value delivery, pricing, etc.)
		Subject courses (product development, communication, finances, business models, presentation skills etc.)

The entrepreneurship training activities focus primarily on personal development to develop and enhance entrepreneurial competencies of each individual participating in the programmes. There is no formal assessment, however, concluding presentations by the participants are organized to inspire others, share experiences, learn from each other, and network. Particular emphasis is set on the role of the mentor and coach who work with the team in particular problem-solving situations related to understanding and planning business processes.

## United Kingdom

### Overview of best practice

Individuals from appropriate departments in 30 institutions that support startup, growth and entrepreneurship were interviewed to understand the support and education offered for startups and their view of best practice. The startup rate and environment in the U.K. has grown enormously (by 2017, 205 incubators and 163 accelerators were reported by Nesta) so the sample is larger to reflect in some part the varied range of activities and how they are supported.

### Institutions

AgeTech Accelerator, Anglia Ruskin University  
Aston University Science Park,  
BlueLab, University of Brighton

Coventry University Ventures  
Banks Mill Studio, University of Derby

Durham City Incubator, Durham University and colleges  
Entrepreneurial Spirit, various universities in 11 citues  
Judges College Cambridge  
3M Buckley Innovation Centre (3MBIC), University of Huddersfield  
City Ventures, London, City University  
Imperial College White City Incubator, London  
Kings College Enterprise , London  
Advanced Technology Innovation Centre, Loughbotough  
Innospace , ManMet University  
University of Manchester, e.g., Manchester Science Park,  
  
University of Newcastle, e.g., Newcastle Bio-Incubator, Start-up Service  
Medbic, Anglia Ruskin University Chelmsford

The above, Nottingham Trent University  
Nest University of Portsmouth  
Centre for Secure Information Technologies (CSIT), Queens University, Northern Ireland  
Oxford Ventures, Oxford University  
The London BioScience Innovation Centre, Royal Veterinary College  
University of Swansea, e.g.Student Enterprise; specialist centres, Centre for Nano tech  
Swansea, Centre For Innovation And Entrepreneurship In Law  
Salford University incubator  
European Marine Science Park, Scotland, Highlands and Islands  
University of Sheffield, eg Kroto Incubator, USInnovation  
Set Squared, University of Bath, Bristol, Exeter, Southampton and Surrey  
UCL. Enterprise

All universities supported startup through a range of activities to cover prestart up, the startup process and business growth or exit. Some had dedicated centres related to specific fields (e.g., Imperial College, Salford, University of Swansea above) most offered support through

- 1) Extra curricular workshops e.g.pitching competitions,
- 2) Curriculum modules at undergraduate level. These might be limited within a faculty (Anglia Ruskin ) or they might be cross-institutional (University of Swansea)
- 3) Physical Facilities, buildings etc developed in partnership with regional bodies or the private sector (SETSquared, Manchester Science Park)
- 4) Support programmes offered in partnership with regional bodies, e,g,, Salford University with the Greater Manchester Growth Hub)

## Training

Training was not a key feature of any of the activities cited by respondents, except in relation to understanding how use of data and digital applications work in the business model. The focus is directed towards developing the entrepreneurial mindset and can be illustrated by these three vivid quotes that the respondents stated:

“We are not here to train people but to develop their entrepreneurial mindset.”

“Our role is to nurture their understanding, [...] they are creative entrepreneurs and they are encouraged to develop skills through knowing who to ask and where to go for ‘nuts and bolts’ information.”

“Offering training in IP or financial budgeting is useless until the entrepreneur has a practical need for them – then they get the best advice because they know who to go to.”

All attendees go through an assessment process to enter the incubator, be it a business idea competition or a two-day workshop to assess the viability of business start up. The most established and the largest range of activities were in the group of institutions formed as SET Squared, which is a “unique enterprise partnership and a dynamic collaboration between the five leading research-led UK universities of Bath, Bristol, Exeter, Southampton and Surrey”. Twice ranked as the Global No. 1 Business Incubator, SETSquared provides a wide range of support programmes, specialist and general, early and late stage, to

turn ideas into thriving businesses. Since launching in 2002, SETSquared has supported over 3,500 entrepreneurs in raising £1.8bn investment, with plans for further growth up to 2030. Others were at an early stage of development, set up in the previous two years to meet specific local opportunities and meet regional needs. Others were newer, e.g. Durham City Incubator.

### Approach

Despite the range of activities and the different ages of these organisations, all expressed similar views as to the way they operated, encouraging incubatees to “**fail fast, fail cheap and fail early**” to shape and reshape their business idea and offering. This view was embedded in their approach to how business idea support was provided and in enacting and establishing the business idea.

### Pre-startup and Entry

Competences are evaluated during first stages as part of the process of working with others, being coached and developing the business. Competences on entering are mainly based around core knowledge (the subject discipline in which the business idea is based), plus some vision, appetite for risk and entrepreneurial ambition.

Other aspects such as leadership and communication vary with the individual but “emerge during the training and activity” provided by these organisations. The ability to activate the idea, mobilising resources, positioning in the market, developing successful responsive marketing are all key competences emphasised by the organisation as developed over time. Whether the individual can develop these competences also depends on their ability to learn, change and respond. Where participants enter accelerators, entrepreneurial competences are thought to be more evident, with clarity about marketing, positioning and follow through.

The programmes offered by these organisations vary in intensity and length but all share the following components:

- Mentoring by established business owners,
- Coaching by a range of specialists to bring out missing competences, e.g., presentational skills, finance,
- Workshops to draw together incubator / accelerator clients and network them with a range of ‘others’, investors, other businesses, subject specialists (law, finance, for instance), plus inspirational sessions from entrepreneurs
- Online resources plus expert access to cover specific issues, e.g., digital marketing,
- Online networking, social media actions and analysis. **Networking is seen as essential for a business to develop,**
- Peer-to-peer learning in action learning sets to share learning, set targets and challenge progress,
- Business development and business support workshops, social issue actions, boot camps and competitions to support group cohesion and encourage cross group working, challenging ideas and getting clients used to defending their ideas.

All activities are based on experiential learning individual reflection and assessment with mentors and coaches and any group sessions, seminars etc having an interactive format. Six HEI representatives and twelve individuals from BSIs evaluated the performance of competences trained at their institutions.

## The level of performance

Table 17: Competence performance in the United Kingdom

Areas	Competences	Cumulative, weighed in HEIs	Cumulative, weighed in BSIs	Cumulative, weighed, Total
Ideas and Opportunities	Spotting opportunities	32	10	42
Ideas and Opportunities	Creativity	24	16	40
Ideas and Opportunities	Vision	20	6	26
Ideas and Opportunities	Valuing ideas	20	15	35
Resources	Ethical and sustainable thinking	<u>24</u>	<u>18</u>	<u>42</u>
Resources	Self-awareness and self-efficacy	41	18	59
Resources	Motivation and perseverance	<b>40</b>	<b>20</b>	<b>60</b>
Resources	Mobilizing resources	41	20	61
Resources	Financial and economic literacy	<u>15</u>	<u>7</u>	<u>22</u>
Resources	Mobilizing others	42	20	62
Into action	Taking the initiative	<b>37</b>	<b>20</b>	<b>57</b>
Into action	Planning and management	38	18	56
Into action	Coping with uncertainty, ambiguity and risk	<b>42</b>	<b>21</b>	<b>63</b>
Into action	Working with others	42	21	63
Into action	Learning through experience	15	13	28
Activating the market		27	15	42

## Overview of best practice in HEIs

The pre-incubation leaders, incubator and accelerator respondents interviewed did not train for competences but focused instead on supporting the development of an entrepreneurial mindset and on the ability to find and mobilise resources in order to shape business formation and growth. Financial competence for instance was not valued as much as the knowledge of “who best to contact” and the ability to lever advantage from contacts (Entrepreneurial Spirit) in order to access funds and to manage them.

There was also an emphasis on doing – “you know an entrepreneur by what they do” (AgeTech accelerator) with the incubator and accelerator both encouraging the need to try out an idea, test it to see how or if it worked, then trying again (fail fast, fail cheap, fail soon). These approaches are summarised as learning activities in Table 18.

Table 18: Entrepreneurship training activities in higher education institutions in the United Kingdom

Co-operative learning	Experiential learning	Reflective learning
All	All	All
Working with partners, supported by the incubator staff and mentors to shape the business and grow it	Trying out a business idea, again supported by mentors and incubator staff, to learn how to make an idea a reality, to appreciate the reasons for failure and the route to try again more successfully.	Reflecting on idea formation and startup to improve the process and approach adopted by the incubatee, in this way the entrepreneurial mindset was felt to be strengthened and developed.
Learning through partnership, e.g., marketing, where experienced marketers provided a structure which incubatees brought understanding of social media, with learning on both sides.	Testing a marketing campaign to see how well it worked, understanding google analytics and other other measures to identify closeness to ideal target markets, trying again!	Reflecting on customer focus and the need to understand how customers approach their decisionmaking.
Coproduction of new innovation with customers and suppliers	Enacting innovation by working with customers to understand how to shape new products and services and how to build customers into the process	Reflecting on the development of an innovative product or service and how much time and / effort can be saved by coproduction.
Data and digital working with existing companies and tech specialists to build data into the business	Trialling use of digital media as part of the business model or in discrete functions such as marketing / information search	Review with mentors using Google Analytics and other associated tools to identify the reach / significance and impact of digital use.

#### Overview of best practice in BSIs

Four business supporting institutions that are recognized as innovation and entrepreneurship leaders on the international level were interviewed to understand their best practice in training the modern entrepreneur for global entrepreneurship. These institutions are: SETsquared Partnership (SET), DC Incubator (DCI), Salford Incubator (SI), AgeTech Accelerator (ATA). SET and DCI provide intensive, tailored support from incubation to acceleration, SI offers solely incubation support, ATA – acceleration support. Incubation is usually six months, acceleration – two years. The background of the participants is rather vivid, mostly consisting of participants with STEM, health/medical, technical, creative high tech, researcher specializations.

In order to enrol in the incubators, participants complete an online application and pitch their idea. Participants with business activities up to 12 months are also able to enrol. The main criteria for selection is the people – whether they have the drive and capability to run the business.



The core philosophy of the programmes offered is to develop an entrepreneurial mindset and to try out business ideas through experiential learning supported by others - **to fail fast, fail cheap, fail often**. The main entrepreneurship activities therefore comprise individual learning on and offline, peer to-peer learning in pairs and groups, inspirational and pitching workshops, access to resources on and offline, online support, advisor and mentor support. Activities are carried out in cooperation with other organisations, including other universities in The United Kingdom and overseas, as well as significant public and private partnerships via regional, national and international collaboration projects and established networks.

The activities carried out are tailored to the needs of the participants and based on the business industry they are working in. With a vast network of mentors, advisors and successful entrepreneurs it is comparatively easy to meet the needs of the participants. Activities in preincubation stage such as workshops help potential entrepreneurs to understand whether they feel capable of entrepreneurship. Incubation activities consist of masterclasses, mentoring, and informative/inspirational courses with proactive, practical activities to encourage agility, failing fast and cheap, and entering the market. In the case of ATA, which focuses on Silver economy, the participants have the possibility to collaborate with users of potential products/services in their creation and testing. The activities of the four business supporting institutions are classified by the Entrepreneurial learning pillars in the table below.

Table 19: Entrepreneurship training programmes in business supporting institutions in the United Kingdom

Co-operative learning	Experiential learning	Reflective learning
Scale-up programme (supports growth of more established companies)	Two-day intensive workshop (to help understand whether participants have the entrepreneurship capability)	Mentoring (industry-based; face-to-face and digital throughout various activities)
Reflective sessions (participants share their progress, milestones, plans, business model canvas; the sessions encourage co-learning and helping each other)	Workshops (acquiring tools for action planning, business analysis, understanding customer needs and the market, developing strategies)	Guest lectures (entrepreneurs matching the industries of the new business ideas)
Drop in sessions (in collaboration with professors, entrepreneurs on entrepreneurship, marketing, digital marketing, market awareness, data analytics, customer co-creation, as well as entrepreneur storytelling)	Practical courses (business fundamentals, legal, finance, communication (on and offline), agility in the business model, agility in responding to market changes, working with customers and testing ideas and business models)	Coaching (individual, teams)
Ideation and co-creation workshops (customer needs, innovation, mobilization of resources to turn an idea into a business, business model canvas, self-employability in business)	Available interaction with companies and industry experts to develop market closeness and enable market entry	Business advice and support (efficacy of the business model, niche identification, commercial strategy – distribution, pricing routes to market)

Silver economy product development (collaboration with users in business planning and product development stages)	Lab or initial Silver economy product testing (legal and health requirement testing), advanced prototype live testing on real people (testing marketability) and business model viability testing
-------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Each institution maintains an effective and supplementary ecosystem consisting of business representing a vast range of industries, academia and research organisations. Great attention is paid to each participating team by providing tailored support and a network to boost market entry effectively and successfully. The learning outcomes are focused on developing knowledge about entrepreneurship processes, customer needs and the market, enhancing the skills of active listening and responding (related to customers and market changes), and developing the competences of effective product development and market positioning. The assessment of participants is usually based on the achieved milestones throughout the programme, development of the business model, and evaluation by user/buyer and advisor panels.

Hence, respondents found identification of best practice very difficult as they suggested that “it wasn’t about a best practice but a group of activities which were brought together to be an effective support programme” (SETSquared). When pressed the following emerged:

1. Fail fast, fail quick, fail cheap – *experiential learning* to test business idea, growth and markets, cited by all as an approach and by Age Tech Accelerator, City Ventures, MedBic, SETSquared
2. Growing creative entrepreneurs – Banks Mill, Salford University, SETSquared
3. Developing an entrepreneurial mindset – all claimed this as a key activity but cited as a best practice by Entrepreneurial Spirit, SETSquared,
4. ‘Aware’ entrepreneurs, growing awareness of new technologies and the changing socio-economic landscape in building and growing the business - again all claimed this but it was cited as a best practice by respondents at the University of Newcastle, Loughborough, Swansea.

In terms of the most effective methods to build an entrepreneurial mindset, the respondents all felt that this needed to be a holistic programme with the following components cited each time, not in any particular order given the emphasis on these being integrated to provide a balanced experience for learners.

- ✓ Peer to peer learning
- ✓ Mentoring and coaching
- ✓ Access to subject specialists (not necessarily academics)
- ✓ Seminars to practice communication and be Inspired
- ✓ Networking, networking, networking (their emphasis)
- ✓ Online access to information, resources and learning programmes
- ✓ Cross group and wider pitching and supporting for communication practice

In terms of subject areas, digital and data were seen as critical with more traditional business skills identified as useful but not taught as part of a programme, although individuals with clear needs (e.g. for financial awareness) would be routed to the approach subject coach and to online resources. This differed at scale up when seminars might be offered in more complex use of data or in business model innovation but this was coupled with individual mentoring and support.

## Conclusions from the Analysis of entrepreneurship training practice

Table 20 concludes the research on competence performance in entrepreneurship training activities at higher education institutions and business supporting institutions in the four countries of the Consortium. The measurement of performance is by total average cumulative weight per country.

The most performed training activities are focused towards developing five top competences: 1) Working with others, 2) Taking the initiative, 3-5) Spotting opportunities / Motivation and perseverance / Planning and management. The last three competences had equal evaluations. When comparing this information with that of the most demanded competences by entrepreneurs themselves, it is possible to conclude that only two out of five demanded competences are being trained in the institutions – Taking the initiative and Motivation and perseverance.

Two sets of competences were of equal value, therefore four are listed as the least performed entrepreneurship competence training activities: 1-2) Ethical and sustainable thinking / Financial and economic literacy, 3-4) Creativity / Vision. Vision is among the least performed, however it is as the second most demanded competence by entrepreneurs. Two of the least performed competences coincide with those least demanded by entrepreneurs: Ethical and sustainable thinking, Financial and sustainable thinking.

Table 20: Competence performance differences in Finland, Latvia, the Netherlands and the United Kingdom

Competences	Finland	Latvia	The Netherlands	The United Kingdom	Cumulative, weighed, Total average
Spotting opportunities	3,6	3,4	3,3	2,3	<b>3,2</b>
Creativity	3,3	3,0	2,3	2,2	<u>2,7</u>
Vision	3,4	3,3	2,5	1,4	<u>2,7</u>
Valuing ideas	3,2	3,5	3,3	1,9	3,0
Ethical and sustainable thinking	3,2	2,1	1,3	2,3	<u>2,2</u>
Self-awareness and self-efficacy	3,1	2,5	2,3	3,3	2,8
Motivation and perseverance	3,6	2,8	3,0	3,3	<b>3,2</b>
Mobilizing resources	3,1	3,1	2,8	3,4	3,1
Financial and economic literacy	3,1	2,6	2,0	1,2	<u>2,2</u>
Mobilizing others	2,9	2,8	2,5	3,4	2,9
Taking the initiative	3,6	3,1	3,3	3,2	<b>3,3</b>
Planning and management	3,6	3,3	2,7	3,1	<b>3,2</b>

Coping with uncertainty, ambiguity and risk	3,2				
		2,5	2,5	3,5	2,9
Working with others	3,8				
		3,1	3,5	3,5	<b>3,5</b>
Learning through experience	3,4				
		3,6	3,3	1,6	3,0

### Importance-Performance Analysis of entrepreneurship competences

The Importance-Performance Analysis (IPA) (Martilla & James, 1977) is a useful tool to understand a particular issue from two different perspectives – importance and performance. Upon gathering and analysing data it is possible to identify particular areas that should be prioritized if there are contradictory evaluations of the importance and performance levels. Here the method is used to identify the levels of importance and performance of entrepreneurship competences. Total average cumulative weighs are calculated in order to have comparative results among the four countries – Finland, Latvia, the Netherlands and the United Kingdom.

The IPA results are divided into four quadrants as showed in chapter “Identification of best practice” on page 46. Quadrant I indicates high importance and performance and is characterized by the phrase “Keep up the good work”, Quadrant II indicates high importance and low performance and indicates a need for attention with the phrase “Concentrate here”, Quadrant III indicates both low importance and performance and the evaluated elements that fall in this quadrant are considered to be “Low priority”, and Quadrant IV indicates low importance and high performance, naming this evaluation as a “Possible overkill”.

Figure 21 illustrates the current situation of the EntreComp Framework competences in the countries of the Consortium. The explanations of the competence legends are listed in Table 21 below. Six competences are in Quadrant I, of which a cluster of five competences maintain a balance between equally high importance and performance. These five competences are related to motivation, resource mobilization, planning and management.

One specific competence is in Quadrant II – Learning through experience which is an untapped opportunity that entrepreneurs acknowledge and valuable and demand, however however higher education institutions may have limitations on performing training activities that would enable this approach and develop this competence due to the established education formats and systems. This is performed more in business supporting institutions, given that the activities are aimed at developing real products, services and businesses during pre-incubation, incubation or acceleration programmes, therefore an important means for learning is through acquiring experience in different entrepreneurship areas and disciplines in a relatively short period in time.

Many competences are of low priority in Quadrant III. The least important one is Financial and economic literacy, afterwards Ethical and sustainable thinking, Valuing ideas and Creativity. These competences are related to different disciplines – business finance, economics, corporate social responsibility, critical thinking, design thinking and other creative methods. The IPA suggests that these are not necessary for the entrepreneur and are not one of the main focuses in entrepreneurship training activities. In most cases Ethical and sustainable thinking is commonly known to the public in Finland, the Netherlands and in the United Kingdom, however, not in Latvia. This fact suggests the low evaluation of this particular competence.

Coping with uncertainty, ambiguity and risk is in Quadrant IV and has a higher level of performance than is demanded by the entrepreneurs. This is an important competence to master as it enables a flexible mindset, however the competence itself includes an array of various ‘unknown unknowns’ that are individual unpredictable cases.

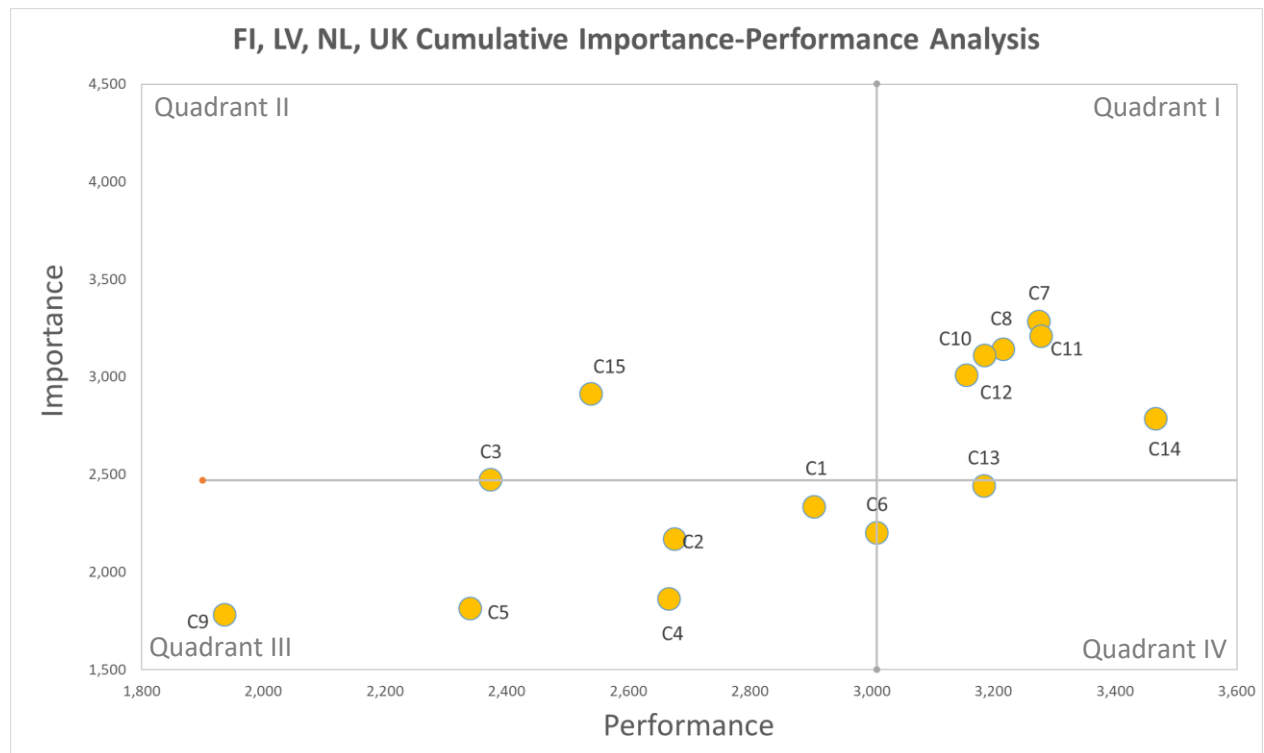


Figure 21: Cumulative Importance-Performance Analysis in Finland, Latvia, the Netherlands and the United Kingdom

Table 21: Competence performance in Finland, Latvia, the Netherlands and the United Kingdom

Competence legend	Performance	Importance	Competence name	Meaning of the location on the IPA
C1	2,9	2,3	Spotting opportunities	Low Priority
C2	2,7	2,2	Creativity	Low Priority
C3	2,4	2,5	Vision	Low Priority
C4	2,7	1,9	Valuing ideas	Low Priority
C5	2,3	1,8	Ethical and sustainable thinking	Low Priority
C6	3,0	2,2	Self-awareness and self-efficacy	Low Priority
C7	3,3	3,3	Motivation and preservance	Keep Up the Good Work
C8	3,2	3,1	Mobilizing resources	Keep Up the Good Work
C9	1,9	1,8	Financial and economical literacy	Low Priority
C10	3,2	3,0	Mobilizing others	Keep Up the Good Work
C11	3,3	3,2	Taking the initiative	Keep Up the Good Work

C12	3,2	3,1	Planning and management	Keep Up the Good Work
C13	3,2	2,4	Coping with uncertainty, ambiguity and risk	Possible Overkill
C14	3,5	2,8	Working with others	Keep Up the Good Work
C15	2,5	2,9	Learning through experience	Concentrate Here



## Best practice exchange training session outcomes

The Consortium partner responsible for developing the methodology, Rotterdam University of Applied Sciences, conducted a short-term joint staff training event “Educator workshop” with the aim to combine diverse teaching experience and best practice to identify the aims and expected results from developing a responsive transdisciplinary entrepreneurship training methodology.

Participants: Mikhail Nemilentsev and Ksenia Sharapova from South-Eastern Finland University of Applied Sciences, Modris Ozoliņš, Madara Māra Irbe and Maris Millers from Riga Technical University, Martijn Priem and Matthijs Smits from Rotterdam University of Applied Sciences.

### Idea dumps

Four tasks were completed upon the first introductory day’s workshop:

Each participant was required to write on sticky notes the answer to the question: What is to be achieved through transdisciplinary entrepreneurship training methodology (TETM) as a result of this project? Latvians had green sticky notes, the Finns yellow and the Dutch – orange.

The desired outcomes were publicly discussed and clustered based on similarities of thought (Figure 22). The participants were asked to discuss the findings from this workshop and identify the main clusters to work further on during this workshop. This was done in pairs. Maris Millers from the Latvian team came up with the Christmas tree concept for identifying eight main clusters (Figure 23), which was then agreed to be used in further workshops for concept development.

The participants scored the main eight clusters by importance (I) and (S) satisfaction of performance on a scale 1-5, according to the previous colour division of sticky notes. The scoring was then calculated by summing the importance valuation with the difference between the importance and satisfaction valuation, i.e.  $I=4$ ,  $S=3$ ,  $\text{Score} = 4+(4-3)=5$ . Conclusively all scores were calculated and the most relevant clusters were thus identified (Figure 24).

It is important to note that the group identified the concept of co-learners, thus expanding the perception of learners to address educators, students, staff and other relevant stakeholders of the entrepreneurship ecosystem.

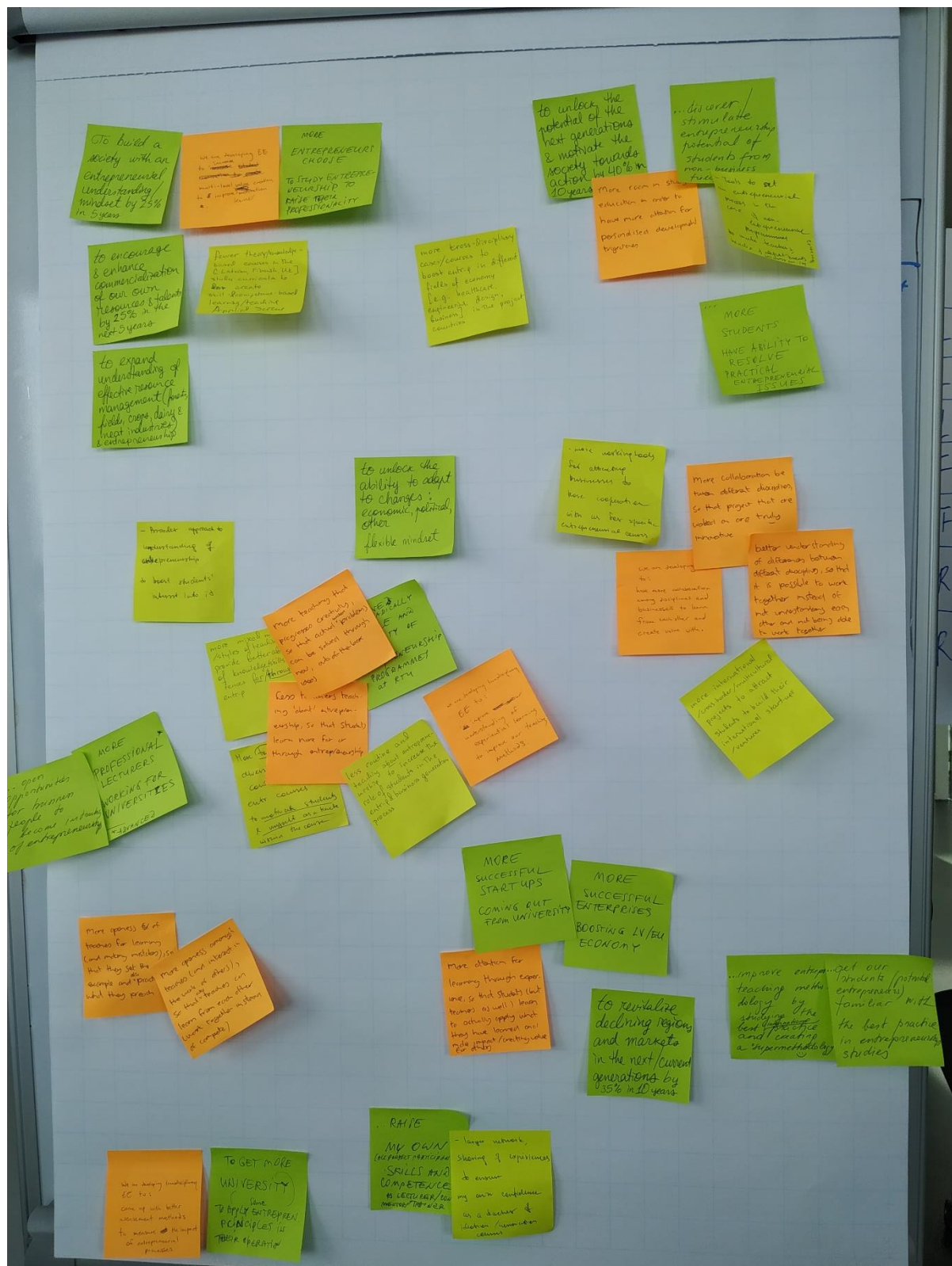


Figure 22: Desired outcome clusters

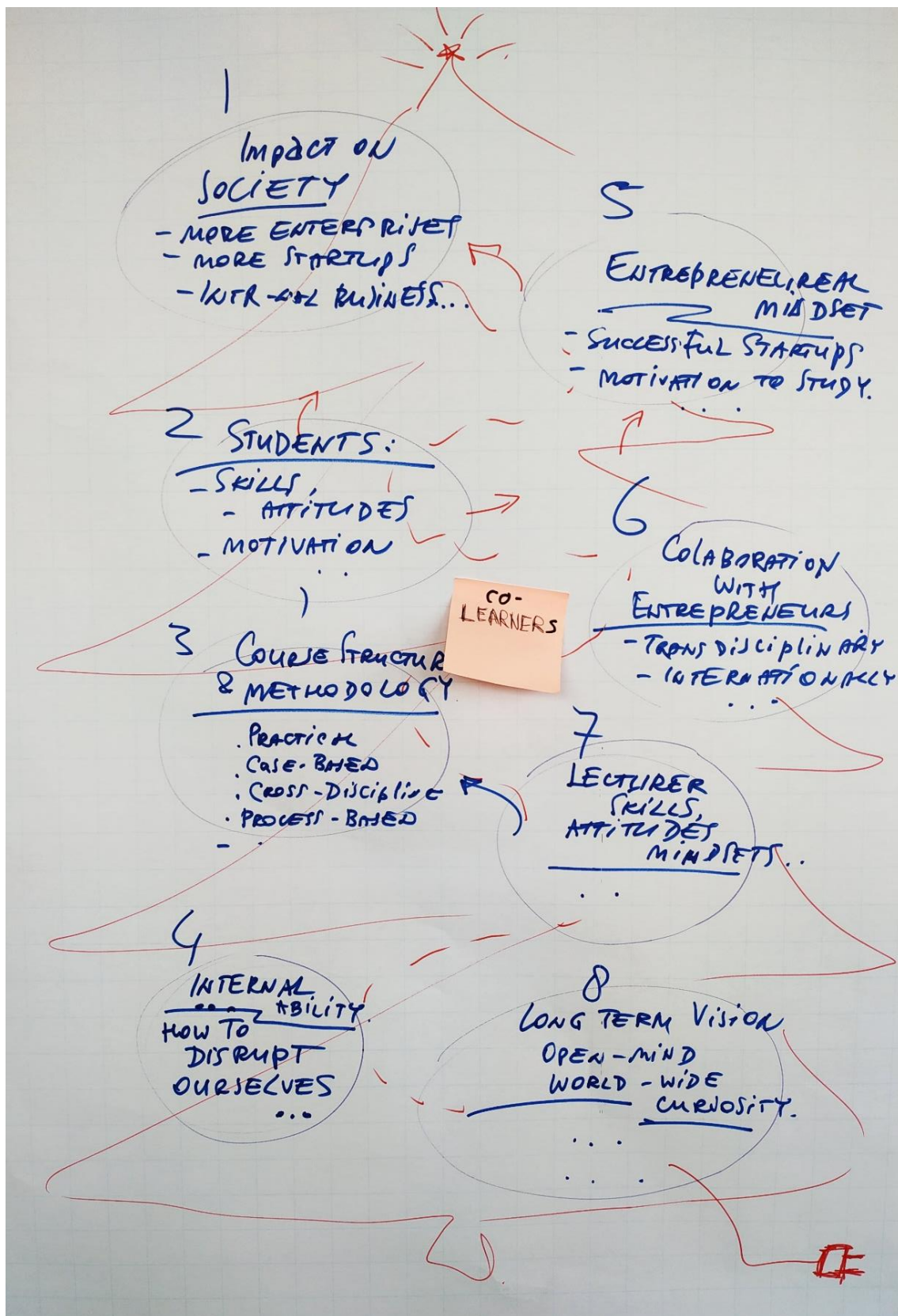


Figure 23: Christmas tree concept with eight main thought clusters



	I	S	I	S	I	S	I	S	I	S	I	S	I	S
	1	2	3	4	5	6	7	8						
L 1	5	4	5	7	6	5	6	4						
L 2	7	5	5	9	6	5	6	5						
L 3	8	5	6	4	7	7	6	3						
F 1	3	8	7	8	7	7	6	9						
F 2	8	7	4	7	7	6	6	5						
R 1	9	6	4	4	6	6	7	4						
R 2	8	9	9	1	3	8	7	7						
	(48)	(44)	40	40	42	(44)	(44)	37						

Figure 24: Importance and satisfaction of performance scoring

### Ideating and minddumping

The next task of the workshop was focused on one of the eight problems of the Christmas tree. The method of Minddump by Babson College was initiated and the team members wrote associations with the problem on yellow sticky notes. Then each person received a mind-map handout and in random order had to stick four of the yellow sticky notes in the corners of the mind-map. Later, time was given to come up with additional associations to the existing four on the mind-map handout. Next, the pages were exchanged in the group and the other participants added more words to the mind-map. After this the participants chose 4 random associations previously written on the yellow sticky notes and repeated the activities of adding more words on the mind-map next to the associations on the sticky notes and exchanging views with other participants. Thus, two mind-maps were filled with associations around the problem. Last, the participants had to choose one of the mind-maps for the final task: post solutions for the characterized problem on orange sticky notes. NB: all raw ideas must be put on the sticky notes. The aim is to focus on quantity rather than on quality to multiply creative stimuli. See Figure 25 with the recorded process.



Figure 25: Minddump process.

The second part of the workshop was divided into two steps: 1) expanding the concepts in two more directions by applying one of two techniques (1a – inspirational objects, 1b – roadblock introduction, 2a – outrageous thoughts, 2b – what would he/she do) and 2) generating spaced out ideas/solutions for the problem.

The workshop was concluded by identifying the winning idea or idea concept out of the developed spaced out ideas. The results from the work of both groups is in Figure 26. Read top-down it starts with the definition of the problem and ends with solution propositions.

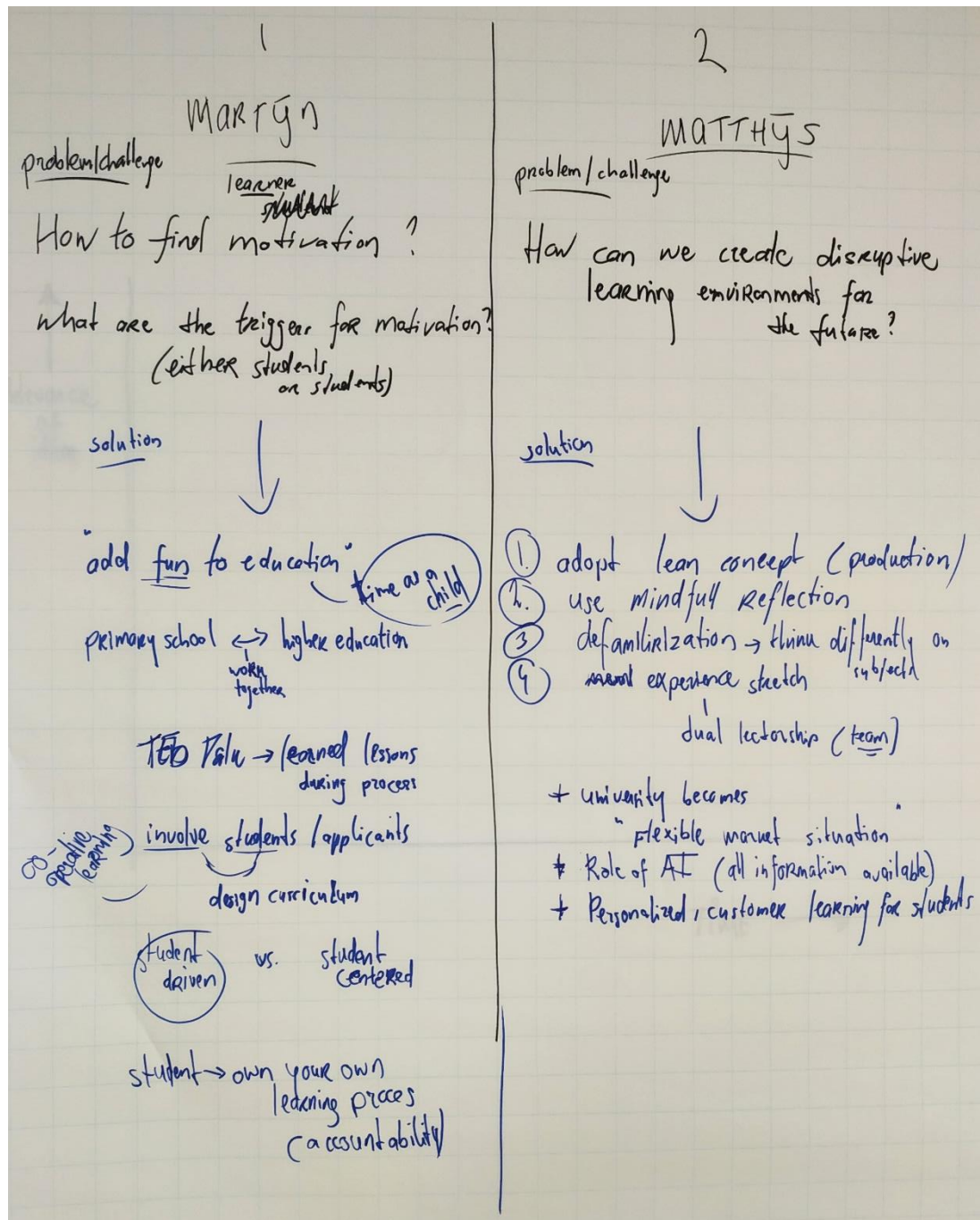


Figure 26: Winning concept proposals from both teams.

### Disruptive learning environment conditions

Five various models of initiating a dynamic and disruptive learning environment concluded the intensive four-day workshop with trainers (Figure 27). The knowledge and understanding was useful in methodology creation as the workshop helped to identify cultural differences and challenges in entrepreneurship education among partners. The models were complemented by thematic keywords:

- competences (mindsets, skills, beliefs),
- community (within universities, students, learners, businesses),
- co-learners (students, educators and university staff),
- defamiliarization (approaching processes in a completely different way to gain new experience and understanding),
- design principles in entrepreneurship education (equalizer as an example monitor),
- ecosystem practices and entrepreneurial actors (support organisations),
- entrepreneurship as an attitude and mindset,
- international and transdisciplinary environment (education sector, society and societal values, business and industry),
- interrelationships and dynamics among all levels of these models and processes,
- transgenerational applicability and integration,
- role swapping in education in knowledge and value-creation processes.

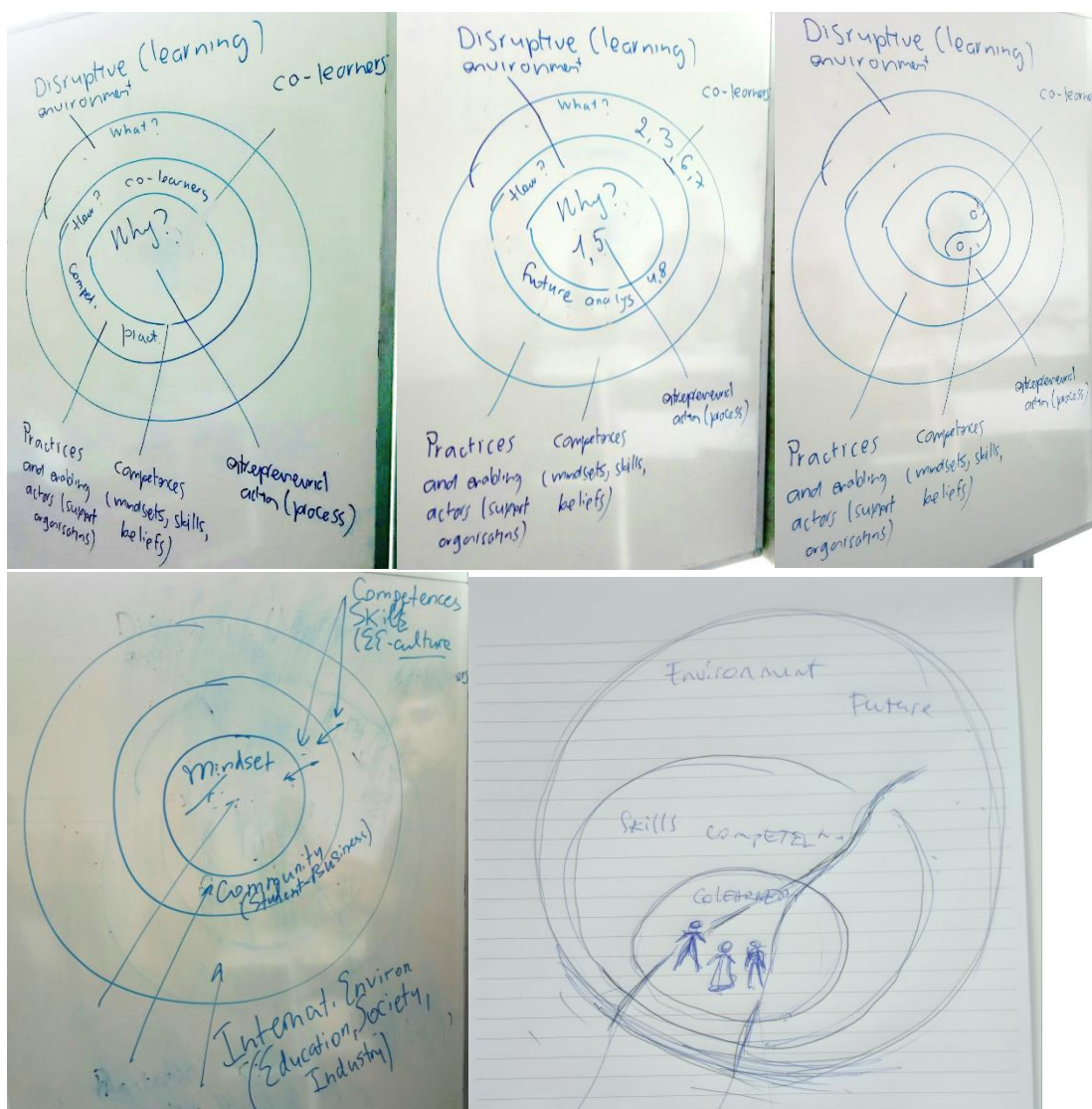


Figure 27: Five conclusive disruptive learning environment models



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