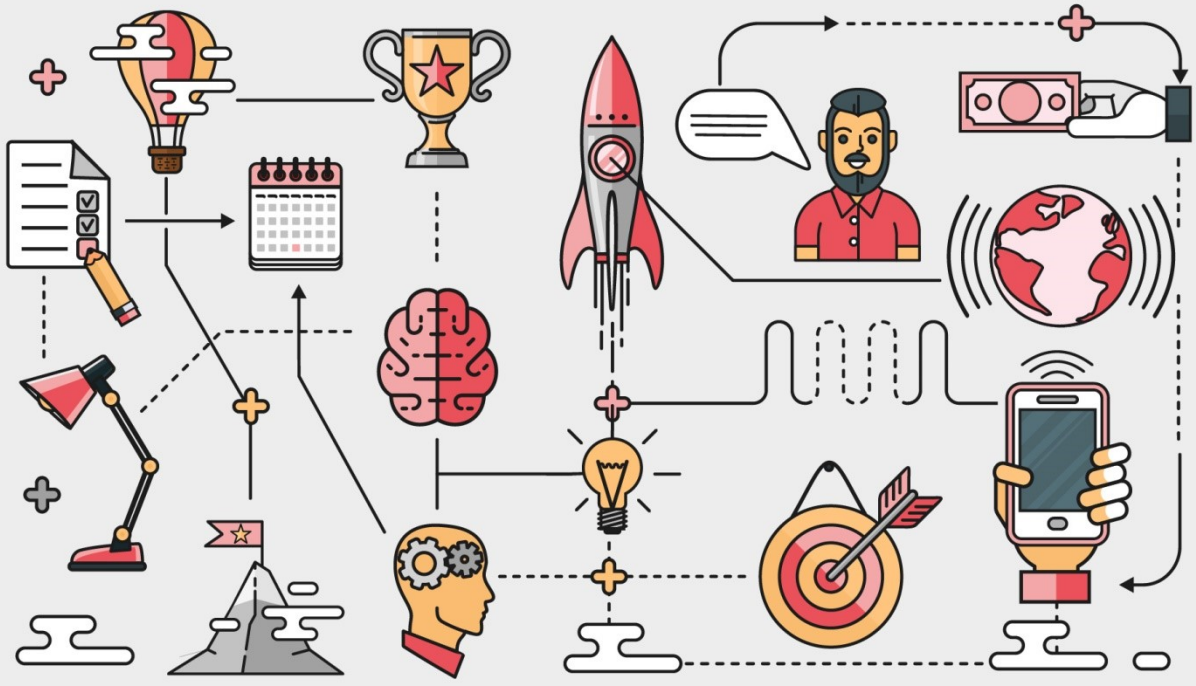
Erasmus+

InnovatiVET

INTELLECTUAL OUTPUT 4 - TOOLKIT

CO-WORKING AND FABLAB



Authors:

Euro-net | Potenza, Italy
University of Turku | Turku, Finland
MCPZ d.o.o. | Ljubljana, Slovenia
Fab Lab London (FLL) | London, United Kingdom
Erhvervsakademi Sydvest |Esbjerg, Denmark

"InnovatiVET" project: approved by the European Commission under the programme "Erasmus+ – KA2 – Strategic Partnership for vocational education and training"

Project no. 2017-1-DK01-KA202-034250 - Agreement Number KA202-2017-006

CONTENTS

Executive Summary 5

CHAPTER 1 - INTRODUCTION 6

1.1. Coworking/Maker spaces and VET 8

CHAPTER 2 – EVIDENCE GATHERING 10

1.2. PHASE 1 – profiles of spaces around the eu 10

1.2.1. The view from the UK 10

1.2.2. Co-working in Denmark 11

1.2.3. The view from finland 11

1.2.4. The italian perspective 12

1.2.5. CO-WORKING IN sLOVENIA 13

CHAPTER 3 – DATA COLLECTION 16

3.1. PHASE 2 - EXPERIMENTS 16

CHAPTER 4 – TOOLKIT RECOMMENDATIONS 17

4.1. Community and Intangible aspects (C&I) 17

4.2. Shared Equipment and Skills Training (S&S) 19

4.3. Engaging VET Teachers and Students (ET&S) 20

ANNEX 1 – COWORKING AND MAKER SPACES CASES 22

Cases from the UK, France and netherlands 22

Case study 1: Makerversity 22

Case Study 2: Making Rooms 23

Case Study 3: LabFab, Rennes 23

Case Study 4: FabLab Amsterdam (De Waag) 24

Case Study 5: Here East 25

Cases from Denmark 27

Case Study 1: FabLab Spinderihallerne 27

Case Study 2: Idea House 27

Case Study 3: Soundhub 28

Case Study 4: Orange MakerSpace 28
Case Study 5: Makerspace 29
Cases from Italy 31
Case Study 1. GoDesk from Potenza - Italy 31
Case Study 2. FabLab Milano - Italy 31
Case Study 3: Famo Cose – Roma Makerspace - Italy 32
Case Study 4: Impact Hub Reggio Emilia – Italy 32
Case Study 5: Co-Working: Talent Garden - Milan – Italy 33
Cases from Finland 35
Case study 1: Innovation House Finland 35
Case study 2: Aalto Fablab 35
Case study 3: Fab Lab Raseko 36
Case study 4: FabLab Tampere (formerly FabLab TUT) 37
Case study 5: FabLab Oulu 38
Cases from Slovenia 40
Case study 1: RogLab 40
Case study 2: PIPC Kočevje 41
Case study 3: 404 - Youth Technology Research Center 42
Case study 4: House of experiments 43
Case study 5: Association for Technical Culture of Slovenia - ZOTKS 44
REFERENCES 46

EXECUTIVE SUMMARY

This report focuses on co-working spaces and their relevance to Vocational Education and Training (VET). Each co-working space has a specific community associated with it, whose members typically work in small groups or as individuals. Just as in larger companies an employee's value is improved through training and continuous professional development, successful co-working spaces have understood that the provision of skills training is a critical part of providing value to their members. This training may be facilitated by the space itself but is usually driven by each individual's curiosity and desire to learn. Co-working spaces, therefore, should be viewed as part of the overall VET landscape. There is much that these spaces and traditional VET environments can learn from each other.

The toolkit provided in this document for individuals, companies and teachers in co-working spaces will stimulate education and skills development. Equally the VET sector can adopt and integrate learning methods and techniques available in the co-working environments into their own teaching structures. This link has been validated through a series of experiments which are documented in Appendix 2.

The case studies documented in this report suggest that closer relationships between VET teaching establishments and co-working spaces could provide benefits to both parties, and particularly to the VET sector which is seen as less experimental and more risk-averse.

One key question – namely, how to encourage the VET sector to engage, and align to the motives of co-working spaces – remains unanswered, as it was not within the scope of this research. Furthermore, we also recommend that future research consider the link between successful co-working communities and value creation, sustainability and employment, as this has not yet been characterised to any significant degree.

The authors recognise that the conclusions of this report are a long way from being usable as policies; rather, that they should be taken as the basis of further experimentation and research to develop future policy positions for organisations including companies, co-working spaces, VET schools and local governments.

The experiments carried out by the project partners are published in the section "documents" on our project website: www.innovativet.eu

CHAPTER 1 - INTRODUCTION

There are many different types of spaces, which cater to a range of needs. What all the spaces described below have in common is that they offer flexible workspace to their members. They may provide equipment for shared use and provide other services such as fabrication or structured mentoring. They may also cultivate a particular kind of community and culture. We explore the various types and terminologies below.

Co-working spaces typically provide flexible office space for individuals and small teams, often on a subscription membership basis. The term 'co-working space' is a general one, referring to any kind of shared office space.

Source 30/10/2019 – www.pixabay.com

Maker spaces frequently include some element of coworking within the space, such as a shared office. While this is not universally true, for the purposes of this report we will consider maker spaces a subcategory of coworking spaces. What distinguishes maker spaces from coworking spaces is the addition of workshops for digital and physical design and making.

Source 30/10/2019 – www.pixabay.com

In this report, we include FabLabs within the broader category of maker spaces. FabLabs are part of an international network of independent spaces started by MIT in the USA. FabLabs are spaces that adhere to the FabLab Charter, which, among other things, requires the space to open itself to the public on a regular basis. FabLab is a brand, and each FabLab is part of a global network of spaces, operating independently, in general, with each FabLab having a separate management, ownership structure, funding model and users. The distribution of FabLabs around Europe is not even – for example, there are many more in France than in the UK, because of differing levels of support from local government and universities in the two countries. In France, the word 'FabLab' is broadly synonymous with 'maker space'. However, we have chosen to use the more general 'maker space' as it offers slightly more flexibility in how a space might be defined.

Hackspaces could be seen as another category of coworking spaces. The word is applied to a wide range of spaces – from community-owned spaces operating on a volunteer basis, to University-backed organisations such as the Imperial College Advanced Hackspace in London. To the extent that the objectives of a particular hackspace overlap with those of maker spaces, the recommendations in this report will still be relevant to them. As an aside: their name is derived from a particular usage of the word 'hack' – meaning to repurpose or make use of components in an inventive way. Hackspaces therefore tend to have a culture of re-use and fixing technology that might otherwise be single-use or waste.

A frequent topic of conversation when comparing different spaces is the funding model. A range of models exist, from subscription membership, to co-operative ownership, to an ad-hoc/daily membership, to an incubator model that offers membership to small companies in return for a percentage stake in the company. Funding models are only peripherally relevant to VET education, so they will not be discussed as a main part of this report. However, for spaces that are funded by their members, initiatives that strengthen the community and learning value that members derive from the space are also likely to improve factors relevant to funding, such as member retention.

For the reasons outlined here, running a maker space is no easy task. It requires a blend of engineering and maintenance skills, business acumen and community management.

1.1. COWORKING/MAKER SPACES AND VET

Coworking and Maker spaces are forming an increasingly important part of the VET landscape. This is mainly due to three factors:

- Flexibility, in being able to accommodate small teams as they grow
- Enabling these small teams to share the cost of expensive equipment and resources, thereby reducing the fixed costs of their business
- Fostering an open, collaborative culture, allowing members to learn from one another.

Spaces also support – and are symptomatic of – a broad 'maker movement' driven in part by the belief that people should be engaged with their technology rather than subject to it and consuming it passively. This movement is not restricted to one country, but does have particularly strong expressions in certain places, for example the EU 'right to repair' regulations which are intended to limit electronics manufacturers' tendency to produce products with 'planned obsolescence'.[1]

'Making' within this context can mean anything from robotics and high-tech engineering, to traditional carpentry and textiles. Many people who are members of maker spaces use them for their main income stream. For others, they allow artistic expression or community engagement. In all of these instances, learning skills is almost always an outcome of engaging with a space like this.

In full, 25 case studies were collected of coworking and maker spaces throughout the EU as part of this Intellectual Output

There are four main ways identified in this report that coworking and maker spaces benefit VET:

- **Direct interaction with VET students**, and with VET subjects in non-VET specialist schools (eg. Aalto FabLab, Finland)
- **Training VET teachers** in project-based learning, creative problem solving and design thinking as per IO3 (eg. Waag / Amsterdam Fab Lab, Netherlands)
- **Supporting freelancers, entrepreneurs and flexible working**. Maker spaces allow business – particularly in fields where physical objects are produced such as design/engineering/product manufacturing - to flourish without a large amount of capital investment that might otherwise be needed. Spaces can, through their members, provide

[1] Ecodesign Directive, 2019: https://ec.europa.eu/growth/industry/sustainability/ecodesign_en

everything from skills training to sense of community, and allow business of 1-2 people to grow into flourishing companies. Different spaces encourage this in different ways (Makerversity, London, UK; GoDesk, Potenza, Italy)

- **Provide direct training**, particularly to non-students (Rennes FabLab/IMT Atlantique)
- **Opportunities for informal knowledge transfer** and other forms of learning and business support. The communal and collaborative environment provides opportunities for skill development, but where this is successful it is achieved through careful 'curation' and planning (Innovation House Finland; Here East, London).

The pedagogy within these spaces is difficult to assess, for the most part, given that 1) many of these spaces exist outside formal academic circles and are therefore less likely to be studied; and 2) a substantial part of the learning in these spaces is itself informal and takes place outside the classroom context. One thing we can say, however, is that it is heavily focused on 'learning by doing' and 'project-based' methods, whereby the learning is driven by what the learner is trying to achieve. As a result, the learner may not actually define themselves as a 'learner', as they are simply trying to do their job.

CHAPTER 2 – EVIDENCE GATHERING

1.2. PHASE 1 – PROFILES OF SPACES AROUND THE EU

For this report a range of case studies has been collected from maker and coworking spaces across the EU in participating home counties to the working groups. Each of these organisations is active in promoting one or more aspect of vocational education outlined in the previous chapter. This chapter set out a summary view from each country to set the context. The detailed cases shown in table 1 at the end of this chapter are presented in detail in Annex 1. This content formed Phase 1 of evidence gathering. Phase 2 which is the experiments is set out in the following chapter.

1.2.1. THE VIEW FROM THE UK

The UK has a long history of co-working in one form or another. For example, by a centuries-old convention, barristers – the category of lawyers who represent clients in court – are self-employed and work in 'chambers' which could be a kind of coworking arrangement. Today, self-employment is rising quickly in the UK, from 8% in 2000 to 15% in 2015. The growth of the tech sector in the past few decades may account for a part of this, along with social factors such as ageing, and technological trends that facilitate self-employment[2][3]. The rise in co-working is, in turn, a response to this rise in self-employment, as a co-working space allows a self-employed person to benefit from having a community of like-minded people at work.

There are also several maker spaces and hackspaces across the country that provide access to physical making tools such as digital manufacturing (3D printing, laser cutting, CNC milling and so on). In addition to these, several universities and schools have created maker spaces to support students' projects and skill training outside their main subject area. For example, the Imperial College Advanced Hackspace is accessible to all students of Imperial College London regardless of their subject. Some of these spaces hold public open days, but they are not, in general, open to those who have no affiliation with the university. Several such spaces in the UK identify themselves as FabLabs; however, the name 'FabLab' is less recognised here than in countries such as France, where local governments and universities have set up a healthy national network with over a hundred spaces.

In the UK, there is no national policy geared towards co-working and it is rare for local governments to fund spaces. One exception is the Making Rooms in Blackburn, for which the council provided set-up funds with the intention that the space would become financially self-sufficient within several years. The council's objective in providing the funding is to improve the value-add of the local economy by stimulating innovation and helping to train and retain talented young people, who would otherwise move to larger cities for their careers.

---

[2] Bank of England (BoE), 'Self-employment: what can we learn from recent developments?', 2015

[3] Federation of Small Businesses, 'Going it Alone: supporting self-employment in the UK', 2016

1.2.2. CO-WORKING IN DENMARK

Co-working spaces has seen a rapid increase in popularity in the last years in Denmark[i] [ii]. While the private sector has seen the business-sense in investing in co-working spaces as occupancy rates continue to rise[iii], national policies have not been specifically geared towards co-working. However, a business and entrepreneurship agreement were launched in 2017 running until 2025[iv] (worth 14.7 billion DKK/1.97 billion Euro). The agreement was to make it easier for businesses to conduct business in Denmark by means of lowering import tariffs, investing in tourism, strengthening digital and sharing economies, lowering corporate tax for firms who conduct research, etc. It has been more on the municipal/regional level where investments on co-working have been made.

Larger Danish cities such as Aarhus and Odense have both invested in co-working spaces to help facilitate entrepreneurs and startup companies[v] [vi]. Originally geared at just office spaces, these concepts (and others in Denmark) have now evolved to also including meetings with mentors and specialists, training courses on topics such as accounting, copyright & patenting, and becoming a part of a professional network. Moreover, the co-working spaces in Denmark tend to be primarily geared towards entrepreneurs who have already finished their secondary/tertiary educations and seldom have agreements with educational institutes.

Makerspaces (particularly at schools in VET) are a growing trend in Denmark. This is particularly due to the growing need of digital competences in the workforce[vii]. Much like co-working spaces, this is also decided at the municipal level rather than a national policy and implementing makerspaces at schools or cities varies greatly across the nation. Due to the costly investments of equipment (such as 3D printers, virtual reality, etc.), scepticism has been met whether the funds would serve better in investing in people (i.e., the teachers) rather than machines[viii]. The soft skills learned at a makerspace are not highlighted as one of the more important aspects.

Overall, there are no apparent (national) policies or strategies specifically geared towards co-working and makerspaces in Denmark. There are strategies on a national and municipal level concerning entrepreneurship and improving digital competences within VET, which may have an indirect effect on co-working and makerspaces.

1.2.3. THE VIEW FROM FINLAND

Stylishly and compactly designed, trendy coworking or collaborative spaces, have been opening up at a rapid pace around major and smaller cities in Finland. Coworking spaces are mostly popular among entrepreneurs, which, too, is pulsing more than ever - both for pioneers starting new facilities and those using them later. Everyone wants their share of the feeling of changing work freedom, and the vast majority of coworking space consumers are represented by a number of full-time or part-time self-employed people.

Whereas co-working spaces are traditionally operated by external service providers internationally, recently opened commercial co-working spaces in Finland are developed and operated by real estate investors.

Open workspaces have also emerged in Finland with the arrival of the Fab Lab network. There are currently five fabrication labs affiliated with Finnish universities: Aalto FabLab (Espoo), TUTLab (Tampere), SensiLAB (Turku), RasekoFablab (Naantali) Fab Lab Oulu (Oulu).

A third category of today's DIY workspace is makerspaces at public libraries. The goal is to bring the joy of learning back to the libraries. "Paja"–makerspace in Finnish–is a new type of service concept for libraries. The equipment provided in makerspaces located in libraries typically includes 3D printers, vinyl cutters and sewing machines.

The Finnish environment is generally very supportive of entrepreneurship. The regulatory burden related to business start-up and registration is low, financing is available for entrepreneurs, and training is available for those who want it. [4]

Finland looks set to remain way ahead of the curve thanks to a new Working Hours Act. Due to come into force in January 2020, it will give the majority of full-time employees the right to decide when and where they work. As the new Act replaces the concept of a 'workplace' with a more neutral concept 'working place', the new Act seeks to better address the current ways of working. In practice this means that the working hours will no longer be tied to a specific place of work, but rather working hours will mean time spent working.[5] Many Finns agree that a key reason flexible working is already so successful is a deep-rooted culture of trust. A recent Eurobarometer study found that Finns' trust in fellow citizens is higher than anywhere else in Europe.[6]

1.2.4. THE ITALIAN PERSPECTIVE

Coworking spaces are recognized in Italy as innovative environments that contribute to reinventing the learning process in education and in the workforce. A paper published by ISFOL Erasmus+ Italian National Agency[7] analysed the results of a qualitative survey on several innovative environments in emerging areas of learning such as coworking and FabLab.

Two elements emerged in the paper as common in those new learning environments:

- The learning is based on a "learning by doing" approach
- There is a high priority placed on "peer learning" and "collaborative learning"

Coworking spaces in Italy are funded privately in most cases, but also by several public administrations, particularly in larger cities. Any public funding usually contributes to fixed costs such as the building, or through the free use of public spaces otherwise not previously used for coworking. Some also make a financial contribution to coworkers via voucher and one-spot funding mechanisms.

---

[4] http://www.oecd.org/industry/smes/FINLAND-country-note-2017.pdf

[5] https://nordiclaw.fi/new-working-hours-act-of-finland-enters-into-force-1-january-2020/

[6] https://www.bbc.com/worklife/article/20190626-spains-fight-against-unpaid-overtime

[7] Isfol, Barricelli D. (a cura di), Spazi di apprendimento emergenti. Il divenire formativo nei contesti di coworking, FabLab e università, Roma, Isfol, 2016 (Isfol Research Paper, 29)

FabLabs in Italy are privately funded but, again, certain public administrations contribute space for free or provide funding for tools such as 3D printers. It is increasingly common to see workshops hosted by FabLabs (based on peer-to-peer learning, hands-on and learning by doing) in secondary school curriculum. In fact, for certain FabLabs here, it is their main revenue stream.

After 2015 reforms to the Italian secondary school system, students in their final 3 years are obliged to get experience training in a work-based environment (400 hours for vocational schools and 200 hours for other schools). Thanks to this requirement, Italian coworking and FabLab spaces have found an interesting area to develop their business and ensure their sustainability.

1.2.5. CO-WORKING IN SLOVENIA

As with the other countries in this report, coworking spaces have become established in Slovenia alongside traditional offices. There are several coworking spaces in the city of Ljubljana, while other Slovenian cities and towns are following. Coworking spaces are more than just an office.

For instance, Poligon Creative Centre has been established in Ljubljana as the first Slovenian creative centre, operating as an autonomous platform for empowerment of freelancers, creative startups and communities. Poligon has also produced numerous conferences and other events to introduce new concepts and educate key stakeholders, organized exhibitions promoting Slovenian creatives internationally and produced several research and policy papers commissioned by government and municipality stakeholders. Recognized as one of the best practices in Europe, Poligon and its know-how are regularly shared at numerous conferences and workshops around Europe and wider region. Poligon operates as a private NGO and so far has not received any public funding.

As part of the Interreg Europe ERUDITE project, in 2017 Slovenia organised the national reference network of FabLab creative laboratories. The initiator and coordinator of the network in Slovenia is the Faculty of Electrical Engineering of the University of Ljubljana in cooperation with the Information Society Directorate of the Ministry of Public Administration. The aim of the network is to identify users of the technological innovation potential of all local communities in Slovenia.

The National Reference FabLab Network Slovenia is a technology-enabled environment for prototyping innovations and inventions, as well as an incentive for the circular economy and local entrepreneurship in both classical and social form. The aim of the network is that activities in the field of setting up and operating creative laboratories in Slovenia will be carried out in a coherent and coordinated manner at all levels. It is also a high priority for Fablabs to provide intergenerational integration and collaboration, with knowledge and competencies being taught to the youngest, to help them continue their education or shape their careers. Some members of the network of creative laboratories already operate within the various forms of entrepreneurial support environment.

A number of different organizations, companies and schools, as well as development agencies and public and private institutes from all over Slovenia, show interest in participating in the network.

Table 1 All cases collected (see appendix for cases in full)

Name	Location	Notes, distinguishing features	Page
Makerversity	London, UK	Professional space with a thriving creative community of designers and engineers	22
Making Rooms	London, UK	Maker space teaching business skills and technical competencies to local community	23
Rennes LabFab	Rennes, France	Open labs spread across the city, exploring novel distributed learning initiatives	23
FabLab Amsterdam	Amsterdam, Netherlands	Public outreach organisation supporting a community of makers and interfacing with vocational teachers	24
Here East	London, UK	Large coworking space supporting a community of innovative start-ups and larger companies	25
FabLab Spinderihallerne	Vejle, Denmark	FabLab focused on building the digital competencies of the future, working with VET schools and industrial partners	27
Idea House	Esbjerg, Denmark	Co-working space for students in Southern Denmark to support new innovative businesses	27
Soundhub	Stuer, Denmark	Co-working and makerspace for professionals in the sound industry, situated in the hometown of Bang & Olufsen	28
Orange Makerspace	Roskilde, Denmark	Makerspace with significant interaction with VET schools and students and youth initiatives	28
Makerspace	Various	A collaboration between corporate and educational bodies to provide mobile making equipment and education to schools	29
GoDesk	Potenza, Italy	A shared workspace to provide individuals and small teams space to collaborate in a stimulating environment and community	31
FabLab Milano	Milan, Italy	A fablab with coworking space for people to prototype physical and digital ideas, and to promote technical and innovation skills	31
Famo Cose	Rome, Italy	A multidisciplinary maker space that creates opportunities for freelancers and artesans	32
Impact Hub Reggio Emilia	Reggio Emilia, Italy	A co-working network for building entrepreneurial communities, with a focus on innovation and impact	32
Talent Garden	Milan, Italy	A co-working network for digital businesses with 23 campuses, headquartered in Milan.	33

Innovation House Finland	Espoo, Finland	Co-working space with a branch in Singapore, supporting a startup ecosystem	35
Aalto Fablab	Espoo, Finland	A university-backed Fablab supporting a collaborative environment for innovation and making	35
FabLab Raseko	Naantali, Finland	FabLab within a VET institution, promoting the use of digital manufacturing and creative projects	36
FabLab Tampere	Tampere, Finland	A university FabLab with a broad multidisciplinary remit as somewhere students can come to pursue both academic and personal projects.	37
FabLab Oulu	Oulu, Finland	A university FabLab providing various equipment and training opportunities, including FabAcademy	38
RobLab	Ljubljana, Slovenia	A creative hub with some digital manufacturing tools that allows cross-sector collaboration	40
PIPC Kočevje	Kočevje, Slovenia	A regional initiative to promote local industry, vocational training and creativity in manufacturing	41
404 Youth Technology Research Centre	Ljubljana, Slovenia	A FabLab for young people to learn and experiment, that works directly with primary and secondary schools	42
House of experiments	Ljubljana, Slovenia	A 'do-it-yourself' science and technology learning centre	43
Association for Technical Culture of Slovenia	Ljubljana, Slovenia	An organisation that provides training and research for young people, focusing on skills training. Also provides training for teachers in teaching methods and professional innovation.	44

CHAPTER 3 – DATA COLLECTION

3.1. PHASE 2 - EXPERIMENTS

Following from the initial evidence-gathering phase, a range of more in-depth workshops ('experiments') was conducted. The purpose of each experiment was to identify a successful or unique aspect of the space and create a toolkit out of them, with generalised recommendations for spaces about what works.

Four locations were chosen across a range of countries and types of space, to give as broad a picture as possible. As with earlier Intellectual Outputs in this project, the experiments were run in the form of a workshop for ideation and discussion, using an adapted 'design thinking' framework.

Following the experiments, key outputs and conclusions were written up and analysed, and formulated into the series of recommendations in Chapter 4 of this document. Detailed descriptions of each of the experiments are published on the project website within documents under "Pilot Experiments" - LINK: https://www.innovativet.eu/toolkits/

Table Outline of experiments conducted

Name of organisation	**Location**	**Purpose of experiment**
SteamHouse	Birmingham, UK	How a space can engage with its members and broader social context, to create a strong community and effective skill sharing initiatives
GoDesk	Potenza, Italy	Identifying how members can take advantage of new trends in digital technology
Association for Technical Culture of Slovenia (ZOTKS)	Slovenia	Building effective partnerships with industrial and civic organisations: why and how
FabLab Raseko	Finland	Identifying the key attributes of FabLab Raseko that make it effective as a learning space for VET, and how these might be replicated elsewhere

CHAPTER 4 – TOOLKIT RECOMMENDATIONS

This chapter is a distillation of key learnings from the two phases of evidence-gathering outlined above. In analysing the evidence, a number of key themes emerged and we saw several recurring ideas that spaces have found to be successful. We have grouped specific recommendations as toolkit components, by theme.

Each of the three themes has three headline recommendations. To keep the toolkit here as broadly applicable as possible to our intended audience, the recommendations are themselves fairly broad. In order to implement them in your specific context, it may be necessary to adapt them by engaging your stakeholders (particularly members of the space, and/or VET students) in discussion about their particular needs and desires.

4.1. COMMUNITY AND INTANGIBLE ASPECTS (C&I)

Informal knowledge transfer is one activity of coworking and maker spaces that members find consistently valuable, along with the facilitation and promotion of a sense of community. These outcomes, though intangible and subjective, are strongly linked with the success of a space in terms of user satisfaction, which is in turn important for the long-term viability of the space.

Source 30/10/2019 – www.pixabay.com

RECOMMENDATION C&I#1: KNOW YOUR MEMBERS

It is important to keep track of who is using the space, and why. Feedback mechanisms such as an annual members' survey are useful for probing these questions, and identifying opportunities for supporting the members in new ways. It is also sometimes possible to keep logs of equipment usage, and on when the space is busiest, so that the management can dedicate resources appropriately. However, personal contact and conversation will always be highly effective, and promote a sense among members that the management team is actually involved. Smaller spaces may be able to do this informally by having managers and technicians simply chat to the users. For larger spaces with more members a more formal structure may be necessary. For example, Here East in London, which has over 1000 members, employs an Innovation Team to understand the needs of its members and foster connections.

RECOMMENDATION C&I #2: COMMUNICATE THE OBJECTIVES AND CULTURE OF THE SPACE CLEARLY

There is a wide variety of different types of space, from coworking offices on the one hand, to Fablabs and maker spaces that maintain digital manufacturing equipment for their members' use. One clear conclusion from the experiments and evidence gathered is that each space has its own distinctive identity, which is a result of factors including the personalities of the management team, the members (or users), the location and surrounding community, any partner organisations and founding bodies, and the reasons why the space was founded initially.

In order to give members a feeling that they can, and should, contribute to the community, it is first necessary to communicate to new members what the purpose of the space is, and what is expected of them within the culture of the community. Many spaces do this by displaying a set of values and a charter or short list of objectives of the space, in a prominent location.

RECOMMENDATION C&I #3: CREATE SPACE FOR PARTICIPATION AND INTERACTION

Since a large part of the 'sense of community' of a space relies on informal, serendipitous interaction, it may be necessary to create formal structures and times for this interaction to take place. For example, a regular breakfast or coffee morning gives members an opportunity to meet and exchange news of their work. In addition, any scheduled talks or events should allow time for informal chat and networking afterwards. In some situations, it may also be worth pursuing a 'semi-structured' model for a networking session that helps break down social barriers.

4.2. SHARED EQUIPMENT AND SKILLS TRAINING (S&S)

Spaces often provide specialist equipment for their members' benefit, some of which requires training. More broadly, the ability to learn and develop skills is also an important aspect of building a career, which coworking spaces can facilitate for self-employed members. These recommendations focus on training to support individuals' employability, or, just as importantly, their entrepreneurial skills and self-management.

Source 30/10/2019 – www.pixabay.com

RECOMMENDATION S&S#1: SCHEDULE REGULAR TALKS AND WORKSHOPS WITH INTERNAL AND EXTERNAL SPEAKERS

Events can serve both to bring people together to promote community networks, and to improve people's knowledge. Some spaces organise a regular programme of events, at times that fits with members' schedules and on topics they are interested in. The objective here is not to give a lecture as you would have in a traditional school setting, but to provoke, inspire and spark debate. For this reason, as stated elsewhere in these recommendations, it is important to provide a time (and allocate a suitable space) for informal networking and discussion.

RECOMMENDATION S&S #2: ENCOURAGE DIRECT KNOWLEDGE SHARING BETWEEN USERS

Peer-to-peer learning is one of the great strengths of coworking and maker spaces, but it sometimes needs some encouragement or structure. Depending on the local culture and the individual, a member may need a degree of 'permission-giving' to coach others and share their skills. This can be done through passive methods (eg. The member has a profile on a wall in the space, where they list skills they would be happy to share with others) or more actively (eg. Having a member of the management team who gets to know everyone and sets up skills matchmaking sessions). It is also important to

balance these skill-sharing initiatives properly so that people do not feel they are giving away their time with nothing in return.

RECOMMENDATION S&S #3: STRUCTURE LEARNING AROUND PROJECTS

Whether skills training takes place to support a specific business venture or creative project already underway, or for the primary purpose of gaining competencies for later use, a project-based approach is one that works well with the decentralised and self-motivated ethos of many spaces. It is also a more scaleable approach as it allows technicians to be occasional mentors and 'provocateurs' rather than teachers.

Some spaces run cohorts of project-based programmes – including Fab Academy, and the start-up programmes at Here East. Other spaces provide mentorship for users and help them come up with learning projects.

4.3. ENGAGING VET TEACHERS AND STUDENTS (ET&S)

We have documented a wide variety of spaces in this report, with a range of approaches for engaging with the formal vocational training sector. Some spaces may not see themselves as operating in an educational sector, while others will have outreach as a primary objective. We believe the world of Co-working and maker spaces has as much to offer the vocational training sector as do large industrial organisations, in terms of promoting an entrepreneurial problem-solving mindset, peer learning and resourcefulness. We have outlined some of the methods that spaces might engage with VET below.

Source 30.10.2019: rawpixel.com from www.freepik.com

RECOMMENDATION ET&S#1: HOST SPRINTS, WORKSHOPS AND PROGRAMMES WITH VET TEACHERS AND STUDENTS

Whether as a formal part of a VET curriculum, or as a stand-alone programme outside school that is targeted to students in the VET system, many spaces support outreach programmes to bring people from the VET sector into the space.

RECOMMENDATION ET&S #2: PROMOTE PROJECT-BASED LEARNING AMONG VET TEACHERS

The 'maker mindset' training undertaken by Waag Fablab in Amsterdam is an example of interfacing directly with VET teachers, giving them an immersive experience of design thinking and project-based learning, and using a maker space to learn new skills and achieve a goal in a short time. These kinds of initiatives are also made more powerful when followed up by mentorship and coaching to integrate these practices into the VET curriculum.

RECOMMENDATION ET&S #3: HOLD REGULAR OPEN HOURS AND TOURS

Part of FabLab charter, to which spaces that call themselves FabLabs must adhere, requires these spaces to be open to the public regularly, for example for a few hours each week. This enables a wide range of people to come and experience ways of working in the space, to meet people who use the space, and to begin to imagine how they would benefit from such an arrangement themselves.

Coworking spaces also hold open hours and tours, as well as events such as talks to which members of the public can subscribe

ANNEX 1 – COWORKING AND MAKER SPACES CASES

CASES FROM THE UK, FRANCE AND NETHERLANDS

CASE STUDY 1: MAKERVERSITY

Location: Central London

Membership: 320 (including part-time members)

Makerversity is a membership community of professional makers and disruptors, based in Somerset House in Central London. It operates as a catalyst for innovation and future-making through its physical workshop space, fabrication facilities and meeting rooms, through a series of thoughtfully designed coworking spaces, and through events that foster a dynamic and collaborative community spirit amongst its members.

Makerversity was founded in 2013, with the support of the Somerset House Trust, the body which manages the historic building next to the River Thames. It is now the largest resident of Somerset House Studios, a major new cross-disciplinary workspace championing collaboration and experimentation in the centre of London. Makerversity's creative community includes design studios, hardware startups, games designers, researchers, artists, freelance engineers and more.

The space offers several tiers of membership, from individual part- and full-time memberships upwards. In the five years of Makerversity's existence, a significant number of innovative product companies have based their operations here, sometimes as individual or two-person teams, and have grown through the space, relocating to spaces elsewhere in the building as their needs change. Throughout their journey, members are able to take advantage of the community and shared facilities. Makerversity proactively supports the exchange of knowledge and support within the community through a programme of internal events, including a popular weekly Friday breakfast. Other facilities include a staffed café-bar, well-used by members as a location for informal meetings and breaks.

Further activities include:

- A thriving public programme, engaging members of the public, domain experts, and the students and graduates of London's many top-tier art, design and engineering colleges.
- A learning programme, working with 16 - 25 year olds to foster creativity, design skills and career opportunities.
- An extensive network of private partnerships and collaborations, pairing Makerversity members with businesses or brands, for mutual benefit.

Website: https://makerversity.org/

CASE STUDY 2: MAKING ROOMS

Location Blackburn, Lancashire, UK

3800 visitors in 2018

The Making Rooms in Blackburn, in the North-West of England, was founded in 2017 with a strong social mission in collaboration with the city council, and now operates as a community interest company (CIC). Based in a former bank in the city centre, the ground floor contains the 'FabLab' space, consisting of a workshop containing digital manufacturing equipment and various tools for design and making. Upstairs, a number of smaller rooms are rented to up to a dozen local artists and businesses – the members of the space – who in return have a discount on use of the equipment downstairs. In addition, Making Rooms also has a number of other revenue streams including classes and prototyping services for local businesses.

The Making Rooms intends to be somewhere that "creativity, technology and advanced manufacturing come together in a community facility, for use by businesses, artists, inventors, students, children and just about everyone else". As such, the space provides:

- Access to tools at low cost, to individuals making physical products – be it professionally, as a hobby, or as a 'side hustle' alongside their regular job
- Skills training in design, manufacturing and running a business – improving their employability and/or their capacity to run a business themselves.
- Opportunities for young people to engage with science, technology, engineering, arts and mathematics outside a conventional classroom setting

One example of the structured skills training that Making Rooms provides is a twelve-week business incubation and mentorship programme, Tech Blackburn. Over a twelve-week programme, a diverse cohort of up to eight creative and innovative businesses receive discounted access to shared workspace and equipment, business mentorship, and skill-building sessions. These eight day-long sessions cover a range of topics from design thinking and business strategy, to marketing and social media, to more future-oriented topics such as the Internet of Things. The programme is aligned with the council's efforts to increase the value-add of the local economy by raising the level of creative and technical skills in the region, and is attracting young people to stay in Blackburn, rather than move to larger towns such as nearby Manchester. The Making Rooms has nearly completed its first cohort and is recruiting for its second.

Website: https://makingrooms.org/

CASE STUDY 3: LABFAB, RENNES

Location: Rennes, Brittany, France

LabFab (Laboratoire de Fabrication) is a network of nine FabLabs across the city of Rennes in Britanny, France. One of these nine TéléFab, is within the Rennes campus of IMT (Institut Mines-Télécom) a graduate engineering school. TéléFab is funded by the university, but most of the other FabLabs in the city, and elsewhere in Brittany, are funded and operated by the regional government as a public resource, similar to a library. There are over 30 FabLabs in the region.

Given its location and funding source, the TéléFab exists partly to serve the students, but like other Fab Labs it also has open hours during which members of the public can come and use the facilities. It also has been working on a series of innovative public education programmes.

Through an initiative led by Baptiste Gaultier, a research engineer and teacher at IMT Atlantique, the lab is involved with several MOOCs (Massive Open Online Courses) which are provided free of charge in English and French. These courses cover content relating to hands-on topics such as digital fabrication, open-source electronics and robotics, and as such they have had to address the challenges of teaching, through a digital platform, those skills which are generally considered to be physical or vocational. To achieve this at scale, these courses make use of project-based learning and peer reviews. The success of the courses is evident in their popularity: over 200k students enrolled in the MOOCs (with a relatively high completion rate of approximately 10%) since they started in 2014.

Furthermore, since 2017, Gaultier has experimented with 'Blended MOOCs': combining the low cost and scaleability of MOOCs with the accountability, mentorship and hands-on tuition possible in classroom-based learning. A cohort of 100 job-seekers were part of initial trials conducted with the French national work agency and a network of 5 Fablabs in the Paris region, who taught a course on digital manufacturing. Within the first cohort, 90% of participants received an online secure certificate from IMT certifying their attainment. This trial was funded by public grants, and the organisers are currently developing a more self-financing model. It is hoped that in future, training programmes might be provided in partnership with local FabLabs to help support and scale the FabLab community.

Website: http://www.labfab.fr/ and https://telefab.fr/

CASE STUDY 4: FABLAB AMSTERDAM (DE WAAG)

FabLab Amsterdam was founded in 2007 and operates within Waag, a public interest organisation that probes the relationship between technology and society, provokes debate, and promotes the democratisation of technology. The FabLab is housed in a historic building in the centre of Amsterdam, and includes conventional digital fabrication equipment, as well as a bio lab and textiles lab. It has attracted a vibrant community of artists, makers and designers, with a growing emphasis on sustainable fashion and textiles. It is one of the partners in the EU's Reflow project exploring the circular economy, in which it will focus on opportunities in the textile industry such as dyeing and textile manufacture from waste biological materials. The different components of the FabLab operate together as one: for example, the biolab might be used to create textiles, which may be processed or formed using tools in the digital fabrication space or textiles lab.

The FabLab is a dynamic and evolving space that brings together art, science and technology expertise, and challenges our perception of what technology can be. Among other projects, it is the birthplace of 'Fairphone', a smartphone manufacturer that emphasises transparency and fairness in the sourcing of its components, and the user's right to repair or alter the device.

As part of its public engagement and education programme, from 2016-2018 the FabLab ran several 'Maker Teacher Camps', each one a week-long experience of project-based learning, with 20-40 teachers drawn from two vocational training schools. The aim of the camps was to build up a 'maker' mindset amongst the teachers, helping them understand what it means to be a 20th century learner. Teachers were exposed to a variety of provocations and prompted to set their own creative project,

which they worked on collaboratively without a set structure but with access to support and expertise, both online and in person. The camps were then followed up with 'maker mindset coaching', and future plans include 'Digital days' to promote the maker mindset in the classroom, and introduce new ideas to vocational teachers that promote flexible and innovative learning styles such as the dynamics of physical space, and creating networks and communities.

Website: https://fablab.waag.org/

CASE STUDY 5: HERE EAST

4,000 people on campus - Plexal - 150 member companies / 1005 members (including hot-desks)

Here East is a technology, business and creative hub in Stratford, East London, situated in the former Press and Broadcast Centre for the 2012 Olympics. Plexal is a coworking space and start-up incubator within Here East which works closely with the Here East management team and forms a crucial part of the ecosystem.

Here East curates a diverse community of companies, from one-person start-ups to multinationals, to academic institutions. Alongside leading companies, several UK universities also have research teams here specialising in fields such as robotics, sports innovation, esports and cybersecurity. The management of Here East is highly selective of its tenants, as it seeks to promote fruitful exchange of ideas between them.

At the heart of Here East is Plexal, a coworking innovation centre for 150 start-up and scaling businesses. Offering anything from a desk to a managed office, Plexal also has an in-house innovation team which works with companies across the Here East campus to create new programmes and partnerships. Plexal has three focus themes: cybersecurity, social inclusion in technology, and mobility. These specialisms have been chosen partly because of the potential for collaboration between small innovative companies and the larger organisations represented on the campus, such as UCL, Deloitte, and Ford. Plexal is also home to the London Office for Rapid Cyber Advancement, an accelerator programme backed by the UK Government, in which start-ups are given free working space and mentorship for a year.

The sense of collaboration and community are enhanced by a curated series of talks, public events and coffee mornings hosted across the campus. There is also a maker space on-site, supported by Barclays bank, which is set to become the flagship 'Eagle lab' space in the UK.

Website: https://hereeast.com/

Evaluation of cases

Feature / VET / lifelong learning criterion	Makerversity	Making Rooms	FabLab Rennes	Waag Fablab Amsterdam	Here East
Informal knowledge transfer: arising from strong links, trust and community spirit. This is an interesting area because it is rarely described, and it is relatively unique to these spaces.	2	1	1	2	2
Technical skill development: designing, making, craft, building, CAD, etc	2	2	2	2	1
Soft skill development: creativity techniques, resiliency, self-management, teamworking	2	2	2	2	2
Business awareness / support: how to run a business; how to manage time; how to do basic accounting and taxes, etc.	2	2	1	1	2
Community collaboration / synergy: creating the conditions for skill matching and collaboration between members	2	1	1	2	2
Networking: providing opportunities to grow a professional network and find funding from investors, or clients	2	1	1	2	2
Outreach: working with schools etc. - how does the space benefit from this? how does the school benefit?	1	1	2	2	0

To what extent does this space fulfil this?

0 = not at all;

1 = yes but not a main focus;

2 = yes and it is something they actively do

CASES FROM DENMARK

CASE STUDY 1: FABLAB SPINDERIHALLERNE

Located in Vejle, Denmark, Spinderihallerne is a makerspace and part of the FabLab network. Focused on the digital competences of the future, FabLab Spinderihallerne defines itself as a "modern prototype workshop"[ix]. The vision for the workshop is to guarantee that all employees in companies and residents of the municipality of Vejle (regardless of age, gender and ethnicity), receive the possibility to experiment with the newest production technologies and thereby prepare them for future technological possibilities. The FabLab and the machines are free to use, and you only pay for the materials consumed. Instructors stand ready to assist in using the equipment.

FabLab Vejle has since 2009, been collaborating with VET schools with workshops on how to pair theory learnt in classrooms with practice by means of designing processes and building physical parts in the workshops. The workshops are also mobile, and can be brought out to the schools. Focus on these workshops has been to spur students' innovative skills. This is very much in line with current issues that Denmark faces concerning companies not using enough 'new' technologies. More specifically, Denmark's confederation of Danish Industry (*Dansk Industri*) has reported that few Danish companies use new technologies in their innovation processes[x]. One of the main barriers for the lack of using new technologies is lack of qualified staff with the right qualifications.

Website: https://fablab.vejle.dk/

CASE STUDY 2: IDEA HOUSE

Located in Esbjerg, Denmark, Idea House was a creation by Business Academy SouthWest for their students who had an entrepreneurial spirit and wanted to start their own company. The Idea House has since expanded and is now open to students from other nearby institutions of higher education (University of Southern Denmark, University of Aalborg (Esbjerg Campus), and University College Southern Denmark)[xi].

A co-working space in a separate building from the main campus, Idea House is an open office space that consists of work desks, meeting rooms, an 'idea room', a library focusing on entrepreneurship and shared kitchen facilities. The facilities are open 24/7 to ensure that the students can work on their ideas when inspiration strikes. Not all students have immediate access, however, and must either have temporary access to Idea House by means of applying for an internship (instead of going to an external company), or applying for access to the facilities alongside their studies.

Idea House offers several advantages concerning innovation and learning:

- *Multidisciplinary:* Students from very different programs are able sit side-by-side and inspire/help one another. Programs can range from marketing, multimedia designers, computer programming and offshore production technologists to building constructors.
- *Professional Support:* The educational institute provides a helping hand to students by means of day-to-day support, facilitating meetings with (un)successful entrepreneurs for Q&A sessions, personality and talent tests for developing soft skills, sparring sessions with

banks/investors, as well as introducing students to established companies who need new products/services that students can work on.

Website: https://www.easv.dk/da/om-os/idea-house/

CASE STUDY 3: SOUNDHUB

Located in Struer, Denmark, Soundhub is a coworking, makerspace and learning space focused on professionals within the sound industry, defining themselves as a "world-class sound and acoustics growth hub for startups, SME's and corporates"[xii]. Struer is the home of Bang & Olufsen, an important global player in the sound industry, and Soundhub shows a synergy effect with the city's vision – becoming the *City of Sound*[xiii].

Soundhub offers following innovative concepts for its members:

- *SoundTech Accelerator Program:* The most promising startups will be paired with experts from reputable players such as Bang & Olufsen and Harman to receive access to state-of-the-art testing facilities and business training. The program particularly focuses on aiding members on developing a sustainable business if you have a sound idea. This is different from most other makerspaces, as most makerspaces tend to focus on the production, rather than the business-side of production.
- Learning Space: Also a rare addition to most co-working and makerspaces, Soundhub ensures that members will experience unorganized knowledge sharing through mentors and specialists, as well as meeting researchers who can aid in fine tuning your skills. Soundhub offers events, seminars and research projects that the startup companies can participate in, ensuring access to a wide network of professionals within the industry.

It is noteworthy that Soundhub focuses more on professionals, rather than educational institutes/VET. However, the concept of focusing on a particular industry, as well as the integration of an accelerator program and learning space can offer valuable insight for VET on how to pair industry with a learning environment. More specifically, can other makerspaces/coworking spaces work as a bridge between education and industry.

Website: https://soundhub.dk/

CASE STUDY 4: ORANGE MAKERSPACE

Located in Roskilde, Denmark, this makerspace has multiple workshops, ranging from 3D printing facilities to woodshops and metal and bicycle workshops. What makes Orange Makerspace unique is its strong integration with the local schools and VET. Their workshop "Made by Kids[xiv]", invites children to become part of an association where they can become comfortable with building constructions and prototypes at a young age. Together with Roskilde Festival, they also collaborate with the Roskilde Festival Højskole (VET school) and have created an entire study line: "Maker"[xv]. Built on Roskilde Festival's values - humanitarian, community and fantastic creativity[xvi] - the study line offers courses such as WoodLab, Digital Maker and Robot technology. The benefit here is that alongside the courses, the students will also volunteer at the Roskilde Festival, as well as co-create a

project at the festival itself. This direct trajectory from classroom to practice can certainly reap benefits.

As students from the 'højskole' sector tend to be in their early twenties (finished with secondary education, not started tertiary education yet), the advantages of understanding practical knowledge and skills could be paramount in choosing the correct tertiary education. This is a costly issue in Denmark[xvii], as dropout rates are increasing due to students being unsure of their choice of study.

Website: https://orangemakerspace.com/

CASE STUDY 5: MAKERSPACE

Makerspace[xviii] is a project-sponsored program by multiple partners (Microsoft, FabLab Denmark, Væksthus Sjælland, and others) whereby a temporary makerspace is established at a school. A Makerspace bus, enables the consultants to plan weeklong visits to the school. The type of learning at these makeshift makerspace events are defined through gamification, hands on guides, case hacking and direct connection to the businesses and industry. Through overlying themes such as innovation, entrepreneurship, IT and media, students are defined as a critical researcher, an analytical recipient, a goal-driven and creative producer and a responsible participant. Examples of projects tackled are heated bicycle seats, optimized indoors climate control, and the perfect workbench leg[xix].

In addition to working on technical skill development, the makerspace project weeks also ensure soft skill development through working in teams, presenting their ideas to experienced professionals in the field, as well learning to overcome failure and adversity during the project.

Although Makerspace uses the weeklong projects as its foundation, it is also responsible for a national competition known as C.R.A.F.T. (Creating Really Advanced Future Thinkers)[xx]. This is for both students and teachers, which focuses on innovative problem solving in a globalized IT world, where ultimately a Danish national champion in Digital Skills is crowned.

Website: http://makerspace.dk/makerspace/

References:

http://makerspace.dk/projekter

http://makerspace.dk/craft

Evaluation of cases

Feature / VET / lifelong learning criterion	**FabLab** **Spinderihallerne**	**Idea House**	**Soundhub**	**Orange Maker Space**	**Makerspace**
Informal knowledge transfer: arising from strong links, trust and community spirit. This is an interesting area because it is rarely described, and it is relatively unique to these spaces.	1	1	2	2	0
Technical skill development: designing, making, craft, building, CAD, etc	2	0	2	2	2
Soft skill development: creativity techniques, resiliency, self-management, teamworking	0	2	0	1	2
Business awareness / support: how to run a business; how to manage time; how to do basic accounting and taxes, etc.	0	2	2	0	0
Community collaboration / synergy: creating the conditions for skill matching and collaboration between members	2	2	2	2	1
Networking: providing opportunities to grow a professional network and find funding from investors, or clients	0	2	2	0	1
Outreach: working with schools etc. - how does the space benefit from this? how does the school benefit?	2	2	2	2	2

To what extent does this space fulfil this?

0 = not at all;

1 = yes but not a main focus;

2 = yes and it is something they actively do

CASES FROM ITALY

CASE STUDY 1. GODESK FROM POTENZA - ITALY

GoDesk is a coworking and an innovation space. GoDesk is a shared workspace designed to inspire, to reduce fixed costs of companies and professionals, to promote the exchange of expertise among coworkers, clients, to improve their skills and knowledge in a way to stimulate innovation.

GoDesk is also very active as business accelerator as it offers a unique ecosystem of resources, inspiration, and collaboration opportunities. The mentorship programmes or some of services for startups, freelancers and small enterprises delivered are based on the educational strategy of WBL (Work-Based Learning) and by involving the learners in several activities, job shadowing, sharing entrepreneurial experience, apprenticeship, internship etc..

In collaboration with local public organization, GoDesk is developing also an incubator programme that could provide some startups with a workspace and several business development services – including accounting services, branding, and intellectual property consultancy.

The training, offered for free for the residents, is a core part of GoDesk because every week there are social events, workshops and several activities about interesting and challenging topics e.g. digital transformation, skills revolution, social media branding etc.

Website: www.godesk.it

CASE STUDY 2. FABLAB MILANO - ITALY

FabLab Milano is a fabrication laboratory fully equipped and also a sharing venue, a coworking area and a good place where it is possible to connect enterprises, artisans and students.

It is located in Bovisa (Milan's industrial area). The activities are mainly focused on 3 areas:

1. sharing and coworking: in a shared environment it is possible to carry out researches, run experiments and acquire technical skills
2. training courses: the courses are based on the principle of exploration and accessibility of digital fabiraction knowledge
3. prototyping and incubation: thanks to a shared environment and the availability of several skilled active participants, it is possible to prototype, test and improve new products, services etc.

Skills courses are available in 2D and 3D graphics, 3D modelling (CAD), 3D printing and electronics (Arduino, Drones, Coding and Robotics). As summer camps there is the possibility to train younger generations (from 8 to 13 or from 14 to 18) about coding, robotics, 3d printing and augmented reality.
Website: https://www.fablabmilano.it/

CASE STUDY 3: FAMO COSE – ROMA MAKERSPACE - ITALY

FAMO COSE is a makerspace in Rome where it is possible to find space, equipment and skills for the development of innovative design, engineering, architecture, fashion and applied arts projects. The space is 210 square meters and its areas are used for digital fabrication, but also for craftsmanship, courses and cultural events.

The idea of FAMO COSE is to create a workplace for freelancers and artisans looking for new ways to create, experiment a test some prototypes. One goal of this space is to create opportunities, to help people develop start-ups. FAMO COSE does this by providing consultancy for fundraising, advertising and marketing campaigns together with the some legal and fiscal advising services. In addition, the space provides a range of equipment, tools and materials from digital manufacturing to more traditional craft and artistic equipment.

Courses and seminars on technical topics are frequent such as the ones about development of new technologies, access to European funding and other topics related to business development. Website: http://www.famocose.it/

CASE STUDY 4: IMPACT HUB REGGIO EMILIA – ITALY

Impact Hub is one of the world's largest networks focused on building entrepreneurial communities for impact at scale — home to the innovators, the dreamers and the entrepreneurs who are creating tangible solutions to the world's most pressing issues[8].

Impact Hub Reggio Emilia was born on 2015 as a place where it is possible to develop an idea or a project looking for skills, support and stimulus from others, or simply a space to rent as workstation in an open, shared and collaborative environment. It is the space where to work together to develop sustainable projects, solutions in line with the needs of the territory, keeping together the economy and the society, through the use of participatory methodologies and constant contamination between different sectors.

Its objective is to become a referral point and to bring an international spirit to the city of Reggio Emilia and its province, by creating a place dedicated to innovation, social entrepreneurship and the network of different and complementary experiences and skills. Other activities and courses delivered by Impact Hub Reggio Emilia include:

- For startups: training, lessons. Workshops, mentorship, professional networking, enterprises, investors and also networking at a global level
- For researchers, professionals and students: a workplace, services and personal advisory, events about challenging topics
- For local communities: projects and process management aimed to sustain and develop innovation local networks thanks to events, co-design laboratories and participatory process activities.

Website: https://www.impacthubre.it/

[8] https://impacthub.net/

CASE STUDY 5: CO-WORKING: TALENT GARDEN - MILAN – ITALY

Talent Garden is the widest co-working network for digital businesses in Europe. It was founded in Italy in 2011 and it is a leader innovation platform and coworking network for digital innovation. It has 23 campuses in 8 different European countries (Albania, Austria, Denmark, Ireland, Italy, Lithuania, Romania, Spain) and it is hosting thousands of talented people, including startups, freelancers, companies and large corporations.

The largest campus from Talent Garden is the one in Milan named Talent Garden Calabiana with 8.500 square meters space. It hosts an innovative coworking area, an Innovation school (Talent Garden's digital educational branch, geared towards both post-graduates and corporate training) and a TAG Cafè area as meeting point for informal meetings and networking. The campus hosts more than 450 coworkers daily and is a member of the Google for Startups' network.

Within the campus there is also a Fablab, a research and development center and a shared digital manufacturing laboratory freely accessible by community members. It is equipped with digital technologies (3D printers, CNC milling machines, robots, laser cutters, Arduino).

Talent Garden Innovation School is an innovative educational institute offering Masters and courses about the digital technologies and the innovation, with a focus on coding, data, design, marketing and business. It has full time and part time Masters with a total of about 4,000 hours of training for 650 students, 2.000 kids and 3.500 professionals. 80 different companies were involved in the training programs.

Website: https://talentgarden.org

Evaluation of cases

Feature / VET / lifelong learning criterion	GoDesk	FabLab Milano	FAMO COSE	Impact Hub	Talent Garden
Informal knowledge transfer: arising from strong links, trust and community spirit. This is an interesting area because it is rarely described, and it is relatively unique to these spaces.	1	1	2	2	2
Technical skill development: designing, making, craft, building, CAD, etc	1	2	2	1	2
Soft skill development: creativity techniques, resiliency, self-management, teamworking	1	1	2	1	2
Business awareness / support: how to run a business; how to manage time; how to do basic accounting and taxes, etc.	2	2	2	2	2
Community collaboration / synergy: creating the conditions for skill matching and collaboration between members	2	2	2	2	2
Networking: providing opportunities to grow a professional network and find funding from investors, or clients	1	2	1	2	2
Outreach: working with schools etc. - how does the space benefit from this? how does the school benefit?	0	2	1	0	2

To what extent does this space fulfil this?

0 = not at all;

1 = yes but not a main focus;

2 = yes and it is something they actively do

CASES FROM FINLAND

CASE STUDY 1: INNOVATION HOUSE FINLAND

Innovation House Finland uses a combination of strong data and creative freedom to help companies grow without forgetting individual well-being. The combination of well-being, quality, and cutting-edge business brings a new generation of innovation culture in Finland.

The founders of Innovation House Finland aim at changing the business culture in Finland by building a strong sense of community where members will gladly participate in activities and network. Emphasis is put on the services provided to its users and the feeling to be at home. Making a difference for the startup ecosystem and for the individual entrepreneurs is at the center of this project. Openness is one of the key issues for success as well as positively encouraging people to share and not hoard information so that everyone can move forward.

At Innovation House Finland, all members celebrate the successes of every company, but they also share the failures and learn from them. To enable this, Innovation House Finland is not just a co-working space but a real community that supports mutual growth, where innovators can connect in a collaborative environment. Both Finnish companies that are expanding internationally and international companies that want to enter the Finnish market are the main focus. There are a range of membership packages, from €150/month for startups to a €650/month package for more established enterprises, and more. The space therefore allows a diversity of types and sizes of enterprise to flourish in its community.

Innovation House Finland was nominated for Best Co-working Space by Nordic Startup Awards in 2018.

The IHF offers memberships that include a well-equipped and flexible workspace, a kitchen area, free Wi-Fi, cleaning and security, basic office services such as multi-functioning copier/scanner/printer, and community managers who help with practical matters. In addition, members have access to:

- Match making supported by community managers
- A network of advisors through its locations in both Singapore and Helsinki
- Peer reviewing and brainstorming.
- Professional and social events
- The possibility to promote their business in IHF events

Website: https://innovationhouse.fi/

CASE STUDY 2: AALTO FABLAB

Aalto Fablab was the first Finnish Fablab founded in 2012. It is located within the Aalto Media Factory, part of Aalto University. This University is a merger of several metropolitan area universities in Helsinki and Espoo, and is seen as the best university in Finland for innovation.

Aalto Fablab provides access to and assistance with digital fabrication technologies, to anyone within the Aalto University community. In the Fablab users can find a laser cutter, a vinyl cutter, a desktop

CNC milling machine, 3D printers and electronics prototyping equipment. In the Aalto FabLab, students are not only challenged by working with new disciplines but also working in multi-discipline teams.

Part of the Fablab model is also to have the space open to the public on scheduled days. The FabLab is also connected to the university curricula by providing two courses, which are open to all Aalto University students: Digital Workshop Basics (an intensive hands-on course to get acquainted with the Fablab machines) and Digital Fabrication Studio (offering more background and design context and completion of a more complex project realized using the Fablab machines).

The users are expected to abide by the philosophy of open knowledge-sharing by helping others, documenting one's work, and sharing what was learned. Specifically, the Aalto Fablab asks that the user "pay forward" what was learned to other users, who may be able to build upon one's work and help speed development.

The lab provides:

- training on the practical use of advanced design technologies, prototyping and production assistance
- Opportunities for peer-to-peer learning, whereby students learn from each other's different approaches to a problem
- experimentation on testing new materials, wearable technology, and so on
- promoting the development of entrepreneurial mind-set and networking in international teams,

Website: http://fablab.aalto.fi/

References:

https://www.aalto.fi/fi/kauppakorkeakoulu
https://www.aalto.fi/fi/yritysyhteistyo/tutkimusyhteistyo-ja-innovaatiot
arts.aalto.fi/fi/cooperation/
https://studios.aalto.fi/fablab
biz.aalto.fi/fi/cooperation/

CASE STUDY 3: FAB LAB RASEKO

FabLab Raseko in the municipality of Naantali (Finland) is owned By Raisio Regional Education and Training Consortium (Raseko). Raseko is a vocational education and training institution, which adds to the uniqueness of the FabLab as the only one attached to a VET school in Finland.

In addition to broaden the learning environment to the students, the college provides the FabLab as part of a study module on digital fabrication with special tools. Students can create prototypes and produce items using a 3D printer or a laser cutter. The study module consists of introduction to tools and working methods relevant to one's own vocational background, e.g. in textile and fashion. The study module gives also knowledge on calculating production costs.

Raseko FabLab is focused on education and community. The Lab promotes the use of digital technology in making art, small scale production and prototyping of new ideas. Students can realize

projects that otherwise would be left without opportunity for prototyping and finalizing steps. As per its mission, the FabLab helps to realize student's passion to take their creative projects to higher levels and to improve their skills. The FabLab is also active in international cooperation. Students are able to visit other FabLabs through mobility programs and they have spent periods, in Iceland, for example, at a FabLab there.

The Raseko FabLab also offers local companies in food sector an opportunity to fine tune their products and services. This can be, for example, for restaurants to improve their recipies and the outlook of their portions in their à la carte menus. The FabLab benefits from the existing network of companies and other stakeholdes of the VET institution and the active collaboration with higher education institutions in the region. With the university of Turku the FabLab has cooperation e.g. in food sector development. An added benefit to the location is that in the region there are both industrial and creative activities.

Website: https://www.raseko.fi/raseko-fab-lab/

References:

https://www.raseko.fi/raseko-food-laboratory/
https://www.raseko.fi/osaamista-ulkomailta-fab-lab-island/
https://www.rannikkoseutu.fi/uutiset/rasekon-naantalin-toimipisteesta-tehtiin-innovaatioiden-keskus-200720685

CASE STUDY 4: FABLAB TAMPERE (FORMERLY FABLAB TUT)

The TUT FabLab was first founded in 2016 within the Technical University of Tampere (TUT). A new multidisciplinary university was started in the region through the merger of two universities, giving the FabLab a broader academic environment including the humanities, arts and design in the region. Due to the merger, the name of the venue was changed to FabLab Tampere.

Students and staff can use the FabLab for research and projects both in the studies and in their leisure time. The FabLab is also open for other users. Materials are paid by the users outside the school community use. Open days allow users to work independently with the equipment with the help of laboratory personnel.

The TUT FabLab offers a range of 3D printers, scanners, laser cutters and other digital manufacturing equipment for its users. The costs of undertaking work in the FabLab are covered by the course organizer. Outside users have a range of options for paying for use of the lab, from an individual day rate for R&D to a corporate hire rate which includes student collaboration.

Fablab Tampere is a learning environment for everyone in Tampere University Community. Fablab will provide a joint workspace for the entire community and offer facilities for doing almost anything related to designing projects and digital fabrication.

Regarding entrepreneurship, the FabLab hosts the Tampere Business Race, offering users intersted in start ups to engage with technology and production design.

The FabLab has also made efforts for community building, through public outreach days and by offering events like “take a child to work” and organizing a Mothers Day event. A special focus is on well being at work and events are tailored to companies to spend a staff day at the FabLab.

Website: https://sites.tuni.fi/fablabtampere/
References:
https://sites.tuni.fi/fablabtampere/yritykset/

CASE STUDY 5: FABLAB OULU

Fab Lab Oulu operates within the University of Oulu. Fab Lab Oulu is catering the Central and Norther part of Finland. In The Oulu FabLab it is possible for students and members of the public to design own product or hardware from the scratch.

Fab Lab Oulu provides various machines, processes, codes, and capabilities that are easy-to-use and help bring ideas into reality using digital manufacturing and more. In addition, Fab Lab Oulu provides users with the possibility to participate in various events, workshops, projects, and training activities for digital modeling and fabrication.

Interested users must register online and pay a visit to explore the machines and capabilities at the site. Users can design their own work and ask help for estimating how much time the work needs from the laboratory staff. Using machines is free of charge, but users are responsible for making their own design at the reserved time slot. Staff offer help with machines and design problems, but will not do the work for the user.

The FabLab offers a training programme through the FabLab Network called Fab Academy: this is a 6-month training program taking place from January to June every year. The program teaches principles and applications of digital fabrication using a hands-on approach to acquire a diversity of skills like web development, project management, 2D and 3D computer-aided design, electronics design and production, 3D printing, laser cutting, embedded programming. At the end of the program the student is capable of mastering the entire process of digital fabrication, demonstrating this capability by creating and presenting a functional prototype that encompasses different functionalities learned during the training. The graduate of the program receives a Fab Academy Diploma awarded by the Fab Academy.

There is also a course on "Principles of Digital Fabrication" organized by University of Oulu, Faculty of Information Technology and Electrical Engineering, which is worth 5 credits. The course is held at Fab Lab Oulu between March and May. Any student at the University of Oulu may participate in the course.

Website: https://www.oulu.fi/fablab/
References:
https://www.uusiteknologia.fi/2018/07/05/oulun-fab-lab-koulii-digiosaajia-elektroniikasta-3d-rakenteisiin/
https://www.ouka.fi/oulu/pitkakankaan-koulu/etusivu/-/asset_publisher/w4X1/content/id/18399313

Evaluation of cases

Feature / VET / lifelong learning criterion	Innovation House Finland	Aalto Fablab	FabLab Raseko	FabLab Tampere	FabLab Oulu
Informal knowledge transfer: arising from strong links, trust and community spirit. This is an interesting area because it is rarely described, and it is relatively unique to these spaces.	2	2	1	1	2
Technical skill development: designing, making, craft, building, CAD, etc	2	2	2	2	2
Soft skill development: creativity techniques, resiliency, self-management, teamworking	2	1	2	2	2
Business awareness / support: how to run a business; how to manage time; how to do basic accounting and taxes, etc.	1	2	1	1	0-1
Community collaboration / synergy: creating the conditions for skill matching and collaboration between members	2	2	2	2	2
Networking: providing opportunities to grow a professional network and find funding from investors, or clients	1	2	2	1	2
Outreach: working with schools etc. - how does the space benefit from this? how does the school benefit?	1	1	2	2	2

To what extent does this space fulfil this?

0 = not at all;

1 = yes but not a main focus;

2 = yes and it is something they actively do

CASES FROM SLOVENIA

CASE STUDY 1: ROGLAB

RogLab is designed as a production, educational and presentation space in a containerized facility of a total area of 30 m^2. It acts as a mini hub of creative activities, with emphasis on the availability of production tools. Its purpose is to develop and test in practice partnerships and modes of operation.

RogLab operates works in the fields of architecture, design and contemporary art, but is intensively devoted to cross-sectoral cooperation, both with educational and scientific institutions as well as with the economic, environmental and spatial sectors. An integral part of RogLab is a manufacturing laboratory that offers accessible technology and services for rapid prototyping, support for creative activities and encouragement of professional development.

RogLab's software orientation makes it possible to access production tools, promote the creative use of 3D technologies, support creators in their professional or amateur way, and develop socially and environmentally responsible projects. It is intended for the widest range of users - from students and professional creators and researchers, manufacturing enthusiasts, to curious people and to all creative adults. RogLab works with architecture, design and contemporary art, and their intersection other sectors such as education, science, and economics.

In RogLab's production lab, users learn how to use manufacturing technologies; creators who need to build quick functional models, prototypes or models in smaller circulation, provide a financially accessible cooperative space at open times. At workshops for children and adults, RogLab presents creative use of 3D technologies to everyone interested. It also acts as a place to socialize, experiment and exchange ideas, knowledge and experiences.

The RogLab program is based on cooperation with private companies, non-governmental organizations and with cultural, research and educational institutions. RogLab's mentoring team is experienced in the field of digital manufacturing, and with the partner network they enrich the range of experienced mentors in design, art, architecture and technology, expand the RogLab program and the circle of participating users.

Benefits

- Strong links with employers develop knowledge and skills that is needed on the labour market, which is benefit for employers and students.
- Transfer of knowledge and cooperation between employers, students, researchers, schools, teachers …
- Development of entrepreneurial skills and future frofessional and business cooperation.
- RogLab is an active intergenerational center and encourage transfer of knowlege, skills and ideas between generations.
- The manufacturing lab is open to small business who would otherwise have no capacity for experiment, prototype and testing.

Website:
http://roglab.si/sl
https://fablab.si/fablabs/roglab/

References:
https://fablab.si/
https://www.dnevnik.si/1042774082
https://mladipodjetnik.si/novice-in-dogodki/novice/fablab-mreza-slovenija-za-podporo-lokalnemu-podjetnistvu
http://digitalna.si/fablab-mreza-slovenije-19-12-2017.html

CASE STUDY 2: PIPC KOČEVJE

The PIPC mission is to promote development activities in the region and to become the bridge between research and developmental environment as well as development needs and resources in the region.

PIPC Kočevje is a support institution that provides more favourable terms for renting premises in the region and a range of administrative and intellectual services for incubator companies. The core activity of the incubator is to help new businesses operate in such a way as to ensure both physical (adequate spaces) and intellectual infrastructure.

In 2016, PIPC Kočevje joined the establishment of the Entrepreneurship, Education and Prototype Centre Kočevje, which aims to produce prototypes and train people for specific skills, both technical and business, so PIPC is upgrading the prototype centre with additional educational activities. Its activities are roughly divided into two parts: training and prototyping. PIPC also offers support to local employers in applying for tenders and in obtaining financial resources from state, municipality and EU to increase competitiveness of companies. The space actively focuses on the region and its capacities, for example by training people in the use of wood, an abundant local material.

The educational prototype centre was created in response to the need to create a higher added value, which is, among others also design and the ability to find a market for finished products. In the local environment, they did not have the opportunity to educate and train to work with computer-controlled machines, which become an indispensable part of production processes in companies. By combining technical and entrepreneurial skills, the space aids development of entrepreneurship in the region and encourages employment.

With the Enterprise Educational Prototyping Centre and targeted training, the region can now provide human resources with the necessary technological knowledge and thus become more attractive for new investments. A prerequisite for the above is of course the right equipment, tools and trained mentors.

The space provides a platform to implement and connect:

- training on the practical use of advanced design technologies,
- prototyping and production of test series,
- promoting the development of entrepreneurial mindset and networking,
- cooperation with educational and development institutions.

Connecting with local authorities and companies in attracting investors has already yielded results: Yaskawa Electric Corporation, the largest manufacturer of industrial robots in the world, chose Kočevje as the first location in Europe to produce robots.

Website:
https://fablab.si/fablabs/pipc/
http://www.inkubator-kocevje.si/
References:
https://fablab.si/
https://www.kocevje.si/novice/podjetnisko-izobrazevalni-prototipni-center-kocevje-pipc
https://pokolpje.si/sl/podjetniski-inkubatorji/podjetniski-inkubator-kocevje/

CASE STUDY 3: 404 - YOUTH TECHNOLOGY RESEARCH CENTER

The Youth Technology Research Center 404 was established with the aim of providing young people with modern technical skills, facilitating the communication of companies with students and creating opportunities for developing their own projects and research.

In addition to the 'machine park', in the center there is also an electrical laboratory, a mechanical processing workshop and a computer classroom. Traditional tools and equipment are available in the center, as well as modern computer-controlled machines. Training for the use of the equipment is provided.

In many educational/training programs for primary school pupils, students and adults, primary purpose is to train users for independent work in technical and technological practices, with an emphasis on research and project work. Educational/training activities are carried out by experts - mechanical engineers, electrical engineers, programmers, constructors, etc., as well as young people - students who have experience in natural science projects and research according to the principle 'youth to youth'.

The future will require extensive technological literacy for the success of the individual and the society, so the 404 Center is concentrated on the mission to create opportunities and strengthen competences for technical and economic development. It also promotes connection between employers, students, researchers, schools, teachers, and facilitates the learning of team work, project work, and the development of soft skills.

To young people with basic technical skills and enthusiasm, they offer further training opportunity to participate in development and research projects. These projects directly engage young people in work with technology and real development challenges, and enable businesses to access young, skilled personnel and innovative solutions.

Activities undertaken by the space also include:

- Project work, development of ideas: cooperation in the development of devices, acquisition, upgrading of technological knowledge and skills, work on development projects.
- Work with primary school pupils: it is very important to be acquainted with technology, machines, programming and electrical engineering. They organize numerous activities, both at schools and in their workshop.
- Work with secondary schools: for example, the space has enabled students to build a research submarine, a robot that can climb stairs, rockets, LED controller and much more.
- Various technological solutions for homemakers, companies, artists and others.

Website:
https://fablab.si/fablabs/404-mladinski-tehnolosko-raziskovalni-center/
https://404.si/
References:
https://fablab.si/
https://slovenija2050.si/2017/07/01/zavod-404/
http://2017.kiblix.org/si/festival-kiblix/zavod-404-ndash-mladinski-tehnolosko-raziskovalni-center-lux.ed-32/
https://www.pef.uni-lj.si/fileadmin/Datoteke/CRSN/tocke_2018/Zavod_404_predstavitev_-_ETSN.pdf
https://www.dnevnik.si/1042841427
https://www.netokracija.si/zavod-404-predstavitev-94645

CASE STUDY 4: HOUSE OF EXPERIMENTS

House of Experiments is a curiosity, creativity, critical thinking and active engagement empowering centre. It exists to arouse curiosity, stimulate creativity, and impart critical thinking skills through open communication, exploration and discovery.

The house of experiments is the first Slovenian center of science in the "do it yourself" style. It is intended for adults and children. In the House of Experiments, they popularize science and prove that learning can be fun too. The permanent exhibition consists of approximately 60 practically entirely interactive exhibits, which can be freely tested. It covers various areas of science, from optical and other illusions, perception, art (creating an image or animation) to the field of medicine.

In 2014, the House of Experiments received a prize from the Republic of Slovenia for outstanding achievements in the field of education.

Its novel setup allows for autonomous research and experimentation: each visitor learns about science through experience, and such education is known as the most effective. Furthermore, the space provides:

- E-experiments: some experiments can be performed from home on a web application.
- Lectures and interactive lectures on current and other issues e.g. earthquakes, the creation of superstars, the movement of light, gravity, genetics, cancer, ...
- Competitions, workshops, festivals for schools and the general public: Sciencetival – several day festival with workshops, lecturers, science show, Houseway – scientific Ljubljana, workshops about diabetes, elastomobiles competition, safe cracking competition ...
- Mobile equipment for presentation in schools all over Slovenia.

Website:
http://www.he.si/
References:
https://www.visitljubljana.com/sl/obiskovalci/aktivnosti/zabava/hisa-eksperimentov/
http://www.otroskiraj.si/ponudba/Hisa-eksperimentov-ideja-za-izlet-ljubljana.html
https://sl-si.facebook.com/HisaEksperimentov
http://www.mizs.gov.si/si/medijsko_sredisce/novica/8914/

CASE STUDY 5: ASSOCIATION FOR TECHNICAL CULTURE OF SLOVENIA - ZOTKS

ZOTKS has been educating in the field of technical skills and natural sciences ror more than seventy years now. It acts as a society in the public interest. They educate and train young people to become creative and innovative individuals who will contribute to sustainable development, preserving and developing a healthy natural environment and promoting a high standard of living for both individuals and society as a whole.

They encourage young people to search for new knowledge, new methods, research, design, innovation, creativity, connectivity and last but not least entertainment. They organize continuous professional training of teachers/mentors for new topics, areas, methods, approaches, and they transfer new knowledge to students by implementing them through research tasks, projects, ideas, competitions and more. Workshops, summer schools and camps for pupils and students are organized in cooperation with practitioners who take care of the realisation of topics, knowledge and skills.

The mission of ZOTKS is to promote a culture of innovative scientific thinking, promote dialogue among various technically-oriented non-governmental and public organizations, and above all dedicated and motivated work with young people. More than 50,000 young people participate each year in their programs and campaigns. ZOTKS aims to developing a team approach and promotes project-based learning and seeks to boost motivation for lifelong learning, research, development of ideas and innovation.

Website:
https://www.zotks.si/
References:
https://www.facebook.com/ZOTKS/
http://www2.arnes.si/~ljzotks2/gzm/dokumenti/pravilnik02.html
http://www.fvkl.si/tekmovanje-zveza-za-tehnicno-kulturo-slovenije-zotks-2018/
https://www.youtube.com/channel/UCba6mKnJt-QPLPvFzDq-btw

Evaluation of cases

Feature / VET / lifelong learning criterion	**Roglab**	**PIPC Kočevje**	**404 Youth Technology Research Center**	**House of experiments**	**Association for Technical Culture Slovenia ZOTKS**
Informal knowledge transfer: arising from strong links, trust and community spirit. This is an interesting area because it is rarely described, and it is relatively unique to these spaces.	2	2	2	1	2
Technical skill development: designing, making, craft, building, CAD, etc	2	2	2	2	2
Soft skill development: creativity techniques, resiliency, self-management, teamworking	2	1	2	2	2
Business awareness / support: how to run a business; how to manage time; how to do basic accounting and taxes, etc.	1	2	1	0	0
Community collaboration / synergy: creating the conditions for skill matching and collaboration between members	2	2	2	2	2
Networking: providing opportunities to grow a professional network and find funding from investors, or clients	1	2	1	0	2
Outreach: working with schools etc. - how does the space benefit from this? how does the school benefit?	1	2	2	2	2

To what extent does this space fulfil this?

0 = not at all;

1 = yes but not a main focus;

2 = yes and it is something they actively do

REFERENCES

[i] https://www.lokalebasen.dk/nyheder/coworking-succes-og-sejrsmarch-med-til-at-fastholde-kontorudlejernes-optimisme-i-top-2324

[ii] https://www.erhvervkbh.dk/kontorhoteller-paa-fremmarch/

[iii] https://www.lokalebasen.dk/bibliotek/Industry-Surveys/MatchOffice-serviced-office-industry-survey-report-2019.pdf

[iv] https://www.regeringen.dk/nyheder/erhvervs-og-ivaerksaetter-aftale/

[v] http://www.danskekommuner.dk/Nyhedsarkiv/2018/September/10/Ivarksatterfalleskab-gor-kommunen-menneskelig/

[vi] https://www.odense.dk/erhverv/ivaerksaetter/stjerneskibet

[vii] https://www.vallensbaek.dk/nyheder/service/robotterne-er-loes-i-syvhoejvaenge

[viii] https://www.folkeskolen.dk/643698/invester-i-mennesker-foer-maskiner

[ix] https://fablab.vejle.dk/om-fablab-spinderihallerne/

[x] https://www.danskindustri.dk/arkiv/analyser/2018/11/kun-fa-virksomheder-anvender-mange-nye-digitale-teknologier/

[xi] https://www.easv.dk/da/om-os/idea-house/?tab=Esbjerg

[xii] https://soundhub.dk.peoplezhosting.dk/about/

[xiii] https://cityofsound.dk/

[xiv] https://orangemakerspace.com/vaerksteder/

[xv] https://rofh.dk/maker/

[xvi] https://orangemakerspace.com/om-os/

[xvii] https://www.information.dk/indland/2018/10/siden-fremdriftsreformen-markant-flere-dropper-universitetet

[xviii] http://makerspace.dk/makerspace/

[xix] http://makerspace.dk/projekter/

[xx] http://makerspace.dk/craft/

Co-funded by the Erasmus+ Programme of the European Union	This project is funded by the European Commission. This publication reflects the views only of the author, and the Commission/National Agencies cannot be held responsible for any use which may be made of the information contained therein.
	The " Toolkit: CO-WORKING AND FABLAB" has been developed under Erasmus+ KA2 Strategic Partnership for Vocational Education and Training Project InnovatiVET and it is licensed under a Creative Commons. Attribution-NonCommercial-ShareAlike 4.0 International License.