

## DT.1.3.1 CAPACITY BUILDING OF FABLABS

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Deliverable D.T.1.3.1

Version 2

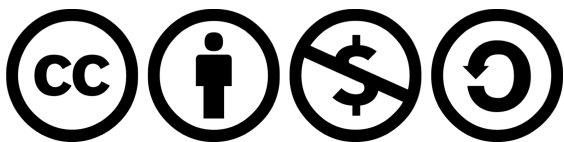
Practices to embed Fab Labs into  
ecosystem (joint collection of good  
practices)

12 2017

LP - MUSE

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## Good practice summary:

1. Generative Design Camp / Luglio 2014 , by GIANLUCA Lopez
2. GENE Portable Lab / Giugno 2015 , by GIANLUCA Lopez
3. SNIP / Special Need Interactive Placemat , by GIANLUCA Lopez
4. FEM-MUSINA <https://github.com/musefablab/FEM-MUSina> , by GIANLUCA Lopez

### 1. Generative Design Camp / Luglio 2014 , by GIANLUCA Lopez

1. Name of the Partner's organization	.bijouets
2. History and professional content	<p>.bijouets is a brand of contemporary jewelry and accessories with an exclusive design, modern and cosmopolitan, made in Italy with 3D printing technology, an additive process that transforms a digital file directly into a solid object.</p> <p>The brand combines the modernity and innovation of technology with extraordinary craft skills: all .bijouets jewelry and accessories, made of laser sintered polyamide, are in fact hand-finished and colored, becoming so real unique pieces.</p> <p>.bijouets uses a light technology, which has a light and sustainable impact. The ideas are turned into products through a process almost immaterial, invisible, developed and perfected over time which is the synthesis of culture, passion and skills acquired over the years, thus reducing waste and emissions and respecting the environment.</p>
3. The context of the action (project)	<p>Generative Design Camp was a free training and experimentation event promoted and hosted by the FabLab MUSE in collaboration with .bijouets. The purpose of the event was to rethink the design, production and customization and distribution processes associated with the fashion design accessory and to develop body jewelry that will be realized through 3D Printing Technologies at HSL Laboratories</p>



4. The main activities of the action	Generative Design Camp lasted 4 days and has touched the following topics: <ul style="list-style-type: none"> <li>• 3D modeling</li> <li>• Fabrication digital</li> <li>• Critical analysis of the products made</li> </ul>
5. Specific products or results	Participants during the Camp acquired skills in 3d parametric modeling, and also analyzed the industrial process that transforms an idea into the product. At the end of the camp were realized through 3d printing all the projects developed during the 4 days
6. Success factors of the action	Some of the participant at the end of the generative camp continued to work with the company with a contract of employment
7. Problems encountered and the experience acquired during implementation of the action	n/a
8. Reasons why you think this action is an example good practice?	The fablab is a laboratory where the users can try to make the first prototype of their project, and move from the world of prototypes to the world of products that can be sold is difficult. With the action of Generative Camp the participants have been able to follow the process that transforms the first prototype into a sellable object and experts in the industry of industrial 3d printing did tutors during the 4 days of the camp.

## 2. GENE Portable Lab / Giugno 2015 , by GIANLUCA Lopez

1. Name of the Partner's organization	University of Verona, Tropical Biodiversity Section MUSE
2. History and professional content	The project is part of the on-going collaboration between the MUSE - Science Museum of Trento and Wildlife Conservation Society (WCS). The main aim is to collect a significant amount of scientific and visual information on Kabobo massif. To target areas geographically distant from those previously surveyed and cover places never before sampled, in particular to investigate reptiles and amphibians and collect the genetic material needed to assess the taxonomic status of key species. During our expedition we plan to sequence directly in the field the DNA of species belonging to different taxonomic groups, through the use of a mobile lab called GENE, which is a system, developed in



	close collaboration with University of Verona (see <a href="http://www.expeditionlab.bio">www.expeditionlab.bio</a> ).
3. The context of the action (project)	The MUSE fablab supported the design and construction of low cost DNA equipment named GENE. In particular he developed Fluorometer for DNA Measurements and a Laboratory spinner.
4. The main activities of the action	<ul style="list-style-type: none"> <li>• 3D modeling</li> <li>• Digital fabrication</li> <li>• Home testing</li> <li>• Data analysis</li> <li>• Prototype enhancements</li> </ul>
5. Specific products or results	The collaboration with the Verona University researchers and the MUSE biology department led to the realization of a Fluorometer for DNA Measurements DIY and a spinner DIY laboratory. Both projects are open source and low cost, all data is online and can be recreated at any fablab. The product tools tested and the data collected compared to those obtained from professional machines and a very small mistake was found, acceptable by DIY low cost tools
6. Success factors of the action	Creating synergies between different actors.
7. Problems encountered and the experience acquired during implementation of the action	Normal prototyping problems like space calculation, connections, regulation of the spinning speed.



8. Reasons why you think this action is an example good practice?	This action highlighted that within fablab it is possible to redesign and recreate professional equipment at low cost without producing erroneous data.
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### 3. SNIP / Special Need Interactive Placemat , by GIANLUCA Lopez

1. Name of the Partner's organization	<b>Needius S.r.l., Maddalena Sommadossi</b>
2. History and professional content	Needius S.r.l. is a scientific company, The mission is to use innovative technologies to design and create solutions and aids for people with special needs and disabilities. The company deals with research, prototyping and commercialization of programs, aids, physical and intellectual, technological systems and equipment (software and hardware). The mission is to use innovative technologies to design and create solutions and aids for people with special needs and disabilities.
3. The context of the action (project)	<p>The muse fablab supported the design and construction of an <a href="#">Interactive board</a> that helps people with autism spectrum syndrome to communicate during the pastry.</p> <p>Its name is NIP Special Need Interactive Placemat. (<a href="https://github.com/musefablab/SNIP">https://github.com/musefablab/SNIP</a> )</p> <p>When one of the symbols is touching, a loudspeaker plays an mp3 file with a voice synthesis that repeats the concept represented on it.</p> <p>The board was created from a version created in the paper format only. Interactivity has been implemented to make it easier and more effective to use: in fact, the educator or parent who is next to the autistic subject are no longer forced to continuously monitor the movements of the latter as they receive sound feedback when he Wants to communicate something.</p>



4. The main activities of the action	<ul style="list-style-type: none"> <li>• Studies on problems in children with autism</li> <li>• 3D modeling</li> <li>• Digital fabrication</li> <li>• Home testing</li> <li>• Data analysis</li> <li>• Prototype enhancements</li> <li>• Coding</li> </ul>
5. Specific products or results	Collaboration with Needius company and student Maddalena Sommadossi led to the realization of a low cost interactive board that helps communication between the subject suffering from autism and the educator or relative.
6. Success factors of the action	Creating synergies between different actors. The project is made public so that anyone can study, modify, distribute and realize the project.
7. Problems encountered and the experience acquired during implementation of the action	n/a
8. Reasons why you think this action is an example good practice?	This action highlighted that the fablab is a place where anyone can create Low cost paramedics device, built according to your needs.

#### 4. FEM-MUSINA <https://github.com/musefablab/FEM-MUSina> , by GIANLUCA Lopez

1. Name of the Partner's organization	Edmund Mach foundation
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2. History and professional content	<p>The Edmund Mach Foundation is an organization that pursues educational goals and scientific research in the field of agriculture.</p> <p>The research and innovation center supports the Trentino economy with studies of improving agricultural and forestry products to protect the quality of life. Pay attention to the development of sustainable agriculture and the protection of biodiversity.</p>
3. The context of the action (project)	<p>The MUSE FabLab in collaboration with the Foundation's research center, analyzed the criticality of home plant irrigation systems. The analysis then produced a study and prototyping of an autonomous system of home irrigation for plants, which collects soil moisture data and which can independently irrigate the various plants connected to the system. Its name is FEMMUSINA with a dual reference to the 2 involved institutions and also a reference to the term "mosina", which means "savings" (intended as water savings in agriculture).</p>
4. The main activities of the action	<ul style="list-style-type: none"> <li>• 3D modeling</li> <li>• Digital fabrication</li> <li>• Home testing</li> <li>• Data analysis</li> <li>• Prototype enhancements</li> <li>• Coding</li> <li>• CNC</li> </ul>
5. Specific products or results	<p>Work has produced a costly and complex prototype to be implemented and managed. After performing several tests and analyzes, a second economic prototype was created, consisting of a few elements, transforming irrigation system into a simple product.</p>
6. Success factors of the action	<p>Creating synergies between different actors. The project is made public so that anyone can study, modify, distribute, realize the project.</p>
7. Problems encountered and the experience acquired during implementation of the action	<p>n/a</p>
8. Reasons why you think this action is an example good practice?	<p>Being able to work closely with research professionals was very helpful in designing and creating the irrigation system. This opportunity proved to be winning as the fablab has become the connecting pole between world makers and the world of research.</p>

# CAPACITY BUILDING OF FABLABS

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D.T1.3.1

Practices to embed Fab Labs into ecosystem  
(joint collection of good practices)  
PP2 - AT

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Version 1

06 2017





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## Description of good practice - No 1

1. Name of the Partner's organization	City Council of Vienna (MA13)
2. History and professional content	We have cooperated in various projects with different departments of the city council of Vienna over the recent years.
3. The context of the action (project)	We have developed a training program for kids with the aim of preparing them for the future job landscape. We needed a partner to finance these courses and distribute the information about them.
4. The main activities of the action	Free workshops on digital fabrication with children in the age of 10-14 during the summer holidays.
5. Specific products or results	<p>Three courses on digital fabrication were developed and held:</p> <ul style="list-style-type: none"> <li>• Print your bag (2D Design and vinyl cutting)</li> <li>• Drawdio (electronics)</li> <li>• 3D Printing (3D Design and Fabrication)</li> </ul> <p>These courses were held 5 times during the summer holidays. One of each course was exclusively for girls.</p>
6. Success factors of the action	Due to the cooperation with the city council, the courses could be held for free. Furthermore the courses were part of the well-known summer program for kids organized by the city of Vienna. This resulted in a wide distribution.
7. Problems encountered and the experience acquired during implementation of the action	No problems occurred.
8. Reasons why you think this action is an example good practice?	see 6)



## Description of good practice - No 2

1. Name of the Partner's organization	Vienna Business Agency
2. History and professional content	<p>The Vienna Business Agency was founded in 1982 as the Vienna Economic Development Fund (Wirtschaftsförderungsfonds) by the City of Vienna, the Vienna Chamber of Commerce, the UniCredit Bank Austria AG (formerly the Zentralsparkasse) as well as the Erste Bank der Österreichischen Sparkassen AG (formerly the Erste Österreichische Sparkasse).</p> <p>The Vienna Business Agency is the first point of contact for national and international companies. It offers financial support, real estate and urban development incentives as well as free service and advice. The objective is to strengthen Viennese companies and their innovative force. As a result, the business location is sustainably developed and strengthened in international competition.</p>
3. The context of the action (project)	HappyLab is very attractive to people to build the first mock-ups and prototypes for a product idea. This cooperation enabled us to give targeted support to members on their way to a successful business.
4. The main activities of the action	We developed a coaching program for designers and makers who want to realize their product ideas with the help of 3D printers, Laser Cutters, CNC milling machines, Vinyl Cutters & Co. In several workshops and coaching sessions experts from the fields of product design and rapid prototyping support you with the implementation.
5. Specific products or results	<p>Module I - Kick-Off Get-together &amp; overview of the digital fabrication tools at HappyLab</p> <p>Module II - Preproduction Product development, calculation, target groups, user centered design, project management</p> <p>Module III: Production Production workshop with the digital fabrication machines at HappyLab</p> <p>Module IV: Postproduction Channels of distribution, packaging design, product photography, social media, funding programs</p> <p>Module V: Presentation Final presentation of the results at Maker Faire Vienna</p>
6. Success factors of the action	<p>Due to the cooperation with the Vienna Business Agency, the program could be co-financed which resulted in a lower entry barrier for the participants.</p> <p>Furthermore the Vienna Business Agency provided rooms and a network of potential startups.</p>



7. Problems encountered and the experience acquired during implementation of the action	Decision processes within the Vienna Business Agency are rather slow, therefore we needed to plan far ahead.
8. Reasons why you think this action is an example good practice?	Some of the participants have successfully launched their product on the market after the coaching program.



### Description of good practice - No 3

1. Name of the Partner's organization	Trotec
2. History and professional content	Trotec was formed in 1997 from a research branch of Trodat and since then has become a world leader in the field of laser technology. As part of the Trodat Trotec Group, Trotec develops, manufactures and markets laser systems for marking, cutting and engraving, as well as engraving materials. We have multiple Laser Cutting machines from Trotec in our labs.
3. The context of the action (project)	Fab Labs and Maker Spaces are an emerging market for Trotec. This relatively new environment is different from their traditional customers. For a safe and durable operation of a Laser Cutter in such an environment new developments are needed.
4. The main activities of the action	We have developed the Fabman Bridges (RFID member card readers), which prevent unauthorized operation and increase safety of machines like laser cutters. Furthermore, the integrated dead man control system prevents unattended operation. At first this was just for an internal usage in Happylab. It raised from other Fab Labs as well as Trotec as a machine manufacturer. Fabman is now available as a product. Furthermore there are plans for Trotec to include it in their product catalogue.
5. Specific products or results	A special device to integrate Fabman with Trotec Laser Cutters has been developed. With the help of the Fabman Exhaust Connector you can process signals from the exhaust system of your laser cutter directly in Fabman. This enables you to determine the machine's status (busy or idle) and to react on failure alarms of the filter unit. Fabman can automatically shut down the laser cutter and prevent it from being switched on in case of a filter malfunction. If you use the safety feature "Prevent unattended operation" you can furthermore set separate safety intervals for busy and idle status.
6. Success factors of the action	Regular joint development meetings result in a better understanding of the needs of both partners, Trotec and the Happylab community.
7. Problems encountered and the experience acquired during implementation of the action	No problems occurred.
8. Reasons why you think this action is an example good practice?	A cooperation between a Fab Lab and a machine manufacturer results in tailor made solutions for Fab Lab use cases. On the other hand the machine manufacturer gets insights into a new and emerging market for their products.

# CAPACITY BUILDING OF FABLABS

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D.T1.3.1

Practices to embed Fab Labs into ecosystem  
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PP3 - HU

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Version 1

06 2017





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## Description of good practice - No 1

1. Name of the Partner's organization	Fab Lab Barcelona
2. History and professional content	<p>Fab Lab Barcelona is part of the Institute for Advanced Architecture of Catalonia, where it supports different educational and research programs related with the multiple scales of the human habitat. It is also the headquarters of the global coordination of the Fab Academy program in collaboration with the Fab Foundation and the MIT's Center for Bits and Atoms; the Fab Academy is a distributed platform of education and research in which each Fab Lab operates as a classroom and the planet as the campus of the largest University in construction in the world, where students learn about the principles, applications and implications of digital manufacturing technology.</p> <p>The Fab Lab Barcelona has produced projects such as Hyper habitat IAAC (official selection for the Venice Biennale XXI) or the Fab Lab House (Audience Award in the first Solar Decathlon Europe in Madrid).</p> <p>It is currently developing projects in different scales, from smart devices for data collection by individuals (Smart Citizen innovative project award in the Smart City Expo and World Congress in Barcelona), the development of the new generation of Fab Labs in the Green Fab Lab project, to the new production models for cities with the Fab City project being implemented in Barcelona.</p> <p>Their mission as a Fab Lab is to provide access to the tools, the knowledge and the financial means to educate, innovate and invent using technology and digital fabrication to allow anyone to make (almost) anything, and thereby creating opportunities to improve lives and livelihoods around the world.</p> <p>Community organizations, educational institutions and non-profit concerns are our primary beneficiaries.</p>
3. The context of the action (project)	The FabKids is a creative laboratory that favours the development of intelligence, creativity and imagination of children and youth. It is a place where thinking is encouraged and innovation occurs, a space where educational and recreational activities for children between 10 and 16 years of age are focus on design and digital manufacturing processes.
4. The main activities of the action	During the 4-days workshops, children use technology intuitively. One of our motivations is to promote reflective, analytical and critical thinking. We think it is necessary that children become technologically skilled; for them it is basic to become active creators with the use of technology, smart objects and video games instead of being passive users
5. Specific products or results	<ul style="list-style-type: none"> <li>• FabZoo and Elefab</li> <li>• Education content and methodology for teaching kids</li> <li>• Training for teachers</li> </ul>



6. Success factors of the action	<ul style="list-style-type: none"> <li>• High number of participants</li> <li>• Projects created by kids could serve education purposes.</li> </ul>
7. Problems encountered and the experience acquired during implementation of the action	Even if Fab Labs are focusing on education, it could happen that there is a lack of skills how kids could be handled. These are skills which need to be developed or imported. It is a good approach to start to educate teachers first, instead of starting with kids.
8. Reasons why you think this action is an example good practice?	Children intuitively use technology daily. One of our motivations is to promote reflective, analytical and critical thinking. We believe that technological literacy will make children become creative with the use of technology, smart objects and video games instead of being passive users.

## Description of good practice - No 2

1. Name of the Partner's organization	Jalalabad Fab Lab
2. History and professional content	In May 2008 a Fab Lab was installed in the village of Bagrami near Jalalabad, Nangarhar Province, in eastern Afghanistan with funding from the National Science Foundation's (NSF) Small Grants for Exploratory Research (SGER) program.
3. The context of the action (project)	<p>This Fab Lab has become a community resource. After 8 months this resource show positive signs of becoming self-sustaining. There are community members that are learning basic economic and business principles by creating product in the lab for sale in local markets. In this informal setting, through hands-on projects and peer-to-peer learning structure, people are gaining technical knowledge and experience using state-of-the-art digital fabrication tools. This experience stimulates motivation to learn more deeply about science, math and engineering and develop skills that are valued around the world. Additionally we have established educational infrastructure that extend learning beyond what a Fab Lab can teach.</p> <p>They have also created a wireless network throughout the community that gives access to the internet, for free, opening up the vast knowledge resources that the internet offers, and providing a gateway to the rest of the world.</p> <p>Fielding a fab lab in Jalalabad has shown that prototyping tools for digital fabrication can function in a post-war, community-stressed setting like Afghanistan and have significant, immediate applications.</p> <p>Identified applications in Information Communications Technology (ICT), civil engineering, and first line health care that can benefit enormously from the capabilities in a Fab Lab.</p>
4. The main activities of the action	The goal of the Jalalabad Fab Lab was to investigate post-war and disaster recovery applications of digital fabrication to see how communities might benefit from access to on-demand, local, custom production capabilities rather than relying on long, slow, and expensive supply chains. The Jalalabad lab anticipated special emphasis on health care needs that require on-site customization for individuals.
5. Specific products or results	<p>Since the Afghanistan Fab Lab was opened in late summer 2008, local users have focused on basic craft and utility projects—including printed t-shirts, small art projects, and long range wireless antennas. As the community gains more advanced skills, they will begin to tackle more difficult projects that address local, personal and community needs. Over the long-term, the FabLab is well-suited to address immediate needs in health care and other areas which are currently constrained by the need for long supply chains or large local inventories. Some recent and ongoing projects in the Afghanistan FabLab focus on either enhanced communications or skills training for Afghans.</p> <p>FabFi: Long Range Wireless Network Connectivity</p>



	<p>FabFi is an open-source, FabLab-grown system using common building materials and off-the-shelf electronics to transmit wireless ethernet signals across distances of up to several miles. With FabFi, communities can build their own wireless networks to gain high-speed internet connectivity - thus enabling them to access online educational, medical, and other resources.</p> <p>Digital Pathology / Telepathology</p> <p>A team of internationals and local nationals performed a biopsy with remote diagnosis - sometimes referred to as “telepathology”. They have installed, integrated and demonstrated to medical staff and students at the Jalalabad Medical School the use of a frozen section machine, digital microscope, and internet connection to obtain real time remote pathology consultations on a tissue sample.</p> <p>User Clubs: Small Businesses</p> <p>User clubs are a hands-on approach to developing sustainable projects while learning. Members of the Fab Lab to organize “clubs” where members make and sell customized things - from simple personalized items like t-shirts and trinkets to antennas and incubators. The goal of these clubs is to focus the user on learning to use the equipment carefully and skilfully by providing an economic incentive. Just as a lemonade stand might be a good introduction to business for an entrepreneurial student in America, the user clubs also teach simple accounting and business concepts. The clubs are not meant to be a long-term income source for the user and so the clubs have a forced graduation once the user becomes very good at a particular skill. Before leaving the program the user serves as a mentor for another incoming novice apprentice in any given skill. The user clubs foster the motivation to raise the standard of output by providing a reward for high quality work.</p>
6. Success factors of the action	<p>Research and teaching skills and experience provided to those who worked on the project Application of computer controlled and digital tools in :</p> <ul style="list-style-type: none"> <li>• wireless, ad hoc meshing and point to point networking</li> <li>• telemedicine</li> <li>• agriculture and farming</li> <li>• business, accounting, and management</li> </ul>
7. Problems encountered and the experience acquired during implementation of the action	<p>As far as we now this Fab Lab does not exist anymore. Website is down. Without international private or public funds Fab Labs in post warzone areas cannot survive.</p>
8. Reasons why you think this action is an example good practice?	<p>Fab Labs are embedded into their local ecosystem; they are giving answers to local needs and problems as well. Present days we are living a European migrant crisis. This example could be a good practice for reindustrialization and promotion of entrepreneurship of war effected countries.</p>



### Description of good practice - No 3

1. Name of the Partner's organization	FabLab Budapest
2. History and professional content	This is our own program approach, the "Ambassador Program" of Fab Lab Budapest. Most of our regular users are coming from various universities and various faculties. Our goal is to have as many users as possible, teach them as much as we can, and give them proper time at the Fab Lab. We realized bottlenecks at marketing, sales and human resources. We tried to find a solution which we are able to "pay" with in-kind contribution.
3. The context of the action (project)	We launched an open call for 2nd grade BA/MA and BSc/MSc students at 3 major universities of Budapest including faculties of engineering, science and design. We offered the upcoming participants free of charge education on the Fab Lab Budapest machinery park (CNC milling; Laser cutting; 3D printing; 3D scanning; Hot-wire cutting; Vinyl-cutting; Electrical prototyping and Robotics), we teach them generative and parametric modelling. The aim was that the ambassador will represent the Fab Lab at the faculty and the payment will be machinery time and free training. We created for each ambassador a virtual account with machinery time where we credited the ambassador after every new user.
4. The main activities of the action	<ul style="list-style-type: none"> <li>• Training of ambassadors</li> <li>• Creating education material</li> <li>• Building community</li> <li>• Presales</li> </ul>
5. Specific products or results	After the program we had 12 ambassadors at 3 universities 12 different faculties. The ambassadors were advertising the existence and the services within their schoolmates and helping them at their lab time. We had also a good input for creating faculty specified education content.
6. Success factors of the action	With the program we had a surprisingly crescent number of new users. The multidisciplinary interactions within the FabLab community became a reality (during the training ambassador candidates started to learn from each other and cooperate).
7. Problems encountered and the experience acquired during implementation of the action	We had two major difficulties during the implementation. First there was a noticeable drop-out level (30%) of the applicants' right after the start of their training. The ones who left they were not dedicated enough to spend 3 weeks of intense training. This factor could be lowered with better selection process. The other problem we faced is how to teach efficient students with different background.
8. Reasons why you think this action is an example good practice?	This is a good practise because it stretches serious bottlenecks through simple but clever solution.

## Description of good practice - No 4

1. Name of the Partner's organization	Transformative Learning Technologies Lab Stanford Graduate School of Education
2. History and professional content	<p>FabLearn Labs (formerly known as FabLab@School) are a worldwide growing network of educational digital fabrication labs that put cutting-edge technology for design and construction - such as 3D printers and laser cutters and robotics - into the hands of middle and high school students.</p> <p>Such labs are a place for invention, creation, discovery and sharing, a space of inquiry where everyone learns and knowledge gets integrated into personal interests and daily life.</p> <p>FabLearn Labs, which are embedded in technology, permit the acknowledgement and embracing of different learning styles and epistemologies, engendering a convivial environment in which students can concretize their ideas and projects with intense personal engagement.</p>
3. The context of the action (project)	<p>Innovation and collaborative problem solving are core skills for virtually any STEM career, and yet those are the very elements that have been pushed out of schools by the mandates of standardized testing. Most high school students will graduate without the experience of having ever designed a solution and built a working prototype. FabLearn Labs aims to be the space where this exploration is possible.</p> <p>The goal of some of the activities at the FabLearn Labs is to engage children as quickly as possible in real projects, creating an authentic context for learning. Good projects create the need to learn more and this process motivates students to learn more about a specific subject. FabLearn Labs allow children to experiment, take risks, and play with their own ideas, giving them permission to create, imagine, and build.</p>
4. The main activities of the action	<p>A traditional school science lab depends on a highly scripted instructional model. All students progress in linear fashion. The FabLearn Labs model relies on open-ended questions as a starting point, with no "correct" answer at the other end. In this hands-on environment, students chart their own course from idea to finished artifact, and no two students' journeys are exactly the same. While the traditional model emphasizes uniformity and predictability, FabLearn Labs emphasizes collaboration and creative problem-solving.</p>
5. Specific products or results	<p>The project has seven main components:</p> <ul style="list-style-type: none"> <li>• A carefully-designed teacher preparation program, refined over the last few years, and tested in multiple countries and cultures. Also, we developed strategies for a full integration with school curricula.</li> <li>• A set of tens of activities designed for children together with teacher guides, allowing students to engage in cutting-edge scientific investigation and engineering projects.</li> <li>• Software tools for scientific modeling and simulation, and equipment for sensor-enabled scientific experiments in physics and chemistry.</li> <li>• Easy to use, age-appropriate robotics and sensing equipment.</li> </ul>



	<ul style="list-style-type: none"> <li>• A fully-developed research program, with custom-made impact measures and learning metrics especially designed for digital fabrication and project-based environments.</li> <li>• A special focus on education and on the connection with the disciplines (sciences, math, engineering)</li> <li>• Lower cost of implementation and ownership, intensive use of re-purposed and low-cost materials.</li> </ul>
6. Success factors of the action	<p>When children are allowed to experiment, invent, and investigate their own intellectual passions, they begin to see themselves as learners who have good ideas and can transform those ideas into reality. We have accumulated multiple research results and peer-reviewed publications that speak to the effectiveness of this approach.</p> <p>There are currently FabLearn Labs installations on the Stanford University campus (California), in Moscow (Russia), Bangkok (Thailand), Palo Alto (California), Barcelona (Spain), Melbourne (Australia), Guadalajara (Mexico), and Aarhus (Denmark), East Palo Alto (California), Helsinki (Finland) and Warsaw (Poland).</p> <p>FabLearn Labs continues to create a community of researchers, educators, designers, and makers to discuss and explore digital fabrication in education, making, and hands-on learning for the 21st Century. Some of the projects that support this community are the FabLearn conference at Stanford University, the FabLearn Europe conference, and the FabLearn Fellows Program.</p>
7. Problems encountered and the experience acquired during implementation of the action	<p>Even if FabLabs are focussing on education, it could happen that there is a lack of skills how kids could be handled. These are skills which needs to be developed or imported. It is a good approach to start to educate teachers first, instead of starting with kids.</p>
8. Reasons why you think this action is an example good practice?	<p>A multi-disciplinary group designing and researching new technologies for education. We understand new technologies not only as a way to optimize the existing educational system, but as a transformative force that can generate radically new ways of knowing and learning.</p>

# CAPACITY BUILDING OF FABLABS

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## Description of good practice - No 1

1. Name of the Partner's organization	Association of open workshops
2. History and professional content	<p>Last year we started close communication and cooperation with other local FabLabs in Czech Republic. Together we started to establish an association.</p> <p>Meetings: Pilsen, Brno, Ostrava</p> <p>Involved open workshops: FabLab Brno, strojLAB, BrmLab, DEPO 2015 Makerspace, HobbyLab, Industra, Fajna dilna, IdeaLab, Robotarna</p>
3. The context of the action (project)	While FabLabs (also called open workshops) as growing phenomenon also in local measure, we identify common needs dedicated to dealing with specific challenges in Czech Republic (insurance, regulations etc.).
4. The main activities of the action	Meetings, Networking
5. Specific products or results	<p>Facebook group (communication platform) "Otevřené dílny v ČR" <a href="https://www.facebook.com/groups/178825842579957/">https://www.facebook.com/groups/178825842579957/</a></p> <p>Web sites (prepared) <a href="http://www.otevrenedilny.cz">www.otevrenedilny.cz</a></p>
6. Success factors of the action	<p>Growing Network of partner FabLabs to share local experiences.</p> <p>To get acquainted other local FabLabs in Czech Republic with activities of FabLabNet.</p>
7. Problems encountered and the experience acquired during implementation of the action	Communication with wide range of partners can slow down progress in common activities. Simplicity and clarity of targets are needed.
8. Reasons why you think this action is an example good practice?	Providing linkage of local Fablabs to international network (represented by FabLabNet) can later support its sustainability.



## Description of good practice - No 2

1. Name of the Partner's organization	SKAS Student chamber of academic senate of Brno University of Technology, <a href="http://www.skas.vutbr.cz">www.skas.vutbr.cz</a>
2. History and professional content	Student chamber is the leading unit of many activities regarding to wide student community.
3. The context of the action (project)	Students prepared Christmas Ball BUT ( <a href="http://ples.vutbr.cz/">http://ples.vutbr.cz/</a> ) behalf of Student chamber. This is very popular event for 2000 participants.  Idea of this bottom-up event is to involve students to create and prepare their own Ball (from students to students). They are also responsible in designing and creating decorations.
4. The main activities of the action	Laser cutting, hotwire cutting from Expanded polystyrene (EPS).  Students designed their own snowflakes and fabricated it themselves behalf and under supervision of our strojLAB (FabLab BUT)
5. Specific products or results	Producing over hundred large scale (2x2m) decorative "Snowflakes" on laser cutter and hotwire cutter.
6. Success factors of the action	Product of our FabLab was exposed in the largest "dancefloor" (expo pavilion) in the city and also largest Ball (2000 participants).
7. Problems encountered and the experience acquired during implementation of the action	No problems occurred.
8. Reasons why you think this action is an example good practice?	This is good example of the strength of community coworking.  See /6
8. Reasons why you think this action is an example good practice?	Some of the participants have successfully launched their product on the market after the coaching program.



### Description of good practice - No 3

1. Name of the Partner's organization	Solidify 3D s.r.o.
2. History and professional content	Solidify is young SME dealing with materials for 3D printing, cooperates with university and supports talented students.
3. The context of the action (project)	Solidify company needed to develop new kind of filament holder for their own purposes.
4. The main activities of the action	Developing of the filament holder and weighing-machine: Design of the machine (CAD, technical drawings) Soldering of the electronics (solder) Body parts fabricating (laser cutter) Building of the machine (assembled and tested)
5. Specific products or results	Filament holder and weighing-machine for holding coils of the filaments for FFF (fused fabrication filament) technology.
6. Success factors of the action	Students could have worked on real meaningful project (motivation). SME worked with talented students (getting desired product). FabLab, as mediator, provided space for realizing cooperation between students and SME's.
7. Problems encountered and the experience acquired during implementation of the action	No problems occurred
8. Reasons why you think this action is an example good practice?	See /6. This kind of cooperation and project is transferable to the other countries and FabLabs. Companies can use FabLab as provider of talented people.

# CAPACITY BUILDING OF FABLABS

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D.T1.3.1

Practices to embed Fab Labs into ecosystem  
(joint collection of good practices)

PP6 - PL

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Version 1

06 2017





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## Description of good practice - No 1

1. Name of the Partner's organization	Electronic, Electrical and Mechanical School Complex Technical and Commercial School Complex City Board of Education
2. History and professional content <sup>1</sup>	Both School Complexes have a long tradition in a vocational education of students - Electronic, Electrical and Mechanical for over a hundred years and Technical and Commercial from the middle of XXth century. The Scholl Complexes educate pupils in technical professions such as mechanical technician, electrical technician, IT specialist, aviation mechanic and photographer. Both of the schools have a lot of experience with making trainings and courses that raise the level of knowledge and competences of their students.
3. The context of the action (project) <sup>2</sup>	Together with the City Board of Education, we decided to start a cooperation with above mentioned and make a professional 3D modeling and rapid prototyping trainings that could be useful in the future career of the students. This were the first educational activities regarding innovation and new technologies addressed to technical schools in the south subregion of Silesian Voivodeship.
4. The main activities of the action	<ul style="list-style-type: none"> <li>• During the whole cycle of workshops 91 pupils have participated in a total number of 360 hours of trainings during the period of over 6 months</li> <li>• main training subjects were: <ul style="list-style-type: none"> <li>○ Introduction to 3D printing</li> <li>○ Digital modeling, digital fabrication and rapid prototyping</li> <li>○ 3D scan</li> <li>○ Use of spatial printing in reverse engineering</li> <li>○ Directions of development and use of 3D printing in the future</li> </ul> </li> </ul>
5. Specific products or results	<ul style="list-style-type: none"> <li>• cycle of free workshops</li> <li>• certificates for all students</li> <li>• free knowledge</li> <li>• passion developing</li> </ul>
6. Success factors of the action	The will of the local authorities and key stakeholders to cooperate in the name of raising the competences of future technical staff of our subregion

<sup>1</sup> what is the history of organization? what experience do you have in making such projects?

<sup>2</sup> what were the reasons of choosing this action? what was the context? what research did you make before? how did you prepare to do such action?



7. Problems encountered and the experience acquired during implementation of the action	No problems occurred
8. Reasons why you think this action is an example of good practice?	<p>It is a great example of appropriate work of local ecosystem - the cooperation between different stakeholders on the field of innovation resulting in raising competences of the future technical staff and thus increasing the competitiveness of our region</p> <p>Pupils have an opportunity to learn about new technologies for free</p> <p>The idea is replicable in similar conditions elsewhere by other entities</p> <p>Innovative in a national scale - there are no other examples of such cooperation concerning this kind of educational activities</p>

# CAPACITY BUILDING OF FABLABS

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D.T1.3.1

Practices to embed Fab Labs into ecosystem  
(joint collection of good practices)  
PP7 - SI

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## Description of good practice - No 1: RogLight

1. Name of the Partner's organization	Museum of Architecture and Design - Ljubljana
2. History and professional content	We have cooperated in various projects with Museum of Architecture and Design over the recent years.
3. The context of the action (project)	We have jointly organized a contest for the best lamp made with our laser cutter. Winners have been exhibited at the Museum, plus got financial awards, free memberships and training at RogLab.
4. The main activities of the action	Call for contest <a href="http://roglab.si/sveze/2017/kreativni_izziv_roglight_16_2_2017.pdf">http://roglab.si/sveze/2017/kreativni_izziv_roglight_16_2_2017.pdf</a>
5. Specific products or results	12 participants 4 awarded and exhibited lamps.
6. Success factors of the action	Award were both financial and promotional (exhibition at Museum of Architecture and Design) Precise specifications criteria (materials, made with our lasercutter)
7. Problems encountered and the experience acquired during implementation of the action	No problems occurred.
8. Reasons why you think this action is an example good practice?	Easily reproducible. Maintain contact with one institution and engage new people into the fablab.



## Description of good practice - No 2: 3D Kitchen

1. Name of the Partner's organization	INTRI d.o.o.
2. History and professional content	INTRI is one of the first private actor on the 3D business in Slovenia and we have been in contact for several matters (technical advices, punctual services on some projects) from the beginning of RogLab.
3. The context of the action (project)	Less than 10% of people who participate to our training actually come to work on our machines, despites the fact that they have 1 month of free membership included in the prive of the training. The reason is that they need to be technically coached to learn to model their own 3D model.
4. The main activities of the action	A weekly unformal coaching n 3D modelling on Rhinoceros. It is not a structured formal course, but a drop-in session where any member can come to work on his project and take profit of tailored technical hints and how-to's of the mentor. Participants also help each other.
5. Specific products or results	We started a couple of month ago, so it is to early to see the results. We expect an increase of regular users for the 3D printing services.
6. Success factors of the action	The mentor from INTRI was from the beginning very enthusiast about this new way of teaching.
7. Problems encountered and the experience acquired during implementation of the action	Participation was relatively high at the beginning (6 to 8 people - maximum capacity is 8). It has decreased in June, probably because of exams period.
8. Reasons why you think this action is an example good practice?	Nice way to maintain a sense of community and build link among users.

## Description of good practice - No 3 Guerilla of Lights

1. Name of the Partner's organization	Stripburger Primary School Tone Čufar
2. History and professional content	Stripburger is a local partner of RogLab since the beginning. They mentored several workshops for kids at RogLab mixing drawing and laser cutting. Primary School Tone Čufar is partner of RogLab for the third year now.
3. The context of the action (project)	How to interpret old objects through the help of modern art and digital technologies?
4. The main activities of the action	11 children from Primary School Tone Čufar participated to the project. Each of them was asked to choose 1 object among a dozen (old camera from the 40's, old gas mask, etc.) and imagined a story about this object answering the following question: where does it come from? Who used it and how? What is the name of this object? What is it made of? In another session, they made a frame to present their object within the context of the story they build up upon it.
5. Specific products or results	10 framed objects with help of digital laser cutter and engraver, exhibited at the annual event "Guerilla of Light".
6. Success factors of the action	Engagement of teacher, RogLab mentor and StripBurger mentors.
7. Problems encountered and the experience acquired during implementation of the action	Lack of time. Too much work was left on the shoulder of RogLab's mentor.
8. Reasons why you think this action is an example good practice?	A triangular cooperation is not easy to set up, but with historical partners, it gives very nice results.

# CAPACITY BUILDING OF FABLABS

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D.T1.3.1

Practices to embed Fab Labs into ecosystem  
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PP8 - SK

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## Description of good practice - No 1

1. Name of the Partner's organization	Faculty of Mathematics, Physics and Informatics OF THE COMENIUS UNIVERSITY IN BRATISLAVA
2. History and professional content	Faculty of Mathematics, Physics and Informatics is consistently ranked as the best faculty in Slovakia. Such a high standing has been achieved thanks to the quality of our teachers and researchers, our openness, a broad international collaboration, and also thanks to our exceptional students. The faculty provides an environment that places high demands on students' skills, but also builds on mutual respect and friendly relationships between students and staff. <a href="https://fmph.uniba.sk/en/about-the-faculty/">https://fmph.uniba.sk/en/about-the-faculty/</a>
3. The context of the action (project)	In cooperation with Faculty of Mathematics, Physics and Informatics, we have prepared a course: Digital manufacturing technology The course is based on the rare collaboration of faculty with our Fablab - cutting-edge digital workshop, where everyone can come to realize their ideas with digital technologies such as 3D printing, laser cutting, milling, electronic embroidery and more. This optional course is suitable for all faculty students, and the entire university if they have the basics of programming. Students will learn how to create, design, code and build their own projects products with technologies that are available in Fablab.
4. The main activities of the action	The course took place 3 hours a week in the summer semester 2017 The main activity was to master digital technologies, confirmed by the implementation and presentation of a small project at the end of the semester
5. Specific products or results	The result was: Experience with independent work, and teamwork in learning to work with digital technologies from idea, through design, modeling, to control of specific machines Students presentations are at: <a href="http://dai.fmph.uniba.sk/courses/dtv/index.php/Projekty">http://dai.fmph.uniba.sk/courses/dtv/index.php/Projekty</a>
6. Success factors of the action	Students who have previously dealt with only theoretical disciplines have been able to practically realize and materialize their ideas
7. Problems encountered and the experience acquired during implementation of the action	Verified and confirmed in our own conditions Neil Gershenfeld's experience of providing students with autonomy in choosing the idea they want to realize has a great motivation to improve their mastery in the control of available technology and to invest time in something meaningful.
8. Reasons why you think this action is an example good practice?	The experience can be used in the pilot project of education and documented projects in the FabLabNet library



## Description of good practice - No 2

1. Name of the Partner's organization	Compotes <a href="http://www.compotes.net/">http://www.compotes.net/</a>
2. History and professional content	Comunity Compotes is a team of young people interested in robotics. They have been doing robotics since their 12 years of age. They started with First Lego League and later they were inspired by the Robocup. In the summer of 2015 we were introduced to them and provided space for them in our FabLab for the development, implementation and testing of robotic footballers with whom they achieve excellent results.
3. The context of the action (project)	Providing space and technology to young, talented, creative and perspective people
4. The main activities of the action	The main activity was to master digital technologies, by the development, implementation and testing of robotic footballers.
5. Specific products or results	The result was: <ul style="list-style-type: none"> <li>• Experience with independent work, and teamwork in learning to work with digital technologies from idea, through design, modeling, to control of specific machines.</li> <li>• Excellent results in competitions RoboCup Junior</li> <li>• Dignified representation of FabLab and Slovakia also at international competitions</li> <li>• With gained experience they apply in regular robotics and electronics courses for young people.</li> </ul>
6. Success factors of the action	Excellent students who have not made room for the development and testing of their robots have also gained the opportunity to acquaint themselves with digital technologies and reach the new level
7. Problems encountered and the experience acquired during implementation of the action	The experience gained during the development of the robot for the race we used to develop a small robot for education. The instructions are publicly available on link <a href="https://www.fablab.sk/en/multimouse/">https://www.fablab.sk/en/multimouse/</a>



8. Reasons why you think this action is an example good practice?	The experience can be used in the pilot projects communities and education. Documented projects in the FabLabNet library.
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### Description of good practice - No 3

1. Name of the Partner's organization	robotika.sk NGO <a href="http://www.robotika.sk">http://www.robotika.sk</a>
2. History and professional content	NGO Robotika.sk is involved in development of mobile robotic systems and related components such as sensors and visual systems. Besides, the general problems concerning motion control, man-machine interface, information processing are in the center of our interest. The members of robotic group are students, PhD. students and researchers. The organize different robotic competitions and educational events.
3. The context of the action (project)	In cooperation with NGO Robotika.sk we are preparing and organizing regular seminars on the first Wednesdays of each month. At seminars they present interesting projects of smart people. Providing space for personal communication to talented, creative and perspective people.
4. The main activities of the action	see 3)
5. Specific products or results	The result was: The presentation is uploaded and published in the archive. <a href="http://www.robotika.sk/seminar-archiv.php">http://www.robotika.sk/seminar-archiv.php</a> Some have managed to make live streaming
6. Success factors of the action	The opportunity to get acquainted, inspired and share information and experience
7. Problems encountered and the experience acquired during implementation of the action	No problems occurred



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8. Reasons why you think this action is an example of good practice?	see 6)
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# CAPACITY BUILDING OF FABLABS

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D.T1.3.1

Practices to embed Fab Labs into ecosystem  
(joint collection of good practices)

PP9 - HR

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Version 1

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**T1 | Capacity Building and Networking of Fab Labs**

**A.T1.3 | Capacity Building of Fab Labs**

**D.T.1.3.1 | Practices to embed Fab Labs into ecosystem**

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Authors:	Zrinka Valetić, Roberto Vdovic (FLZG)
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## Version Control

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09/06/2017	Maja Gložinić	FLZG	Internal review
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## Annexes

No	File Name	Title

## Details

<b>Deliverable Title</b>	PP9 Good practice
<b>Deliverable Number</b>	D.T.1.3.1
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## Executive Summary

FabLab contribute to DT1.3.1.Good Practice Collection with several good examples of collaboration with other institutions, related to education, related to innovation and business and related to local community. By combine and involve different stakeholders we build collection of around twenty good practices we already established in cooperation with different institutions during least few years.



FabLab.hr good practice collection (bold suggested for FabLabNet good practice):

1. 3D Printing Open Days (annual event), Faculty of Architecture
2. **HUB\_S Innovative Spaces Design Concept for Urban Revitalisation**, Faculty of Architecture
3. 3D scanning and 3D printing workshops for young visitors, Archaeological Museum Zagreb
4. Faust Vrancic Creative Days, local context inspired digital fabrication workshops (annual workshops on Island of Prvic), NGO Otok
5. **Science Picnic Creative Lab**, digital fabrication studio as part of the Science Picnic event (annual event), NGO Baltazar
6. **Inclusive digital fabrication workshops**, curriculum development for kids with special needs, Slava Raškaj Educational Centre
7. Modular Cutlery, development of special cutlery for kids with motoric difficulty, Special Hospital for Protection of Children with Neural and Motoric Difficulty
8. Inclusive creative workshops, Croatian Muscular Dystrophy Association
9. Capacitive Interface for People with special needs, Mechanical Technical School Faust Vrancic
10. Re3D, build digital fabrication equipments from old parts, circular economy related, Mechanical Technical School Faust Vrancic
11. Mljet recycle, sustainable and local community challenge, Dubrovnik ZTK
12. Primary Schools initiative - Creative Labs in schools - Croatian Initiative
13. Public Libraries Initiative - Creative Workshops in public spaces - Croatian Initiative
14. InterPeers Education, several primary, secondary and university schools knowledge exchange chain workshops and initiative
15. Makerbuino, product development support and promotion, CircuitMess Ltd.
16. Ultimaker, 3D printer - support, education and promotion
17. Rhinoceros, 3D modeling - support & education
18. David Vision, 3D scanner - support & education
19. BigRap, 3D printer - support, education and promotion
20. MyMachine Croatia, network development in Croatia as part of MyMachine Global



## Description of good practice - No 1: Annual event - 3Dprinting Open Days

1. Name of the Partner's organization	Faculty of Architecture, University of Zagreb
2. History and professional content	Initial idea of FabLab start at Faculty of Architecture University of Zagreb (Af), and two of three cofounders are members of University. We have cooperated in various projects and events over the last five years and this cooperation become even more intensive with new EU funded project DOIT.. Cooperation with Faculty of Architecture, University of Zagreb, start with FabLab registration in 2013, and school is co-organizing 3D printing Open Days, annual event since 2013, till most recent cooperation on EU funded H2020, DOIT project.
3. The context of the action (project)	City of Zagreb is capital of Croatia, and biggest city. Most of human and financial resources are located in Zagreb. Without MakerFair (now closest is in Ljubljana, Slovenia and Osijek, Croatia) or similar makers oriented events, we believed this kind events should fit in both FabLab and City of Zagreb interest. For year 2017, we expected to bring (Mini)Makers Fair in Zagreb, by evolving this 3D Printing Open Days event, but new Mini Makers Faire's make this idea postponed.
4. The main activities of the action	Two days event is organized in cooperation with Af with idea to promote digital fabrication in education. In year 2017, it would be fifth annual event. For next year we are planning to organize international conference Education (R)Evolution with topic of makers impact on education on all levels.
5. Specific products or results	Two days event, with demonstrations, lectures and workshops is : performed on annual event free for both participants and visitors.
6. Success factors of the action	Significant interest, both of participants to be present (around 65 projects), and visitors (around 500-2000 visitors annually) to explore recent development in digital fabrication, but also in makers movement.
7. Problems encountered and the experience acquired during implementation of the action	No problems occurred for last four years of this event. Extending cooperation with other stakeholders might rise organisational issues. Planning annual events and education conference might rise financial issues.



8. Reasons why you think this action is an example good practice?	Cooperation with high education plays important role in dissemination of knowledge and engage young population for innovation topics. Organisation of such events which might evolve to more serious conference about education in future (planned for Spring 2018), might help both FabLab to disseminate ideas, but also to Faculty of Architecture to become leading institution in Croatia about education changes for future.
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## Description of good practice - No 2:

### HUB\_S Innovative Spaces Design Concept for Urban Revitalisation

1. Name of the Partner's organization	Faculty of Architecture, University of Zagreb
2. History and professional content	<p>Cooperation with Faculty of Architecture, University of Zagreb, start with FabLab registration in 2013, and school is co-organizer of 3D printing Open Days, annual event since 2013, till most recent cooperation on EU funded H2020, DOIT project.</p> <p>This good practice is related to developing new kind of innovative spaces as part of urban revitalization initiated by local community. Two architects, prof. Baletić and prof. Josić, invited FabLab to brainstorm and make concept of new HUB in Sesvete, suburban zone of Zagreb. FabLab is invited to bring international experiences, and knowledge transfer to local context. Main office building from devastated meat factory is used for this purpose.</p>
3. The context of the action (project)	<p>We develop idea to bring together in one architectural space infrastructure for three different stages in Design Thinking concept for learning by doing in HUB_S</p> <p>For initial phases conceptual, ideate, makerspace kind of space is planned. Easy to access, very informal space purpose is to involve different interest groups, including young population, but also, even retirement persons in multidisciplinary groups to generate ideas. Space is equipped with different digital fabrication tools, but also with other tools for handwork, electronics workshops, and even working with clay, simple 3D scanning, etc. Purpose is to generate ideas but also to educate about new technologies and even value added in combination with traditional crafts.</p> <p>Second space is related to second stage in design thinking and it is more formal, with more professional equipment for digital fabrication, and other tools needed to develop prototypes small series of fabrication. This space should support idea2product and product2market stages.</p> <p>Third main space is for co-working by small groups, and even small and mid size private spaces. This space is also supported by more business oriented services.</p>
4. The main activities of the action	<p>Concept proposal and design for local community and City of Zagreb, Office for entrepreneurship is developed. Consultation with main stakeholders were performed in preparation phase.</p> <p>Inclusive social workshops are performed to tackle with expected design and function of this space, to help us to check idea, and get comments from local community stakeholders, but also to help architects to prepare more detailed designs according with local community expectations.</p>



5. Specific products or results	<p>This concept, closely related to design thinking stages. to bring together different innovative space under one roof is not seen at this moment. Usually, those spaces a separated, and different stakeholders are not interesting to bring for example kids in more business related spaces. However, current existing business oriented innovation spaces, suffer from lack of interest and no users. On other hand, some of cases in Croatia, show need for makers style spaces to incubate ideas. We believe, that first stage of Idea Factory (makerspace), should generate 100 of crazy ideas, 10 of them should be validated by prototyping in FabFactory (fablab), and 1 would go to Startup and business stage.</p>
6. Success factors of the action	<p>Most important for this good practice is fact, that it is local community initiative. Local community understand needs and ask professionals to solve problem.</p> <p>Local community see this HUB_S also as new community center and even center for Sesvete. HUB_S plays important part of urban revitalisation of this part of City of Zagreb, together with some other revitalisation projects.</p>
7. Problems encountered and the experience acquired during implementation of the action	<p>No problem with local community, but opposite.</p> <p>In some stage, City of Zagreb, government express doubts about need for those kind of spaces, and expected to have another Startup and Coworking space without spaces for two preliminary stages. When we describe inclusive workshops and community building concept those doubts are gone.</p> <p>HUB_S project is on waiting decision on City level, for funding.</p>
8. Reasons why you think this action is an example good practice?	<p>Developing community space as part of urban revitalisation, by bring together different makers culture and digital fabrication space together with Startup and Coworking might incubate quicker wide range of ideas.</p> <p>Specific location, suburban location, might develop even more solutions both for rural and urban problems. HUB_S is also planned as a sustainable building and can become Living Laboratory for this community.</p>



## Description of good practice - No 3:

1. Name of the Partner's organization	Archaeological Museum in Zagreb
2. History and professional content	Cooperation with Archeological Museum in Zagreb, start in 2014, when we are invited to present 3D scanning and 3D printing to young groups of museum visitors over workshops. Collaboration with museum institution was great opportunity to spread idea what we are working and present this to more general public. Mrs. Ana Soltar from museum invited us to organize workshops for both elementary school pupils and secondary school students.
3. The context of the action (project)	Idea was to bring affordable technology to 3D scan and 3D print, and to show and practice process with attendees on premises of museum.
4. The main activities of the action	Around 15-20 attendees per group were using some of museums artefacts replica to practice 3D scanning and then replicate those 3D models with 3D printer, explore changes and difficulties in process. Available equipment was, Structure sensor, Kinect 1 & 2 for 3D scanning and 3D printers Ultimaker original & Ultimaker 2.
5. Specific products or results	This open workshops for museum visitors are developed to provide most information on one side and to invite and involve museum visitors to more interactive way in visite. As result, one 3D printer is become part of standard museum exhibition and print one of most important exponent (Vučedolska golubica)
6. Success factors of the action	Idea, to show how Kinect can be used to 3D scan complex archeological subjects and to replicate them, share them and use them for different promotional purpose in museum was achieved.
7. Problems encountered and the experience acquired during implementation of the action	Significant process time between 3D scanning and 3D printing makes those two process incompatible to perform for all attendees, what can lead to frustration. 3D scanning requires some space to perform walk around what can be challange to perform with large groups or in inappropriate space.



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8. Reasons why you think this action is an example good practice?	This practice lead to other cooperations with museum, such as Museum Night, but also some research about available affordable 3D scanning solutions and comparison of results, and also ways to build museum visitors community and make young population interest for museums.
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## Description of good practice - No 4:

### Faust Vrancic Creative Days, digital fabrication workshops

1. Name of the Partner's organization	NGO Otok (Island of Prvić)
2. History and professional content	Cooperation with NGO Otok started in 2016, when we are invited to present 3D printing to local community and schools from Šibenik by perform workshops. Workshops are organized on Island of Prvić, where renaissance inventor and diplomat Faust Vrancic (DaVinci of Croatia) had summer mansion. During 3 days, Friday, Saturday and Sunday in October, schools from Šibenik are invited to visit Prvić and join workshops related to digital fabrication to tackle with local context issues.
3. The context of the action (project)	Different creative workshops related to Faust Vrancic Machine Nove, and local inspired problem are subject of workshops done with digital fabrication, but also by make them complementary with traditional crafts and skills.
4. The main activities of the action	Around 3-5 attendees per group and total of 4-7 groups were invited to explore different digital technologies: Workshop is related to explore world of Faust Vrancic innovations: <ul style="list-style-type: none"> <li>- to collect information</li> <li>- to explore one of innovation and replicate it</li> <li>- to present their success</li> </ul>
5. Specific products or results	Each group present their presentation and prototype related to challenge (for example Faust vs. Leonardo parachute design). Results are presented to local community and island visitors.
6. Success factors of the action	We are invited to bring information about new technologies to rather isolated to community on island. As result of this workshops we are developing initiative for Fab@Boat, which should bring new technologies in more isolated parts of Croatian Adriatic coast.
7. Problems encountered and the experience acquired during implementation of the action	Because of rare connections with mainland, workshops for schools are available only on Friday and can last up to 4 hours. Not so good connection are also challenge to organize those workshops and bring equipment, so we prepare workshop with limited amount of equipment.



<p>8. Reasons why you think this action is an example good practice?</p>	<p>This good practice plays important role, because it brings technologies to places in Croatia which are isolated and had rare connection, but also demographic indices show “slow death” of those places. FabLab inspired by this workshops and islands situation, start initiative called Fab@Boat for communities at island in Adriatic Sea. Pilot activities performed (without boat) in Rijeka, Pula, Island of Krk, Island of Prvic in 2017 and significant interest of both local community and tourist were expressed.</p>
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## Description of good practice - No 5:

### Science Picnic Creative Lab, digital fabrication studio as part of the Science Picnic

1. Name of the Partner's organization	NGO Baltazar, Zagreb
2. History and professional content	FabLab is part of Science Picnic since 2015. In 2017. FabLab is invited by organizer, NGO Baltazar to become content partner for Science Picnic event and to organize digital fabrication studio. Science Picnic last 3-4 days, and main idea is to promote science, but also STE[A]M among young population. In previous years, around 30.000 visitors become part of this science festival..
3. The context of the action (project)	Challenge is to promote digital fabrication tools, but also related makers technologies might be interesting and inspired for visitors as part of Science Picnic. Picnic idea to bring everyone to open space is great, but challenging to equipment during different weather conditions. Since picnic is organized on premises of Jadranfilm, movie production studio, we decide to organize in one of those closed pavilion Creative Lab, to promote digital fabrication to improve STE[A]M skills.
4. The main activities of the action	Organisation of different digital fabrication workshops and presentation: <ul style="list-style-type: none"> <li>- different 3D scanning solutions,</li> <li>- different 3D printing technologies,</li> <li>- 3D print with chocolate, clay</li> <li>- playing with sensors...</li> <li>- combine with traditional crafts (silk, wool, wood)</li> </ul>
5. Specific products or results	No specific product is done, but experience in organizing such big events is most important result.
6. Success factors of the action	Science Picnic is largest event on which FabLab is part of organization. Importance of new technologies especially, digital fabrication was recognized by main organizer, and it's decision to involve us as content partner.
7. Problems encountered and the experience acquired during implementation of the action	Large number of visitors is challenging to organize efficient workshops, therefore by combining presentations and workshops of different technologies together with some other participants we are able to achieve best impact. Weather conditions are important factor when picnic is organized. Open air workshops are attracting more participants then closed spaces.



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8. Reasons why you think this action is an example good practice?	Collaboration on such significant events play important role in promotion of FabLab idea, new technologies and application together with other important STE[A]M skills.
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## Description of good practice - No 6:

### Inclusive digital fabrication workshops, curriculum development for kids with special needs

1. Name of the Partner's organization	Slava Raškaj Educational Centre, Zagreb
2. History and professional content	As part of our second mission, related to local community, FabLab is working on dissemination of knowledge about new digital (fabrication) technologies with focus to people with special needs. We made contact with educational center Slava Raškaj in Zagreb. They provide services to persons with impaired hearing, with normal hearing but with impairments concerning the voice-speech-language communication, with communication difficulties from the spectrum of autism and pervasive developmental disorder as well as to children and young people with multiple disorders to clients from their birth up until the age of 30.
3. The context of the action (project)	Challenge is to develop specific inclusive workshops for Center which include different digital technologies to improve STE[A]M skills, but also to recognize specific needs by attendees to find solutions using those technologies.
4. The main activities of the action	Curriculum development based on test workshops performed in year 2017 is planned in collaboration with Center Slava Raškaj.
5. Specific products or results	Curriculum related to digital technologies
6. Success factors of the action	



<p>7. Problems encountered and the experience acquired during implementation of the action</p>	<p>Workshops are performed, and as result more interest from, both, school staff and students is expressed for further collaboration, and to develop specific curriculum.</p>
<p>8. Reasons why you think this action is an example good practice?</p>	<p>Collaboration with local community and in this case persons with specific needs play important role in promotion of FabLab idea, new technologies and application together with other important STE[A]M skills.</p>

# CAPACITY BUILDING OF FABLABS

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D.T1.3.1

Practices to embed Fab Labs into ecosystem  
(joint collection of good practices)

PP10 - DE

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Version 1

06 2017





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## Description of good practice - No 1

1. Name of the Partner's organization	TU Munich
2. History and professional content	<p>The Technische Universität München (TUM) is a research university with campuses in Munich, Garching, and Weihenstephan.</p> <p>TUM is among the highest acclaimed universities in Germany. The university has a sound international reputation and was ranked 2nd in Germany, 15th in Europe and 56th in the world in 2010 by the Academic Ranking of World Universities. In the same year, it was ranked 2nd in Germany, 16th in Europe and 58th in the world (overall) and in Engineering &amp; Technology 1st in Germany, 9th in Europe and 36th in the world by the QS World University Rankings. In 2010 Times Higher Education World University Rankings ranked Technical University Munich 4th in Germany, 29th in Europe and 101st in the world.</p>
3. The context of the action (project)	FabLabs and MakersSpaces display a great opportunity for students to improve and work on their machine skills. It also represents a place to come to in order to work on ideas and get started on an innovation.
4. The main activities of the action	<p>All TUM students have the opportunity to use MakerSpace's facilities through scholarships for free. In order to get the students awareness of the program MakerSpace uses university classes at the beginning of the semester, flying opportunities, social media channels, etc.</p> <p>TUM students also have the opportunity to take credit-worthy classes at MakerSpace - example ThinkMakeStart which is a class where students start and launch an idea in three weeks. The program starts with the students having to come up with an idea for a launch able product and create an adequate business plan. The next steps include the manufacturing of prototypes at MakerSpace and pitching it to an expert jury.</p>
5. Specific products or results	The cooperation serves solely the purpose of promoting innovation and a Do-It-Yourself mindset among creative and motivated students.
6. Success factors of the action	Operating in close proximity to the TUM should make connecting with the students and making MakerSpace a familiar name within the student community easy - unfortunately it is not as easy as thought to get students to spend more time close to uni.
7. Problems encountered and the experience acquired during implementation of the action	see number 6
8. Reasons why you think this action is an example good practice?	Investing in education and the next generation of makers, engineers, workers, etc. is essential.



## Description of good practice - No 2

1. Name of the Partner's organization	BMW Group
2. History and professional content	<p>For 100 years, the BMW Group has been inspiring people worldwide with unique mobility experiences. The special fascination of the BMW Group lies not only in its products and technology, but also in the company's history, written by inventors, pioneers and brilliant designers.</p> <p>Today, the BMW Group, with its 31 production and assembly facilities in 14 countries as well as a global sales network, is the world's leading manufacturer of premium automobiles and motorcycles, and provider of premium mobility and financial services.</p> <p>Constantly evolving to stay a decisive step ahead has always been the intent guiding the BMW Group's thinking and actions as a company. Therefore, especially in the context of its centenary, the company is looking into the future and considering today the mobility concepts of tomorrow. Our employees are the foundation of the BMW Group's success. Their professional qualification and commitment are outstanding. In return, we offer safe and attractive jobs and comprehensive opportunities for personal development and qualification.</p>
3. The context of the action (project)	Our open workshop concept, which is the first of its kind in Europe in this size, was brought into being at the Entrepreneurship Center in Garching, near Munich, in cooperation with the BMW Group.
4. The main activities of the action	In cooperation with the BMW Group we were able to develop educational programs that give the future BMW workforce (apprentices, engineers, etc.) hands-on experience with high-tech machines.
5. Specific products or results	<ul style="list-style-type: none"> <li>• huge membership contingent for BMW employees</li> <li>• special course concepts for BMW apprentices</li> <li>• co-financing allows for a lower entry barrier</li> </ul>
6. Success factors of the action	The cooperation resulted in a close connection and understanding of (BMW's) markets needs in technology/machine affinity.
7. Problems encountered and the experience acquired during implementation of the action	Not every BMW employer knows about the possibility of using the MakerSpace for free (contingent).



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8. Reasons why you think this action is an example of good practice?	Building a network and knowledge exchange with one of the world's leading manufacturer of premium automobiles and motorcycles.
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### Description of good practice - No 3

1. Name of the Partner's organization	Autodesk
2. History and professional content	Autodesk is a leader in 3D design, engineering and entertainment software for people who make things. The company is headquartered in the San Francisco Bay Area and has more than 9000 employees worldwide. Over 100 million people use Autodesk software like AutoCAD, Revit, Maya, 3ds Max, Fusion 360, SketchBook, and more to unlock their creativity and solve important design, business and environmental challenges. Autodesk's software runs on both personal computers and mobile devices and taps the infinite computing power of the cloud to help teams around the world collaborate, design, simulate and fabricate their ideas in 3D.
3. The context of the action (project)	As an attractive place for engineers and makers MakerSpace provides Autodesk with the rights people to use and, through that, test their design software and receive feedback on bugs and customer experience. This cooperation also enables Autodesk to provide their software to a broad range of (future) engineers.
4. The main activities of the action	In cooperation with Autodesk we were able to develop educational programs that connect students and engineers with the vision and tools of Autodesk.
5. Specific products or results	<ul style="list-style-type: none"> <li>• expand course offering <ul style="list-style-type: none"> <li>◦ Autodesk fusion 360 for 3D Printers</li> <li>◦ Autodesk fusion 360 for CNC machines</li> </ul> </li> <li>• Establish Autodesk Meet-up in order to create a network of synergies knowledge exchange, training etc.</li> </ul>
6. Success factors of the action	<ul style="list-style-type: none"> <li>• very engaged and visionary contact person/Autodesk evangelist</li> <li>• knowledge of CAD-software essential in field of engineering</li> </ul>
7. Problems encountered and the experience acquired during implementation of the action	No problems occurred
8. Reasons why you think this action is an example good practice?	<ul style="list-style-type: none"> <li>• Creating synergy effects through knowledge exchange</li> <li>• distribution of software</li> </ul>