Interreg CENTRAL EUROPE
European Union
European Regional Development Fund

FabLabNet

FAB-FEST, FAB-IN-A-BOX, FAB-CITY STAKEHOLDER ENGAGEMENT

DT311 - Joint methodology for Stakeholder Engagement

Version 2
01 2018

Introduction

This deliverable describes the joint methodology developed related to achieve long lasting effects to local ecosystems. This methodology is developed in cooperation of LP (IT), PP2 (AT) and PP9(HR), based on current and existing activities, deliverables developed in FabLabNet and vision about how to engage different stakeholders and inline with S3 strategy proposed by each partner on project.

To achieve long lasting effect different activities are proposed to engage different stakeholders from local ecosystem on different levels and interest. Those activities can be divided to size or complexity and need to prepare them:

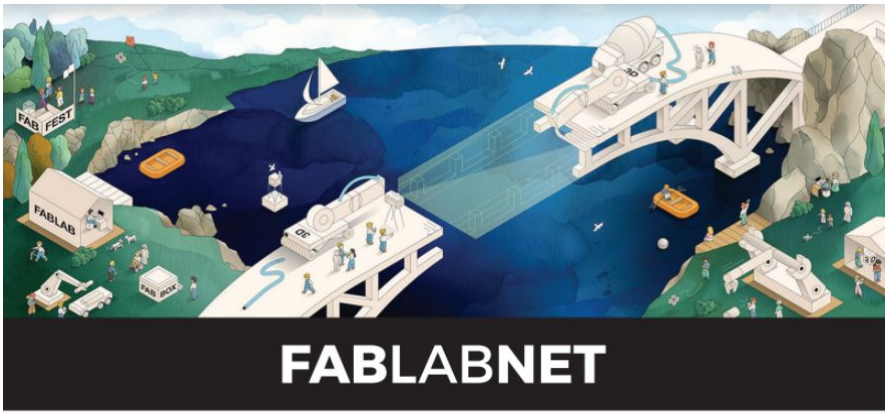
- FabFest - a medium size format activity/event to engage one of QH stakeholders such as academia, education, community by hands on experience, demonstrations, and presentation in form of festival event. This include makers exhibition, workshops, talks.
- FabBox - a small popup activity with all necessary tools (FabBox toolbox) to engage smaller group on single topic workshops in different local community premises or schools, or as support for FabFest or FabCity events.
- Fab City is a 1-2-days public debate and workshop coordinated by the fablab and meant to open up a local multi-stakeholders conversation to uncover and discuss the social impact connected to the adoption of distributed manufacturing development policies in urban contexts.

The FabLabNet partners are variously implementing these activities:

	FAB FEST DT312	**FAB in a BOX** DT313	**FAB CITY** DT314
LP IT	X		X
PP2 AT	X	X	
PP3 HU		X	X
PP5 CZ	X		
PP6 PL		X	
PP7 SI		X	
PP8 SK			
PP9 HR		X	
PP10 DE	X		X
Total	**4**	**5**	**3**

As an example, these are the currently planned activities for 3 partners:
IT Fab City: Workshops related to local communities and business, education.
AT Fab Fest: activities with mobile labs, organizing Maker Faire Vienna, going to schools.
HR Fab in a Box :different popup activities in local community, public libraries and schools.

All activities will follow the Inscription Communication Manual, as foreseen as an example in the following images.



INSCRIPTIONS APPLICATION MANUAL
December 2017

INSCRIPTIONS FOR PROGRAMS

The inscriptions for programs should be used on white background only.

GADGETS SAMPLE APLICATION

We print both characters on each product.

1. Fab Fest Concept (DT312)

Introduction - Fab Fest Festival for innovation, creativity and technology

A Fab Fest should offer a family-friendly examination of innovative and creative projects at the interface between technology, art, science and craft. It gives makers, businesses and visitors the possibility to connect and exchange ideas. The topics could be as colorful and diverse as the maker movement itself: The programme includes themes from the field of 3D printing, Robots & Drones, Electronics, Fashion & Wearables, Hacking, Internet of Things, Art & Design, Model Making, Music & Sound, Open Source, Virtual Reality and much more.

The Makers

Makers are the soul of every Fab Fest. They are resourceful DIY-enthusiasts, creative minds, unconventional thinkers or technology experts who enjoy tinkering and can be found in all age groups. They are eager to learn, but also knowledge mediators who like to share their innovations. This way they bring new and innovative ideas to life, individualize and optimize existing products or put them into operation again in terms of sustainability.

The Fab Fest - embedding it into your local ecosystem

Vienna - metropolis of innovation and technology

For many centuries Vienna has been a center for creativity and therefore offers perfect conditions for the emerging maker movement, the young creative scene as well as start-ups and founders. Numerous institutions all over the city - like Fab Labs, maker- and hackerspaces as well as workshops - spread the DIY spirit and encourage to try out new technologies. With its many universities and colleges of higher education Vienna is not only a knowledge hub, but also a metropolis of innovation and technology. The goal should be to find link to your local ecosystem and maker scene to establish a sustainable format for your future events.

A Fab Fest is based on 5 main engagement strategies

In this chapter we want to give you an overview of our tested engagement tools for a Fab Fest format and some details for the implementation of them. We will focus on the following five engagement tools:

1. Maker exhibition
2. Workshop program
3. Talks
4. Kids area
5. Internal get together for Makers

Maker Exhibition

The exhibition is the main part of the event, since it is giving the possibility for the local maker scene to present new projects and initiatives. But keep in mind, that the focus is not only on technology, also on craftsman ship, upcycling or DIY, presenting new and inspiring projects to the audience should be the general goal. A touch and feel or hands on approach are important, so the visitors can explore and experience new things and meet local communities or spaces. There is the possibility to gather the exhibitors by themes within the exhibition or maybe if you plan to have a special thematic focus for your Fab Fest you can also try to gather all projects from that field in one area to show the visitors the broad variety of approaches to one topic.
If it should be possible for your organisation and the venue, it is great to have an outdoor area where you can show bigger exhibits or projects that cannot be displayed indoors due to fire regulation.

Workshop program

Depending on the amount of people that want to offer a workshop during your event you should provide workshop areas with a basic infrastructure for that - tables, chairs, internet, beamer or a TV for instructions. From our experience the workshop should be between 45 min to 2 hours, not longer, so the visitors still have enough time for the exhibition or talks if they join a workshop. If there are any material costs that the attendees need to pay, the best thing is to let those things handle the trainer themselves and just communicate the costs for the visitors additional to the short description about the topic of the workshop.
The workshops are a nice opportunity to have a hands on experience for the visitors and take some time to learn and build something diretcal step by step from an expert or experience new tools. Due to that they have also something that will last after the event.

Talks

Talks are a great possibility to present a project to a broader groupe, explain your idea and work or start a bigger discussion on a topic. The aim might be to show the public the diversity of open innovation, exchange ideas, sharing resources and possibilities of open collaboration, presenting new initiatives to the community or new maker projects. The timeframes are flexible for the talks - sometimes people just might want to have a lightning talk to point out an event that they are organizing, but also keynotes fit the program that can last 30 min. You can also thing of having up to three or four speakers from one field with short lightning talks followed by a panel discussion on the topic that they are all working on.

Kids area

Nevertheless there are a lot of new things to discover for children on every corner in the Maker exhibition and in the regular workshop program, we decided to have a dedicated area just for children starting from four years. It is an open space where four to ten year old can explore and experiment in different technological fields and explore science in a playful way. There they have the possibility to construct and disassemble things to understand how they work, learn about how 3D printing works and e.g. have the first virtual reality experiences.
Corporations with local education institutions that are focusing on STEAM education for children from an early stage on can be very helpful to provide an already tasted workshop program with high educational standards. And it is a win win situation for both sides - the institutions have the possibility to present their offer to a broader public and from the organizational point of view you can provide the visitors with a divers program specially aimed at kids.

Internal get together for Makers

From our experience it is crucial to offer the exbiitors the possibility to network during the event. During an event day, where the Makers are at their booth busy explaining their work and projects, they usually don’t have time for networking with the other exhibitors. Therefore we organize the internal get together for the participating makers as a networking possibility in the evening of the event. This way they have the chance to meet the other participants, see what the other Makers are working on and maybe find partners for upcoming projects.

Building a sustainable Maker Community

One of the main challenges when you are planning to organize a Fab Fest is to get in touch with the local Makers and try to build a community for your event that will grow and last in the future. From our experience a good strategy is to get in touch with your local Makerspaces or Fab Labs and try to engage them to become a community partner for your Fab Fest. Invite them to join your event and present their space, but also encourage them to share your call for projects for the event. It is important to find multipliers for your call to make sure that you reach people that want to join your event.
You can also get in touch with universities and specific departments to encourage students to present their projects. Also in schools you can find some interesting projects and the teachers are often willing to help their students to participate at the event.

Call for projects

Before you get in touch with the community partners or universities you need to set up a template where you collect the informations from you exhibitors - the basic contact informations and also the informations about their project that they want to join the event with. You will need a short description, links, pictures or their specific needs for infrastructure. Regarding talks and workshops it's important to know how long they will be. For workshops also how many people can participate, if there are any age limits, if maybe the participant need to have any previous knowledge or if they need to pay a fee for materials that they will use in the workshop.
There are many thematic thematic areas where to find interesting project for your event and get in touch with the communities like e.g.: 3D printing & 3D scanning, Arduino, Raspberry Pi & Co., Art & Design, Biohacking, Crafting Drones & Aircraft, Energy & Sustainability, Fashion & Wearables, Food, Games, Hacking, Home Automation, Internet of Things, Knowledge transfer, Manufacturing Technologies, Model making, Music & Sound, Open Source, Radio & Communication, Recycling & Upcycling, Robots, Science & Research, Shared Spaces, Start-up or Virtual Reality.
It worked very well for us to get in touch with groups from this different kind of areas and encourage them to join your event and spread it among their members and community.

Specially if people are not familiar with such a format of event like Maker Faire, it is good to explain them why they should join the event and what can be the benefits. Therefore we wrote down some reasons why people should join the event and exhibit for our communication:

1. Because you're a maker!

To answer the most common question first: Everybody who works with his or her own hands or tools of any kind in a creative or productive way, is a maker. A lot of things are combined: Crafting, Art, Science, Hobby, Technology.

So it doesn't matter if you prefer to work with the hammer or the soldering iron, get creative with the code editor or the sewing machine, if you wittingly work on a project or prefer to experiment, if it's a hobby or a start-up: You're a maker and you will enjoy participating the event.

2. To meet other makers

You're not alone: There's no other place where you can meet so many creative minds with different backgrounds.
Besides the public visiting hours we scheduled some time for networking so you have the chance to meet as many makers as possible from your own neighbourhood, other parts of Austria and all over the world, to exchange ideas and build new communities. Do-it-yourself was yesterday, today is all about do-it-together!

3. To learn new skills

You're a pro at soldering, but sewing is a sealed book for you? Or it's the other way around? You can expand your skills and learn something new for future projects.
Take part in the workshops of other makers. And finally reach out to the makerspace you've been planning to visit for a long time.

4. To make some progress with your project

Bring your notebook and a pen, because you probably won't be able to remember all the smart questions and suggestions coming your way. Be prepared for the fact that people want to recreate it or want to buy it from you.
Who would have thought, that this certain approach from a different field is the one thing, that will help you make progress? Get inspired by others. We're lifting the boundaries between disciplines, because we know that new ideas thrive where different minds come together.

5. Because you can show your ideas to a big, curious audience

Thousands of people of all age groups will stop by your booth, hundreds of people are interested in your workshop and want to learn from you. This could be intimidating, but makers who are courageous enough will get rewarded, because a direct feedback like that can't be bought anywhere. And here you'll get it for free.

If you're looking for companions for a project, present a prototype for a product or call attention to your workshop, your offer or your community - there's no better place for doing all these things.

6. To inspire other makers

Priceless: The shining eyes of the crowd or other makers when they realize: I want to try this as well! As soon as possible!

At the end of the day our visitors come home with their first selfmade ring or a t-shirt that they printed themselves: The best souvenir are all the new ideas in their head, this feeling of "I want to do this as well!" And you inspired them!

2. Fab Box Concept (DT313)

It is a mobile workshop organised in less developed areas of partner Fab Labs regions in order to demonstrate easy access to technology and knowledge thus lowering the barrier of entry to innovation. Idea of FabBox is inspired with pop-up events mobile supported by mobile boxes developed in HappyLab (AT).

FabBox is united title for **small format activity** and **set of tools** which support those activities. FabBox is targeting smaller groups and purpose is to engage those groups by hands on experience. FabBox toolbox can of course be used for all engagement activities as part of FabFest and FabCity format activities.

Participants: AT, HR, PL, SI, HU Fab Box will be assessed

FabBox activity
FabBox as format of small activities is planned to be performed as ad-hoc workshop or demonstrations to engage small group on their premises. It can be performed outside FabLab, as PopUp activity. It is targeting different focus groups from local community, or different levels of educational institutions, from primary schools, over secondary schools and gymnasiums to university level institution. All required is in FabBox toolbox and educated activity leader can perform those activities.
FabBox activity purpose is to engage participants to learn by doing, therefore equipment and software is carefully chosen to be easy to use, and make understandable learning process and high learning curve.

A FabBox is based on following engagement strategies

Workshops
Talks
Exhibition

Workshop program:
Workshop pop in/ 45min-2h, gather deeper knowledge in a specific field of interest, experience new tools, technologies, taking something home, that you build, different workshop areas, special kids workshops, age needs to be communicated, are there any material costs, also exchange with your knowledge with like-minded in a workshop session,

Talks:
Possibility to present own projects to a broader group, discuss, thematic focus might be the diversity of open innovation, exchange of ideas, sharing ressources, possibilities of open collaboration, presenting new initiatives to the community, new maker projects,

Exhibition:
The exhibition as a main part, giving the possibility for the local maker scene to present new projects and initiatives, focus is not only on technology, also on, craftsman ship, upcycling or DIY, presenting new and inspiring projects to the audience, touch and feel, hands on approach, visitors can explore and experience, possibility to meet local communities/ spaces

Fab-in-a-Box - all in one box fabbing tools

FabBox toolbox is set of tools packed in box required to support different topic workshops in local community or schools, but also other groups in society.
FabBox toolbox offers all required to enable ad-hoc popup activities outside FabLab premises.

We propose following FabBox toolboxes to support different fabbing workshops:

1. **FabCut FabBox** | Vinyl cutting and thermal transfer related toolbox
2. **FabLaser FabBox** | Laser engraving and cutting related toolbox
3. **FabMill FabBox** | CNC milling related toolbox
4. **FabPrint FabBox** | 3D scanning and 3D printing related toolbox
5. **Fabtronic FabBox** | Electronics, sensors, wearable, soldering and programing related toolbox with collection of carefully chosen sets such as Arduino, RPi, sensors, uArm open source robotic hand, BackYard Brain, Little Bits or similar, Lego Education Sets, computer or other controlling electronics such as ipad, smartphones etc.

Each FabBox toolbox is consist of necessary hardware: machines, computer, sample consumables; software: all necessary software is already installed to computer in toolbox; tutorial: basic tutorial how to connect and setup toolbox parts. For using toolbox, elementary course is required to be performed in FabLab in case use of third parties.

Those toolboxes cover all basic digital fabrication skills that can be performed for FabBox activities. Those activities can be oriented to single or several skills and several boxes can be used to be fitted to project oriented tasks. Content and topics of those toolboxes are subject of decision for each partner, fablab or institution.

Purpose of toolboxes is to be used for basic digital fabrication activities, which can be either single skill oriented or project oriented.
Single skill, for instance, is topic of digitalization or vectorization, or different material and technology cutting and engraving, thermo-transfer to textile, 3D scanning, 3D printing, soldering, programming.
In case of project oriented, it can be performed together with some artistic topics, in school bringing together, art course with technical course and informatic course. For this purpose Tie Design project can be example.

Idea is to share best experience collected over development, but it is not obligatory and can be fitted by each partner for specific request or interest. For instance, thermoforming is

compatible technology to bring together, digital and traditional crafts, however, it is not planned for FabBox activities but it is optional.

Proposed equipment is also based on portability and usability in popup activities and might not fulfill high demand on precision.

1. **FabCut FabBox**

Purpose of this toolbox is to be used for basic digital fabrication skills related to vinyl cutting machine:

1. Digitalization
2. Vectorization
3. Different material cutting
4. Material embossing
5. Thermal Transfer

All skills and be project oriented, it can be performed together with some artistic topics, in school bringing together, art course with technical course and informatic course. For this purpose Tie Design project can be example.

Content
Toolbox should have following required parts:

a. **Computer** - is necessary part of toolbox in case you want to be independent in performing any pop-up activity. Any notebook with usual office (dual core, i3) use is adequate to fulfil digitalisation, vectorisation, and to work with vinyl cutter. No specific demand on graphic card. However, in case of using computers in other toolboxes, usage of identical computers can lower maintenance, with pre-prepared operating system with required software for easy maintenance. Since we connect vinyl cutter and webcam both on usb, and usually mouse is much easier to work on, notebook should have at least three USB ports.
   Software - beside operating system, software supporting vinyl cutting machine is required, and also webcam utility in case is not recognizable by operating system. Silhouette Studio (https://www.silhouetteamerica.com/software). In case of supporting open source Inkscape (http://inkscape.org) is great option to start work with, and can be used with other toolbox, however this should be supported by hardware with appropriate driver. Silhouette Cameo 3 is supported by Inkscape development (https://github.com/fablabnbg/inkscape-silhouette). There is also support for Brother hobby cutter.
b. **WebCam** (e.g. Microsoft, Logitech) - Purpose of web camera is to perform 2D digitalisation. There is no special demand on webcam, and can be optional also. In this case, camera on computer is required. Also, use of mobile phone camera is possible, but this make process more complicated, slower and for education less understandable. We suggest any USB HD webcam, for easy capturing and digitalisation

of any drawings or collage by participants.
Good price performance can be Logitech cameras (http://www.logitech.com) such as C270, C525 or C920, but other manufacturers are also acceptable.

c. **Vinyl cutter** (e.g. Silhouette Cameo/Curio) - is integral part of this toolbox. Purpose is to demonstrate basic subtractive digital fabrication technology in easy to use way. We have positive experience with Silhouette America (http://www.silhouetteamerica.com) products, although those products not follow open source philosophy. Those are reliable products and use universal cutters which lower overall maintenance. There are different manufacturers like Brother (http://www.brother-usa.com) or Roland DGA (http://www.rolanddga.com), but in case of Roland they are more oriented to professional demand, and Brother offer all-in-one solution with scanning and cutting in Scan'n'Cut product is join together separate skill processes. There are some option for open source vinyl cutting device such as Fluxamacutter (http://www.fluxly.com/blog/2010/03/fluxamacutter-press-fit-diy-vinyl-cutter.html) and appropriate open source software such us InkCut (http://inkcut.sourceforge.net) or RoboCut as optional open source software for Silhouette products (http://robocut.org/)
*Silhouette America products which are explored and considered are Silhouette Curio and Cameo. **Silhouette Curio** is smaller and have more option. Size are up to 12"x12" format. Beside cutting it offer emboss mode/option which offer more digital fabrication variations.*
***Silhouette Cameo** is adapted to bigger formats (width 30cm, virtually unlimited length), it is bigger and heavier. Advantage of Cameo is AutoBlade which can automatically adapt to different materials defined in software.*

d. **Heat press** (e.g. HappyPress) - purpose of thermal transfer is demonstrate actual fabrication process. All what we prepared with previous equipment can be transferred to textile, for individual product design. Usual affordable vertical heat press is not portable, but offers best demonstration of fabrication process. With weight around 15-20kg it is not portable, and construction made them difficult to organize in box. Hobby Press offer wide range and even different lighter construction with weight around 10-13kg. Not: Any home iron can be used for actual thermal transfer.
***HappyPress** (http://www.happyfabric.de) use similar construction and with around 11kg might be considered as best option for both fabrication demonstration and portability with work heat area A4.*
Although we emphasize fabrication process, heat press can be even optional or can be substitute with most portable and simple iron used in every home. In case of portability this is might be considered as a best option.

e. **Small tools & Consumables** - ripping needles, cutters, markers, papers, various foil, colour papers, cotton textile products like small bags eventually T-shirts etc. Needles and cutters are required, and other consumables are for demonstration purpose. Each FabBox activity should be prepare required consumables based on specific project task which are planned to be performed.

2. FabLaser FabBox

Purpose of this toolbox is to be used for basic digital fabrication skills related to laser cutting and engraving machine:

1. Digitalization
2. Vectorization
3. 2D vector design and drawing
4. Material cutting
5. Material engraving

All skills and be project oriented, it can be performed together with some artistic topics, in school bringing together, art course with technical course and informatic course. For this purpose Light Box project can be example.

Content
Toolbox should have following required parts:

a. **Computer** - is necessary part of toolbox in case you want to be independent in performing any pop-up activity. Any notebook with usual office (dual core, i3) use is adequate to fulfil digitalisation, vectorisation, and to work with laser engraving machine. No specific demand on graphic card. However, in case of using computers in other toolboxes, usage of identical computers can lower maintenance, with pre-prepared operating system with required software for easy maintenance. Since we connect vinyl cutter and webcam both on usb, and usually mouse is much easier to work on, notebook should have at least three USB ports.
   Software - beside operating system, software supporting laser cutting - engraving machine is required, and also webcam utility in case is not recognizable by operating system. In case of supporting open source Inkscape (http://inkscape.org) is great option to start work with, and can be used with other toolbox, however this should be supported by hardware with appropriate driver.
b. **WebCam** - Purpose of camera to perform 2D digitalisation. There is no special demand on webcam, and can be optional also. In this case, camera on computer is required. Also, use of mobile phone camera is possible, but this make process more complicated, slower and for education less understandable. We suggest any USB HD webcam, for easy capturing and digitalisation of any drawings or collage by participants. Good price performance can be Logitech cameras (http://www.logitech.com) such as C270, C525 or C920, but other manufacturers are also acceptable.
c. **Laser cutting / engraving machine** - is integral part of this toolbox. Purpose is to demonstrate basic subtractive digital fabrication technology. There are two different laser cutting technology can be used:
   a. Diode laser - easy to maintenance, use, portability advantage

b. CO2 laser - more professional, more requirements, less portability

Diode laser usually blue or violet laser (405-455nm) with strength from 500mW up to 10-15W can be used for different purpose. Strength of 500mw can be used for marking on papers, 1.5W can be used for engraving on wood, cutting some foam materials. More strength diode laser for instance 3W, 5W, 10W or even 15W have to be used with serious protection. They not substitute CO2 laser tube based machines.
There is variety of different small laser engraving machines such us Neje (http://www.trusfer.com). Those machines offer small working area (35x35mm - 42x42mm) but also great portability and easy to use with some models with strength ranging from 500mW to 1500mW. This machines even not for professional use, can be used to perform laser technology workshops and skill development.

CO2 laser tube based machines are way to more professional use. They start with 40W strength and 50 or 60W can be considered and put in "portable" case. More strength such are 80-100W require 100cm+ length tube and can't be considered as portable.

Full Spectrum Laser Muse *(https://fslaser.com/muse) is one of two lasers from H-series models that are portable enough and can be considered for popup activities. Muse, 45W machine, with working area 500x300 and dimension within approximately 600x400x250mm on table or in a box.*
Glowforge *(https://glowforge.com) with Glowforge Basic/Pro is offer similar characteristics, but at this moment (12/2017) it is still pre-ordered, but with challenging price compare to Muse product. Interesting characteristic is the optional Air filter which avoid necessity for separate air filter required while working with lasers. However functionality should be tested when become available for further consideration.*
Dremel LC40 DigiLab Laser Cutter *(is also option when become available. With, expected, similar characteristics offers diversity on desktop laser cutting machines offer.*
FabCreator FabKit *(http://www.fabcreator.com) is also interesting option in kit, still in pre-order.*

Air filter *- is optional, but in some region required part for CO2 laser devices, what makes CO2 laser questionable as FabBox optimal device. Depending on laser cutting machine each manufacturer suggest optimal Air filter solution. Usually devices with weight around 10 kg, and size 30x60x60cm and bigger. Some manufacturers are Bofa (http://www.bofaamericas.com), SentryAir (https://www.sentryair.com) and Fumex (http://fumexinc.com)*

Water chiller *- is optional part, but also required in case of CO2 laser devices. Industrial water chiller such as* ***CW-3000*** *(for 60/80W CO2 tubes). Stronger chillers*

such as CW-5000 is used for 80/100W CO2 tubes), and it is not reasonable to use them as portable devices.

d. **Small tools & Consumables** - cutters, markers, cardboards, various foil, different wood samples, rubber or leather samples. Cutters are required, and other consumables are for demonstration purpose. Each FabBox activity should be prepare required consumables based on specific project task which are planned to be performed.

3. FabMill FabBox

Purpose of this toolbox is to be used for basic digital fabrication skills related to CNC milling machine:

1. 2D design and drawing
2. Basic 2D+ or 3D modeling for milling
3. Different soft material cutting/milling/engraving

All skills and work in workshop should be project oriented, it can be performed together with some artistic topics, in school bringing together, art course with technical course and informatic course. For this purpose Tie Design project can be example.

Toolbox should have following required parts:

a. **Computer** - is necessary part of toolbox in case you want to be independent in performing any pop-up activity. Any notebook with usual office (dual core, i3) use is adequate to fulfil digitalisation, vectorisation, and to work with CNC milling machine. No specific demand on graphic card. However, in case of using computers in other toolboxes, usage of identical computers can lower maintenance, with pre-prepared operating system with required software for easy maintenance.
Software - beside operating system, software supporting CNC milling engraving machine is required. In case of supporting open source Inkscape (http://inkscape.org) is great option to start work with, and can be used with other toolbox, however this should be supported by hardware with appropriate driver.

b. **CNC milling engraving machine** - is integral part of this toolbox. Purpose is to demonstrate basic subtractive digital fabrication technology. Although CNC machines are first computer controlled machines old more than 50 years, affordable desktop machines just recently become available with growing popularity for makers movement.

c. **Small tools & Consumables** - cutters, markers, soft material, like soap, wax pieces, rubber, softwoods samples. Cutters are required, and other consumables are for demonstration purpose. Each FabBox activity should be prepare required consumables based on specific project task which are planned to be performed.

4. FabPrint FabBox

Purpose of this toolbox is to be used for basic digital fabrication skills related to 3D scanning and 3D printing:

1. Performing 3D scanning
2. Editing point cloud and other 3D models
3. Slicing and working with 3D printer

All skills and be project oriented, it can be performed together with some artistic topics, in school bringing together, art course with technical course and informatic course. For this purpose My first Lamp / My House project can be example.

Toolbox should have following required parts:

a. **Computer** - is necessary part of toolbox in case you want to be independent in performing any pop-up activity. Any notebook with usual office (dual core, i3) use is adequate to fulfil different software, and to work with 3D scanner and 3D printer. No specific demand on graphic card. However, in case of using computers in other toolboxes, usage of identical computers can lower maintenance, with pre-prepared operating system with required software for easy maintenance.
   Software - beside operating system, software supporting 3D scanning and 3D printer is required. In case of supporting open source Pronterface, Repetier are interesting option, but to start work with, Cura open source software is might be interesting option. All hardware should be supported by hardware with appropriate driver.
b. **3D scanner** (e.g. Structure Sensor) - is integral part of this toolbox. Purpose is to demonstrate basic 3D scanning technology. There are several affordable options to consider and wide range of professional. From portability and easy to use point different sensors 3D scanner should be consider. Interest for this field lately, offer different notebooks with depth camera, and new generation of smart phones might be equipped with depth camera and enable 3D scanning.
   Structure Sensor *(http://structure.io) is an interesting, portable and affordable multipurpose device might be interesting to be part of a toolbox. It can be used with IOS devices (ipad), but with hack cable can be used with computers. Structure Sensor offers SDK which offers interesting programming option in combination with Electronics FabBox. It also support OpenNI (http://structure.io/openni) and OpenCV (http://opencv.org), which is supporting different devices including Microsoft Kinect which can be also used for 3D scanning as an optional device. Other options include Intel RealSense products (https://click.intel.com/realsense.html).*
   More precise and still interesting options are related to structure light technology. One of those 3D scanners are developed by ***David Vision*** *(purchased by HP in 2016, http://www8.hp.com/us/en/campaign/3Dscanner). This 3D scanning solution offers respectable precision comparable to more expensive 3D scanners.*
c. **3D printer** (e.g. Ultimaker, MakerBot, HobbyKing)- is required part of this toolbox. Purpose is to translate 3D model from computer to tangible model in different fused

material such as PLA or hybrid materials. Although there are options with different technology like SLA, FDM is best option for hands on learning experience. Similar to other devices, there is perplexity between more portable or professional devices. On desktop niche there are two main FDM 3D printer constructions, delta vs. cartesian (xyz). Both construction can be find portable, but delta construction might be more sensitive on moving, while different prusa construction have more stable casing to move around.

Ultimaker 2GO *is small size (http://www.ultimaker.com) 3D printer which might be considered as optimal solution between portability, stability, reliability, and great value. Working area of 120x120x115mm is small comparing to other Prusa printers, but overall dimensions are also portable with max 255x280x287mm (& separate power supply).* ***HobbyKing Mini Fabricator*** *(https://hobbyking.com) is similar option with focus on portability and affordability.*

Delta construction can be found as ***Mini Kossel or Mini Rostock*** *on e-bay, and solid delta construction is Monopiece.*

d. **3D Pen** - although it is not necessary, 3D pen can be used to demonstrate work of 3D printer, to add more free artistic addon to 3D printed parts, or to made standalone drawings. It is quick and easy to use for different, more artistic, purpose. Filament used in 3D pens can be different from 3D printers 1.75mm vs. 2.85mm what can be decision making argument on 3D printer decision.
e. **Small tools & Consumables** - cutters, markers, filament samples. Cutters and spatula are required, and other consumables are for demonstration purpose. Each FabBox activity should be prepare required consumables based on specific project task which are planned to be performed.

5. Fabtronics FabBox

Purpose of this toolbox is to be used for basic electronics and programing skills:

1. Basic electronics components
2. Soldering
3. Basic programming
4. Biosensors
5. Robotic hand programming

All skills and be project oriented, it can be performed together with some artistic topics, in school bringing together, art course with technical course and informatic course. For this purpose My first Lamp project can be example.

This toolbox is about customization, therefore we offer different possible content and users can decide to combine some of those components, depending on interest of their local community, schools, or even smart specialisation field:

1. **Soldering stations** - required tool for soldering practice and first steps in electronics development
2. **Development platforms** (e.g. Arduino variants (Mega, Uno, Nano), Raspberry Pi) - well known electronic development platforms for education but also for electronic development for entrepreneurial projects.
3. **Sensors set** - set of different sensors to extend development platform such as Arduino or Raspberry Pi for new purposes. Those are proximity sensors, light intensity sensors, flex or pressure sensor, soil and moisture and many other.
4. **Bio sensors** (e.g. Backyard Brains, BITalino, e-Health, NeuroSky) - set of sensors for biosensing and experiments with living beings like plants or humans.
5. **Educational electronic Sets** (e.g Little Bits, Lego Education) - different educational sets for kids who are not able to use soldering and more complex development platforms, but able to working with electronics, controlling devices and beginning with programing
6. **Capacitive switches** (e.g. Makey Makey, Bare Conductive) - enable to use conductive controlling in experiments like, fruit with touch of hands. Great to work with people with some kind of disabilities.
7. **Robotic arm** (e.g. uArm Swift Pro) - robotic arms can be multipurpose output device to learn programming and robotics fundamentals. We are in favor of open source devices, and there is repository on Internet for 3D printed robotic arm which can be also used in some cases.
8. **Controlling device** - such as computer, tablets or smartphones with controlling software.

3. Fab City Concept (DT314)

Participants: HU, IT, DE
Goal (from AF): to promote bottom-up initiatives under the smart city concept (Fab City).
How (from AF): local workshops to engage other smaller, specializes local lab to open up with cooperation and eventually turning into FL nurturing project in the field of digital fabrication.

Distributed and Urban Manufacturing is an emerging model which is currently pervading european most innovative cities. Such model enacts the city as a creative and productive infrastructure enabling its inhabitants, schools, business players and much more to take action and push the production of new goods, technologies and services. If the phenomenon of fablabs in cities has become an established and wide fact, Urban Manufacturing emergence involves way more actors than fablabs and maker communities, generating a highly interconnected and collaborative ecosystem of actors among policy makers, startups, makers, inventors, business players, schools, utility companies and institutions in general.

During the 2-days Fab City workshop the fablab will facilitate a multi-stakeholders conversation and co-design workshop session in which a diverse set of local actors will uncover *use cases* of urban manufacturing policies adopted in most innovative national and european municipalities.
The **first day - organized around panels of discussion with policy makers and experts** - will aim to create awareness.
The **second day - organized around a set of co-design workshops** - will aim to trig a multi-stakeholder productive conversation and collaboration about future inclusive urban policies related to innovation and manufacturing.

The best list of stakeholders/invited attendees and participants should tap into:

- Local policy makers belonging to urban economy and smart city, inclusion, research and education sectors
- Locally active civic society, included Informal bottom-up organizations and spaces for social interaction and recreation
- Social entrepreneurs
- Schools representatives
- Maker community, mainly intended as non-standard technology workers, independent researchers and startups
- A national/regional/local expert in youth-policies or demography or both should be invited to keynote and help picture the current national state of youth employment in the country, comparing its relation with research and innovation national investment

- An expert in urban policies related to distributed manufacturing and smartcity should be invited to keynote about national and international best practices and lighthouse projects in this field.

More in details, the **Fab City 1st Day** will be organized as a conference-style event, in which external experts will picture national and international examples of urban policies related to distributed manufacturing (such as Barcelona Digital Plan and Milano Manufacturing 4.0 - ITA version, ENG version), the policy guidelines behind the plans and the resulted and expected impacts in term of urban social development. Local policy makers, public officers and stakeholders will conversely highlight and confront for a wide audience the current state of innovation policies which are currently undertaken by the local municipality in term of manufacturing, innovation labs, digital innovation hubs, fablabs and shared laboratories and how they connect with school curricula and national plans for youth development and education.

The **Fab City 2nd Day**, the fablab will facilitate a set of co-design sessions in which potential direct stakeholders among those above mentioned (locally active civic society, included Informal bottom-up organizations and social spaces, social entrepreneurs, schools representatives, makers and active citizens) will draft together a set of prototypes and graphical proposals addressed to the municipality to be informed in an initial inclusive bottom-up approach to urban policies design in relation to distributed urban manufacturing.

To understand more clearly who to involve especially in day 2 workshop, it could be worth to follow Mozilla Foundation Open Innovation Toolkit guidelines on participatory co-design session people recruiting. Also the Urban Innovation Toolkit designed by Umbrellium for Future Cities Catapult could be in case be perused as facilitation tool for the workshop sessions.