Interim Report

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Executive Summary

The shemakes.eu project aims to empower future female innovators of the sustainable textile and clothing industry through inspiration, skills and networks. Partners use a three-pronged approach to reach this goal, providing innovative learning paths for girls and women of various ages, concrete business support and connections, and inspiring stories of female role models.

This deliverable focuses on reporting the learning activities carried out in the labs for the three targets that are key to WP2: Curiosity (8-18 year-olds), Discovery (18-25 year-olds) and Innovation (25+ year-olds) in this first loop of 6 months.

This document was directed by IAAC as coordinator of WP2 and co-created with the direct partners, especially the three task leaders (T2.2 - LEON, T2.3 - ONLF, T2.4 - WAAG).

The **first chapter** gives an overview of the WP goals, advancements and methods of organization, and lists the activities carried out between and by labs.

The **second, third and fourth** chapters explain the details of activities run for each of the 3 learning paths: Curiosity, Discovery and innovation, supported by key lessons learned.

The **last chapter** presents the initial framework for documentation gathered in the open-source git platform (Learning Path Toolkit) and presents the plan of knowledge exchange for future transfer labs.

The document is completed with conclusions, references and annexes.

The **more tangible results** are summarized as follows:

- The labs have complied with their engagement objectives, organizing a rich density of activities with a high level of engagement. They have involved **more than 200 participants in the learning activities**, engaged with more than 150 women, and with a minimum of 50 participants for each targeted age.
- They have customized and tested activities for each shemakes topic. They explored: **Sustainability** with activities around **biomaterial making**, **wearable technologies** with the **interactive monster and Voodoo Rabbit** workshops; **industry 4.0** with initiations to **leather moulding and modular fashion**; they explored **textile narratives and new perspective on entrepreneurship** with the interviews of **Fabricademy ex-students** and **five sustainable fashion** brands; they started **rethinking wool** with a Discovery activity around what's re-wooling in the Romanian context.

- Labs have co-designed and are implementing an **open-source documentation** that is now visible here: http://fabricademy.fabcloud.io/shemakes/handbook/
- Good practices and emerging reflections are shared about the specificities of **teaching and co-creating with different age groups,** about how to **cooperate with a large panel of stakeholders** and how to **frame different sizes of interventions** to adjust with the **local** context.
- During the first phase of activities, labs and their ecosystems have shared interesting perceptions highlighting the **complexity of gender equalities and related stereotypes**. While they were learning from gender theories, perspectives and participating in gender vision workshops, labs started to observe and adapt their learning environment to have **a better awareness, to increase skill development and sense of reputation** building by and for women.

Next steps will focus on best shaping the documentation to fit with the engagement of the future transfer labs. While keeping on experimenting with new formats and partnerships, labs will adopt a reflective attitude to bring relevant insights for fostering women empowerment for science, innovation and industries, and systematizing inclusive practices in learning environments.

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1. Introduction

1.1 Context and Objectives from DoA[1]

1.1.1 WP2 definition

As mentioned in the DoA and D2.1, "*WP2 aims to define and test Learning Paths from young girls to women innovators, incorporating elements of the Fabricademy courses into existing projects and curricula for three age groups. Participants thus take part in collective shemakes.eu learning experiences, some but not all of which are STEM-based, through a structured curriculum (6 months max) or shorter modules (1 day to 1 week).* "

Thus, this WP:

- Adapts, expands and diversifies the Fabricademy model and tools for curricular pathways for different age groups and gender targets.
- Develops and deploys the Curiosity path for girls aged 8-18 in collaboration with schools, museums, etc.
- Develops and deploys the Discovery path for young women aged 18-25 in collaboration with academies, universities, etc.
- Develops and deploys the Innovation path for women ages 25 and up in collaboration with T&C businesses, research and training institutes or start-up and accelerator programmes.

[1] Description of Action of the shemakes.eu project

1.1.2 Description of the deliverable

D2.2 Learning Paths Interim Report (lead partner: IAAC; PU; M9) describes and synthesizes the results of the first phase of the Learning Paths, reports on the results of the activities of the 6 Labs and provides an updated version of the Learning Path Toolkit.

1.2 Methodology

Overview

After delivering the D2.1, labs collaborated to envision the notion of "learning path", structuring the overall approach and co-designing roadmaps for each lab. WP2 partners have been engaged in the planning and realization of a series of learning activities: being practical, testing and reflecting. Each lab could prepare and run their respective activities while they collectively worked on a process to facilitate exchange of knowledge, monitoring and evaluation of the activities.

From March to September, Labs were engaged in biweekly calls to share their updates on difficulties and knowledge gained. Those meetings were established in collaboration with WP3 and WP4 and each work package leader anticipated the content the week before, via mail or via a dedicated call if needed. A reporting document[2] was created, integrating all the minutes and recordings of those meetings.

Work package Leaders have co-created and improved a set of guidelines to help each lab to organize their activities, and included guidelines: for evaluation with TIG, for communication- with FLOD and for general issues or ethics with CEDECS-TCBL.

A set of guidelines

A document entitled "**How to plan and document activities**"[3] was shaped as a powerpoint including all references to better plan and document their work. It contains 12 slides. Here is an overview of the main content, while the detailed one is provided in annex 1:

- Situating your activity in Shemakes
- Getting inspired by other practices
- The activity canvas for preparation
- Ethics procedures for each activity
- Report and communicate your activity

[2] This document is internal. It can be provided on demand to the coordinators.

[3] Part of the document is provided in annex 1.

- Navigating in your folder
- How to document?
- Evaluation
- Assessment section in the handbook

The document itself refers to a set of procedures and tools created for supporting and monitoring the labs' activities:

- A *spreadsheet for monitoring* the activities has been shared with all partners, containing the core information needed for each activity. It is structured in five categories with respective requested contents:
    - General info of the activities
    - Communication
    - Stakeholder engagement
    - Evaluation
    - Documentation
- An individual folder in the google drive has been created for each lab. There, they can upload the most important materials for follow-up and documentation of the activities.
- *Templates* for activity canvas, activity documentation (see annex 2), flyers creation (see example in annex 3), evaluation forms (see example in annex 4), were created. Labs are advised to use them and improve them for further actions.
- A set of graphical templates realized by the labs as well as by Flod to guide labs in communicating their activities (see two examples in annex 5).

Method approach

Beyond this first structure, Labs mainly **follow a problem-solving approach guided by practice-based activities**. Labs were encouraged to share their concerns and advancements during the biweekly meetings, via the whatsapp group or by direct communication with the WP2 leader. Regular good practices were shared during those meetings and served as inspiration for structuring the interventions.

In addition to online meetings, all task leaders and Matrix co-organized an intensive peer-learning week in close collaboration with Fab 16, the Annual Fab Lab conference, from 8th to 15th August, where some activities of the learning paths were facilitated by lab gurus, run and tested with peers of the Fab Lab community. This has helped in testing the workshop formats and documentation, as well as receiving practical feedback, and discussing better ways to document activities for replication purposes.

Work from other WPs has also been beneficial for WP2, to improve the quality of activities and the flow of organization, such as the workshop done by TIG on the shemakes gender vision, a meeting about the Hypathia project, and the communication guidelines created by FLOD.

1.3 Synthesis of activities carried out

Table 1, Synthesis of recurring labs meetings

Date	Meetings	Who?
31.03	Round of feedback and presentation of D2.1 results. Discussion about innovation path and replication	**All labs**
21.04	Feedback from Curiosity and Discovery by ONLF and LEON, introduction to consent form and spreadsheet of activities and demands on communication and evaluation	**All labs**
28.04	Overview of the evaluation frame by TIG and presentation of google drive folder and update on the spreadsheet	**All labs + TIG**
05.05	Round table of activities by IAAC, ONLF, LEON, presentation and discussion around the *How to plan and document activities*	**All labs + Matrix**
18.05	Redefinition of the Innovation path strategy for the 1st loop of activities, preparation of the innovation path survey, events and interviews	**WAAG, IAAC**
26.05	Round table of activities by all labs, presentation of the activity, documentation template and update and questions on documentations	**All labs + Matrix**
09.06	Round table of activities by all labs, update of ONLF, opportunities for running shemakes learning activities interlabs, innovation narratives events and follow-u, small introduction to the git handbook	**All labs + Matrix**
16.06	Creation of the Miro for illustrating the activities to documents, feedback on innovation interviews (2.4), administrative point	**IAAC, WAAG, Matrix**
23.06	Diffusion of the Miro Matrix to all labs, and overview of the survey and interviews procedures	**All + Matrix**
07.07	Discussion on the WP1 methodology guided by Matrix and updates	**All + Matrix except LEON and ONLF**

21.07	Reflections with WP3 on business engagement and innovation practices. Joint Toolkit reflexion for WP2 and WP3, and reflexive activities about key learnings to be the bases for a communication paper for Fab16 conference	**All + Matrix + TCBL**
08-15.08	Community gathering to test some learning paths within the Fab Lab ecosystem and local community of the Aegean lab: workshops were held all along the week.	**IAAC, WAAG, Matrix, ONLF, LEON**
25.08	Reconnexion, introduction to deliverable 2.2 and distribution of tasks, reminder about documentation and monitoring, Introduction to Git by Cecilia Raspanti (WAAG)	**All except REDU**
01.09	Reconnexion with REDU and interaction on Curiosity and Innovation path for documentation	**All except ONLF**
15.09	Update on deliverable and small debugging sessions for the toolkit	**All except ONLF and MAKE**

Table 2, Synthesis of lab activities (March 2021-September 2021)

Path	Lab	Date	Title and short description	N° people engaged	Duration
Curiosity	LEON	28.05	Microbootcamp for educators for tests and feedback for future integration of shemakes activities	5 teachers	3h
Curiosity	LEON	29.05	Make your own e-textile garment	15 participants with 2 girls aged 8 to 11	3h
Curiosity	LEON	19.07	Mini Fabricademy - textile workshop for girls 8 - 11	9 participants with 9 girls aged 8 to 11	2 days (8h)
Curiosity	LEON	21.07	Mini Fabricademy - textile workshop for girls 12-15	9 participants with 9 girls aged 11 to 14	2 days (8h)
Curiosity	LEON	24.07	Wearables for kids (6-9 years old) - Wearable Activity for kids in Light Museum (Ponferrada, LEON).	8 participants with 5 girls aged 6 to 9	2h

Path	Lab	Date	Title and short description	N° people engaged	Duration
Curiosity	LEON	10.08	Interactive monster	8 participants with 4 girls aged 8 to 18, 2 aged 18-25 and 2 aged 25+	2h
Curiosity	LEON	12.08	Modular garment, from paper to digital design	16 participants with 2 girls aged 8 to 18, 3 aged 18-25 and 3 aged 25+	2h
Curiosity	IAAC	28.04	Remix The school. Biomaterials Design: An immersive demonstration of biomaterials with Sant Marti school	20 participants with 11 girls aged 8 to 18 (9 to 11)	3h
Curiosity	ONLF	05.06	Voodoo rabbits workshop: introduction to e-textiles to kid group 1	8 participants, 6 kids with 4 girls aged 10 to 12	3h
Curiosity	ONLF	15.07	Voodoo rabbits workshop: introduction to e-textiles to kids group 2	12 participants, 10 kids with aged 4 girls 10 to 12	3h
Discovery	ONLF	12.04 - 16.04	Leather moulding with Grasshopper, with the design school "Haute école d'art et de design" (HEAD) students	8 participants, 6 young women aged 18 to 25 from HEAD school	5 days
Discovery	ONLF	12.04 - 16.04	E-textiles, with HEAD students	8 participants, 5 young women aged 18 to 25 from HEAD school	5 days
Discovery	ONLF	12.04 - 16.04	Modular Fashion, with HEAD students	10 participants, 9 young women aged 18 to 25 from HEAD school	5 days
Discovery	ONLF	12.04- 16.04	Zine evaluation feedback	26 participants, 20 young women aged 18 to 25 from HEAD school	5 days

Path	Lab	Date	Title and short description	N° people engaged	Duration
Discovery	IAAC	21.03	Club I - Bacterial dyeing with the master in design for emergent future (MDEF) and Fabacademy	12 participants, 5 young women aged 18 to 25 from MDEF and Fabcademy	3h
Discovery	IAAC	28.03	Biomaterials Design Subtitle: An immersive demonstration of biomaterials held at the Design museum DHUB in collaboration with Materfad	24 participants, 18 young women aged 18 to 25	2,5h
Discovery	IAAC	25.05, 03.06	Club II: Kick-start your mycoculture with MDEF and Fabacademy	10 participants, 5 young women aged 18 to 25	2h
Discovery	LEON	17.04	Introduction to biomaterials with ABLE association, the Association of Biotechnology of LEON.	10 participants, 5 young women aged 18 to 25, 3 women aged 25+	5h
Discovery	REDU	27.05	ReWool - workshop for Arts&Technical Universities students- Iași	21 participants with 17 young women, 3 women aged 25+	½ day
Discovery	Matrix, IAAC	12.08	From soft robotics to biobotics with community	23 participants registered, among 13 women all ages	1,5h
Innovation	ONLF	10.08	Leather moulding and Grasshopper, Community Gathering Paros	12 participants, 12 women aged 25+	2 day (2-3 hours workshop)
Innovation	WAAG IAAC MAKE	Jun July	Innovation survey for 2.4 learning path	29 respondents, all women aged 25+	around 20mn/survey
Innovation	WAAG IAAC MAKE	03.06	Innovation narratives. Launching event for Fabricademy alumni & innovators	13+ participants with 13 women aged 25+	1h
Innovation	MAKE	18.06 to 16.08	5 interviews with women entrepreneurs from the Textile &	5 women aged 25+, entrepreneurs in T&C	1h to 2h each

Path	Lab	Date	Title and short description	N° people engaged	Duration
			Clothing sector (2 brands: clothes / underwear (Azaadi & Mood Paris) 1 coworking space for creators (Hall Couture) 1 B2B sourcing solution (Fairly Made), 1 B2C app (Clear Fashion)	sector	
Innovation	WAAG	01.06 - 30.07	Interview with Fabricademy Alumni	5 women aged 25+	1h to 2h each
Innovation	IAAC	24.07	Interviews with ex-fabricademy alumni	4 women aged 25+	1h to 2h each

As described, an important number of activities occurred in the past 6 months in each lab for each learning path and involved different targets of girls, young women and women aged 25+.

Table 3, Summary of reach

	Curiosity	Discovery	Innovation
Objective for phase 1	50 girls aged 8 to 18	25 girls aged 18-25	15 women aged 25+
Total targeted groups	93 kids, 50 girls 7 teachers Cooperation with at least 2 schools (San Marti, LEON education school), 2 museums (Light Museum, DHUB Barcelona) and teachers from the LEON education faculty	134 youngsters, 64 young girls 39 women 25+ Cooperation with the Art and Design ecosystem (HEAD, MATERFAD, Barcelona DESIGN MUSEUM, University of Arts "George Enescu") technological centres(ABLE association, Iași, Technical University " Gh. Asachi" - Iași)	29 survey respondents 14 interviewed Cooperation with ex-alumni of Fabricademy and social entrepreneurs and companies (Mood Paris, Azaadi, Hall Couture, Fairly Made, Clear Fashion)

N° of activities /area

Sustainability	1 (Biomaterials)	5 (bacterial dyeing, biomaterials, mycelium, Rewool)	14 interviews mixed
Wearables	7 (voodoo rabbit, emonsters…)	2 (e-textiles, soft robotics)	
Industry 4.0	2 (modular garments)	3 (2 leather moulding, modular fashion)	
Innovation narratives	1 (teacher session)	2 (gender vision, women opportunity)	

The description of activities and key lessons learnt for each type of path will be developed further in chapter 2, 3, 4.

2. Curiosity Path

In this paragraph, we describe and illustrate the activities run for the Curiosity path and update the general recommendations.

2.1. Updated description

This path addresses primary and secondary school female students aged 8-18. Developed as a formal, informal and after school activity in close collaboration with schools and science or design museums, it allows finding and nurturing future talents as well as creating aspirations, trust and joyful moments for kids. Fab Lab LEON leads the activity, together with IAAC and ONLF, based on its running program Poderosas, which aims to overcome stereotypes and prejudices among girls in order to foster new vocations. Each Lab, as well as four of the 12 transfer Labs in phase two, work with two groups of 8 girls maximum three years apart.

In designing the Curiosity Path, the shared learning path created in Miro platform presented in D2.1 was used to name different activities and identify the skills that are developed in each activity.

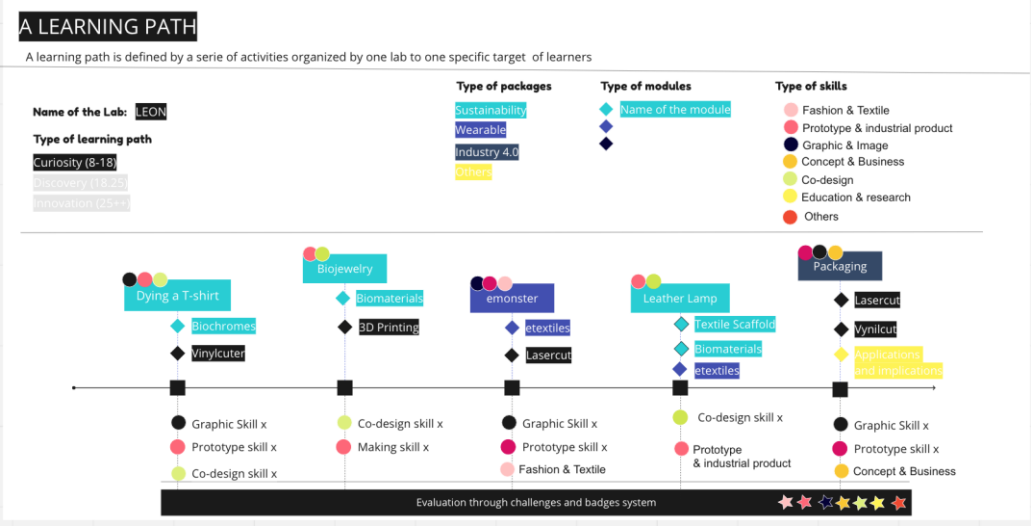

Figure 1, Envisioned Curiosity Learning path by LEON

2.2. Key activities

2.2.1. Mini Fabricademy for kids by LEON (28.5.2021 - 12.8.2021)

Learning through play is one of the methodologies used in kids' learning, where children invent and share their own games and DIY toys based on age, likes and interests. With Learning through play, children develop social and cognitive skills, mature emotionally, and gain the self-confidence required to engage in new experiences and environments (Wikipedia, 2021).

Learning through making is another core methodology in the Fab Lab and makerspace environment. Martinez (2014) emphasizes that "*Learning through making, both at schools and afterschool activities is contributing to the creation of a safe environment for kids to play, discover, tinker, experiment, activate their creativity and develop their fine motor skills*".

Throughout 10 years of conducting workshops for children, at Fab Lab León, we have observed that **monster drawings** (play) and **interactive monsters** (making) are often chosen both by boys and girls under the age of 11, regardless of their gender. The interactive monster activity allows the youngest children to get started in the world of textile electronics in a playful way, establishing knowledge that can be used in the future in fields such as fashion, wearables or assistive technology.

The activity of DIY interactive monsters has already been introduced and documented by Leah et al (2013).

Program of activities

Minifabricademy for kids consists of a mini-itinerary based on Fab Lab León's previous experience with the Poderosas group and the adaptation of several of Fabricademy's classes for children. The content of this Minifabricademy for children has been chosen, taking into account the initial program envisioned in D2.1 for the Curiosity path, adapting some classes - of the initial Fabricademy Program - OS Circular Fashion and e-textiles -, and through collaboration with two other labs engaged into Curiosity path, namely, IAAC Fab Lab Barcelona and ONLF.

A set of activities has been developed between April and September involving 4 staff, 5 educators and 31 girls between 8 and 18 years old among a total of 64 participants. This Curiosity path consisted of 3 phases: a micro-bootcamp for educators, a community event for families and workshops of interactive monster and modular fashion for two groups of kids with different ages (8-11, 12-14).

1- Testing with teachers. Training the trainers: textiles micro-bootcamp for educators (28.05.2021)

After creating the content of the workshops and their documentation, a pilot activity was organized with teachers from diverse entities such as the University of Education, Light Museum and an early childhood education organization for students with special educational needs. The objective was to capture information from them about the times used, the possible difficulties for younger children and analyze how the facilitators could better adapt them to children with less manipulative skills and also how we could apply them in the classroom by incorporating it into the school curriculum. Once the resulting feedback was received, a new iteration was carried out, this time to target younger children and explore the possibility of including a customized version of Fabricademy modules in a Plastic Arts class that explain the additive composition of colors (additive color mixing theory). At the end of the bootcamp, the participants filled an evaluation survey of the activity and highlighted some improvements.

Figure 2, Illustrations from the test with teachers. LEON

2- Activity with CEL's families (29.05.2021)

An open invitation to 14 families, 30 people in total, coming from CEL JUNIOR, an initiative from CEL (Círculo Empresarial LEONés/LEON Business Circle). CEL aims to continue promoting the entrepreneurial spirit among the youngest (7-13) and make visible the innovative activity of LEON companies among the boys and girls that are relatives of CEL businessmen, through workshops and guided visits to the most representative industries and companies in the province.

This event aimed to capture general interest in textile activities, to publicize the Shemakes.eu project and to generate synergies between companies in the province of LEON. The activity consisted in a presentation of the shemakes.eu project, followed by a hands-on workshop where the participants created a basic textile electronics project that was presented to their parents. Then, they could access and follow a step-by-step tutorial. One of the most relevant conclusions among children and adults was that technological projects could be created within the textile field and that sewing was one more skill that had to be developed among girls and boys alike.

Figure 3, Illustrations of the activities with CEL's families. LEON

3- Interactive monster and modular garment workshops: 8-11 girls, 12-14 girls, Light Museum and FAB16 (19.07-12.08.2021)

The objective of these activities was to involve the girls in the entire textile fabrication process, from the conception of the idea to the execution of the textile project. These activities were carried out in two groups of girls by age (8-11 year-olds and 12-14 year-olds) in which 2 of the older girls also participated in the younger ones to simulate the concept of "ambassadors" and transfer knowledge of the activity from one group to another.

The activities consisted in: a/ the realization of an interactive textile object adapted to the tastes and interests of the girls in which an electronic circuit was introduced and b/ the manufacture of a modular textile accessory to introduce the concept of circular fashion among the girls.

The interactive monster and the modular garment workshops were replicated during the FAB16 international event, - being held in a hybrid format (local + online) and also in connection with the Shemakes labs in Paros (Greece) for a community gathering of 24 participants in total.

Figure 4, Knowledge transfer from older girls as ambassadors to younger girls

Figure 5, interactive object (phone) + modular garment

Figure 6, interactive monster in Light Museum

Key learnings and reflections

When carrying out activities with boys and girls, we realized that in the textile activities the boys came with less confidence than the girls. The girls had more self-confidence and enjoyed the activity a lot. However, at the end of the activity, the boys showed more enthusiasm when they recognized that they had acquired a skill

that they did not have at the beginning, and they were proud of it. It is something similar to what is observed in girls who come fearful to an activity more related to programming or electronics that seem to be less friendly for girls.
It was also felt important to:

- Propose this activity with a character that is currently popular among children, for example AmongUs, Minecraft or Ladybug
- Allow girls to customize the character
- Invite girls from the older group to explain the activity to the younger girls

2.2.2. Remix the School by IAAC

Remix The School (RTS) is a project of Fab Lab Barcelona at IAAC in collaboration with the Escola Sant Martí Poblenou and co-financed by the Creative Flips EU Project as an innovative pilot projects for cooperation between creative hubs and educational institutions with the goal of promoting transversal and creative skills transfer. It's an iteration of the Remix El Barrio project where the team applied the best practices, insights and methodologies developed throughout the Do-It Europe and Siscode EU projects. IAAC, within the shemakes.eu project, has co-organized a workshop at the Design Museum of Barcelona, DHUB.

Remix the School is full of content to provide methods and tools for the Curiosity path in cooperation with schools, teachers and kids, around food waste, the plastics problem's awareness and biomaterial making.

Shemakes organized a biomaterial demonstration workshop held at the design museum with the kids of the local primary school associated with Remix the School. This demonstration, based on the biomaterial workshop in the Discovery path, was customized for children, with the introduction of a fairy tale about Remix the planet, of adapted recipes and lot more illustrated feedback sessions.

It involved 20 kids with 11 girls, their respective teachers and was facilitated by the Fab Lab team and facilitators from Remix El Barrio.

A documentation is being produced here.

More information about the methods and tools from the Remix the School project:

https://Fab Labbcn.org/projects/remix-the-school

- Repository of guides, inventories, videos, canvas… https://drive.google.com/drive/folders/1J29gyyBXpEs_2vlv05S8FFQEZAB7g8TO?usp=sharing

- Visualization Miro board of activities and steps of the overall programs. https://miro.com/app/board/o9J_l9zaJ0s=/ + Remix The School_Deliverable
- Remix the school takes part of the Curiosity path and builds further on hybrid versions with different schools.

Key learnings and reflections

- Work with specific vocabulary, creating for instance a fairy tale to raise awareness around gender problems in innovation
- Create tutorials and recommendations for teachers
- Online tips in sessions with kids: organizing distributed events by classroom.
- Find a common production theme for children to work together, learn cooperative work.

2.1.1. Voodoo Rabbits by ONLF

Voodoo Rabbits - 5.6.21 / 15.7.21

The latest version of the Voodoo Rabbits workshop (formerly called Voodoo Dolls) is the result of a process of reiteration started in 2017, when we proposed the workshop to a group of 8 kids from 8 to 10 years old. The workshop is also an excellent example of collaboration between Fab Labs and makerspaces in Switzerland and in Europe.

Voodoo Rabbits is an activity that is highly appreciated by kids and parents because it mixes traditional crafts like sewing with electronics and - for the older children - programming. This activity was chosen as one of the workshops for the Curiosity Path in the framework of Shemakes because it engages boys and girls equally and all participants are eager to show their skills and knowledge in art, sewing or electronics. Peer learning is strongly encouraged, and the instructors try to give hints to solve a problem rather than solving it themselves without the children understanding the issue. In order to make their rabbit doll work, kids have to follow instructions and understand the basics of circuits. However, there is enough space for creativity to personalise their doll. The Voodoo Rabbits workshop was also an opportunity - to better understand the perception of girls and boys towards scientific and artistic jobs and their gender characterization through a survey.

The first idea of the workshop has been developed by the group of makers and artists from the SWISS SOCIETY FOR MECHATRONIC ART- SCHWEIZERISCHE GESELLSCHAFT FÜR MECHATRONISCHE KUNST (SGMK), which is active in the German speaking part of Switzerland. Based on the observations of the difficulties encountered by children in surface-mount soldering, ONLF developed a bigger

board and lately - in collaboration with two Fab Labs in the French speaking part of Switzerland - a board with through-hole components. We also added a microcontroller Attiny45 that allowed the kids to play in a more interactive way with their dolls. The last version of the board that we are still using was developed after a few exchanges with the Fab Lab Wemake - Milan and we feel to have found the right balance between simplicity and interactive features. The design of the soft part was also dramatically improved throughout the years: we started using old cuddly toys, but the children didn't like to cut and open their own toys, especially if they had animal shapes. We then used a doll shape and finally a spooky rabbit that was liked equally by boys and girls.

To organise the activity ONLF collaborated with the Geneva Public Library (discussions about duration, age, safety…) and Passeport Vacances, a summer programme supported by the Geneva district, that selects innovative and fun activities for children and teen-agers.

Key learnings and reflections

- The activity is easily transferable to other labs with basic skills of electronics and sewing
- Give kids enough time to solve problems
- When properly designed, e-textile activities are equally appealing to girls and boys and - help girls to appreciate electronics from a different perspective
- Find a good balance between following a protocol and creativity
- Children enjoyed the activity and about ⅓ of participants registered to other activities organised by the Fab Lab.

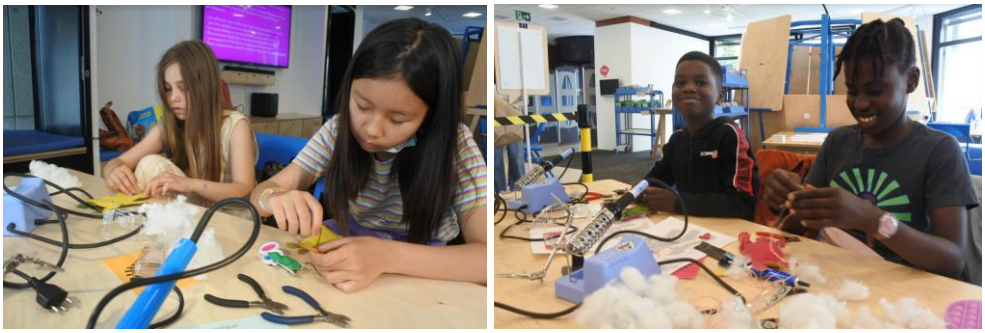

Figure 7, Voodoo Rabbits by ONLF

2.3. Key learnings and reflections

Having fun with hands-on activities, learning from experimentation, and learning from peers are the foundation of the Curiosity path. Each child's learning time is different, so special attention must be paid to their maturity, their sensitivity and not

just their age. When children teach others, or when they present their work in public or when they explain their projects at home, they internalize what they have learned. Getting groups of motivated teachers who want to innovate in the classroom and introduce these workshops by finding a theme that relates to them in the classroom, will allow reaching more children.

Here some additional reflections formulated as tips:

- Create the groups according to the girl's maturity and not only by age, younger/ less mature girls need to be guided step by step, and - older ones can be more autonomous. So the number of students per instructor depends on this.
- Facilitate peer to peer learning: inviting older girls - to explain the activity to the younger girls will engage both parts.
- Plan the time for each activity according to the age group and schedule time for the girls to present their final project, inviting the families to watch the girl's projects in an open event
- Support and accompany the educational community, based on past experience and supporting impact and scaling up.
- When working with schools, find recognition of the school children work in a space outside the school, for example an exhibition in a museum next to artists' works, to give it more credit.
- Labs would benefit in offering more workshops “for all” -all sex/gender included- and guaranteeing open spaces for expression and for caring about group dynamics.

2.4. Next steps

The next step for the Curiosity path is to complete the shemakes toolkit with all the documentation and continue working on agreements with schools and museums to better sustain the opportunities raised by the shemakes.eu project to put labs closer to such institutions.

By practicing more workshops, the labs will be able to better understand the group dynamics, especially the evolution of confidence before, during and after the activities. This will help to better frame the type of activities and evaluate when to engage mixed groups vs girls’ only groups so as to empower them to science and technology, without promoting classic stereotypes about gender.

In order to engage more people, from schools and museums, labs should diversify training for trainers’ activities with educators from different educational sectors and organize events open to the community to show the projects made by the girls.

3. The Discovery Path

3.1. Main description

This path addresses young women aged 18-25 and is thus closest to the existing format of Fabricademy, expanding and improving its content. Led by ONLF together with IAAC and LEON, each Lab (as well as four transfer Labs in phase two) establishes a collaboration with at least one **academy, university or institute for fashion, textile design**, etc. in order to incorporate Fabricademy modules into existing curricula and better align skills acquired with emergent needs of T&C ecosystems. Through this path, participants are exposed to innovative practices, materials and digital manufacturing techniques that they can integrate in their portfolio of competences, and the Labs can establish permanent collaborations with more **traditional T&C educational institutions**.

3.2. Key activities

3.2.1. HEAD Bootcamp by ONLF - 12/16 April 2021

At HEAD, the Geneva school of art and design, students develop projects through workshops and seminars as well as collaboration with private and public professional partners. HEAD offers - among several others - a bachelor and a master in Fashion Design: the collaboration with ONLF was established with two professors of this branch, one of whom participated in 4 modules of Fabricademy in 2020-21. Though it is an innovative school, the HEAD BA doesn't offer courses on e-textiles and students don't have direct access to digital fabrication machines, which are normally operated by school technicians.

The collaboration developed along 3 main axes:
1) introducing students to the use of 2D and 3D modelling software
2) learning how to use machines like a Computer Numerical Control (CNC) and a laser cutter applied in textile manufacturing
3) being exposed to different approaches of design- and production at the Fab Lab, demonstrating small scale local manufacturing workflows

The chosen format was a one-week bootcamp at ONLF for 26 students (of which 20 young women aged 18 to 25) who could choose to work on: e-textiles; leather

moulding, 3D modelling and the use of the CNC; modular fashion and the use of a laser cutter. The week started on a Monday with a plenary presentation about fashion, sustainability and new technologies. The students split into three groups and worked on a concept of a bag to be delivered on the following Friday, when each pair presented a working prototype to their peers and other invitees.

The bags - with electronics, in leather or assembled without sewing - were exhibited at the hall of the Manufacture Collaborative (MACO) for 2 weeks. The MACO is the first and only third space dedicated to urban and collaborative manufacturing in the Geneva region. Participants also had the opportunity to visit the artefacts of other associations installed at MACO.

The bootcamp was the occasion to use bootcamp journals or Zines as evaluation tools to stimulate the participants to self-reflect on themes like gender and tech-based fashion. The first day students built their Bootcamp journal (zine) and at the end of each day, we proposed a different topic to think about (gender, sustainability, technology, my expectations…). Students had to elaborate the topic in the zine with drawings, texts, collage… At the end of the week, we used the zine as a tool to discuss and evaluate the participation of the participants.

Students were extremely engaged and motivated, and we felt that spending a full week together was a great way to establish meaningful professional and personal relationships. Students were encouraged to test different ideas and they had enough time to make several prototypes and exchange with their peers.

Figure 8, Activities with HEAD students. ONLF

Outputs: Documentations created from this collaboration:

- Leather moulding and Grasshopper
- Modular fashion bags
- E-textile bags
- Programme to set up a week of activities with design schools
- Zines as a self-reflection and evaluation tool
- Students' presentations

Key learnings:

- Find the good balance between leaving autonomy and freedom to students and helping them organise their time.
- Work closely with the teachers to adapt the programme to their specific needs.
- Leave enough time for exchange and informal learning.
- Students are exposed to innovative technologies they were not aware of.
- The activity is transferable to labs that have a capacity to host big groups and are equipped with machines for rapid prototyping

3.2.2. Biomaterials with biotechnologist by LEON - 17 April 2021

This activity is one of the first activities resulting from the agreement established between Fundación TMa and ABLe. ABLe is the Association of Biotechnologists of León whose main objective is to disseminate and promote Science and Biotechnology in León. Among their activities, they propose the mentoring of high school students who are interested in pursuing careers related to Science and Biotechnology and they hold various outreach workshops in schools in order to promote and disseminate scientific knowledge. ABLe's first contact with Fab Lab León took place in 2019, attracted by the possibility of manufacturing different DIY instruments and equipment in the Fab Lab to carry out their experiments and create a BioLAB together.

Within the framework of shemakes.eu, the collaboration with ABLe is developed around the following lines:
1- Practical development of biomaterials workshops with the members of the Association using the open-source content of Fabricademy.
2- Digital fabrication of the biomaterials molds using the different Fab Lab processes
3- Scientific analysis of the behaviour of biomaterials by ABLe
4- Holding of dissemination seminars for children on biomaterials and sustainable, circular and local digital manufacturing.

The activity consisted of creating different types of biomaterials and their molds using Fab Lab processes such as 3D printing and laser cutting to incorporate them into Fab Lab León's library of biomaterials. At the end of the day, a round table was established where the participants explained that it had been an opportunity to learn about the applications of biomaterials in the textile field, that it was a new activity to add to the catalog of activities that are carried out in schools, and that a future closer relationship would help exploring the possibilities of Digital Manufacturing to carry out other types of experiments.

Figure 9, Inspiration from Gaudi Labs

Key learnings and reflections:

- Document as you go. The documentation must be done in parallel with the activity, especially when different ingredients are added that can modify the result
- Plan reflection time after the activity to analyze the results, expectations before carrying out the activity and the possible applications in textile context

3.2.3. Biomaterials Design, with Materfad and Design Museum of Barcelona by IAAC - 28 April 2021

Benefitting from the collaboration between Materfad and IAAC with the exhibition of Remix el Barrio Siscode's pilot, Fab Lab Barcelona organized a demonstration biomaterial workshop inside the Museu del Disseny de Barcelona, the Catalan capital's centre devoted to art and design.

As a strategic partnership between the two entities, IAAC proposed, within the Shemakes.eu project, to host a day of learning paths at the Design Museum's space, while the Remix el barrio project was in exhibition. The free attendance workshop invitations were opened through the Eventbrite platform and disseminated across the diverse ecosystems of Fab Lab Barcelona, IAAC, Materfad and the DHUB, embedding important connexions with design schools, university students, elementary schools, and professionals. Materfad also shares a core interest in gender innovation; they participated actively in the Sustainable challenge: Gender perspective in fashion at the end of 2020.

The ¨Biomaterials Design¨ workshop is a demonstration of biorecipes and manufacturing processes that promote sustainability, circularity, biodegradability and zero waste, from the starting point of the material. Participants get introduced to three different demonstrations showing three biofabrication processes (casting, molding and 3D printing). It is designed for a large number of participants and for

this reason, the group is split into subgroups that attend different activities that are happening simultaneously. The activities can be demonstrations, hands-on learning, guided visits or presentations and the activity follows the methodology of « rotating stations ». Due to pandemic restrictions, students stayed at the same places, while tables and facilitators rotated. The suggested duration for each of the rotating stations is 30' including a small introduction and a wrap-up reflection or feedback. The ideal number for a subgroup is 8 to 12 people. The activity can scale up and extend in time to accommodate more participants by adding more stations.

Outputs:

http://fabricademy.fabcloud.io/shemakes/handbook/1.-learning-paths/Discovery-path/4-biomaterialDiscovery/

Key learnings and reflections

- Such collaboration takes time and needs to be well prepared. Many administrative rules need to be fulfilled especially in a time of Covid.
- Museums have interesting approaches for accessibility and inclusivity that can inspire labs' practices, for instance: the format of communication used to document exhibitions (color, size of visual panels), the obligation to translate in different languages (included "braille" for blind participants) and some official regulations they have to comply with
- Additionally, the museum really appreciated to open its facilitation floors to an external collective of designers emerging from the Fab Lab Barcelona.
- Museums can play the role of platform for showcasing locally manufactured digital craftsmanship and reaching out to a broader audience
- The diversity of activities and sequences of demonstrations need to be rhythmic, supported by time-keeper and ideally a transition signal, as in that case a choreography between facilitators.
- Participants would have appreciated to touch, experiment and make but the activity was designed considering the covid restrictions.
- The rotating stations format continuously captures the attention of participants, since every 20'-30' they are introduced to a completely different setting, with different facilitators and techniques. The setting is like a theater with different scenes where participants can wander around.
- Material driven design that combines creativity and material science raised more interest in young girls.
- Post-evaluation forms remain hard to get as the event is targeted to a broader public, with little interaction between participants due to its format, and covid limitations.

- As the labs share the vision that *"education has no age"*, the Discovery path could engage collaboration with universities and museums for a wider target group, no matter the ages, especially adults aged 25+.

3.2.4. MDEF Clubs by IAAC - 21 March, 25 May, 3 June 2021

The Master in Design for Emergent Futures (MDEF) is organised by the Institute for Advanced Architecture of Catalonia and Elisava Barcelona School of Design and Engineering, in collaboration with the Fab Academy. It is a multidisciplinary design course which focuses on turning ideas into actions to transform the state of society. During the first phase of shemakes, IAAC initiated the MDEF clubs, which were imagined as learning activities off the main courses where students from different programs can join, learn and experiment together with the Fab Lab team members and interns. The objective is to create some Discovery moments so as to raise knowledge and future interest on suggested topics identified by teachers and students. The MDEF program students have expressed their interest in the Fabricademy, Textiles and Materials research and especially in the field of material driven design, DIY biolab practices, sustainability, and circular design. The MDEF faculty together with the Textiles & Materials research area, co-designed a series of Clubs that combined introductions to basic DIY BIO practices, tooling and tutorials for growing microorganisms and making bio composites. Students that were engaged in the Material CLUBS learning paths and wanted to implement the learnings in their final Master project were later offered one to one mentoring sessions and access to the biolab infrastructure.

Three sessions have been proposed: one on textile bacterial dying, and two on mycelium-based techniques. The three sessions started with a brief contextualization, a live demonstration and space for experimentation thanks to an informative leaflet and live advice. Growing materials activities need time and students would come to the Biolab in the following weeks to observe their experiments and understand the BioLAB activity and infrastructure.

Figure 10, Photos of the biomaterial workshop at the Design Museum, Barcelona

Key learnings and reflections

- The concept of "clubs" as an extracurricular activity that brings students closer to a lab's functionalities, can be an incentive for training future lab users, managers, and staff. It can also create grounds for deeper applied research for students that are interested in the Fab Lab Ecosystem.
- The topic of Biomaterials design that combines Material Science, Biology and Industrial Design seems to attract more women, seen by the statistics of the participants from the workshops. Then, this might be used as an incentive for women to enter science and technology careers.
- The approach relies on student's motivations and availability. It could be hard to find the right timing when students feel already overloaded by the main courses.

3.2.5. ReWool – mixed workskops for students of Art and Technical courses in Iasi, by REDU – 27 May 2021

Before 1989, the Romanian wool industry was thriving, with dozens of factories across the country. But now there are only a few small family businesses left, in two regions of Romania: Ardeal and Molova. Today, Romania no longer has the processing industry it once had.

Romania also lacks collection centres, so shepherds have to take the wool to very remote areas to process it. But this means extra costs and the risk that the wool will deteriorate; the wool is dirty and full of droppings and thus sells for half of what it would if it were clean. Unfortunately, in Romania the shepherds are not associated and have no direct connection with importers. Even though the shepherds receive a small subsidy for a kilo of wool, they say it only helps them cut costs a little.

REDU has proposed a workshop to contribute to the re-appropriation of traditions related to the processing of wool, which in the Romanian context was a raw material widely used in the households of our grandparents and great-grandparents.

As opposed to the general approach of a wool trade based on growth and globalization, we wanted to test a different idea, that of making a mini wool factory in our household and/or of bringing all the tools we need to process wool close to home.

Secondly, we wanted to engage students, especially females from art courses and technical courses, to start collaborating with each other. In recent years, we have noticed a lack of collaboration between these two universities and we have always been of the opinion that this link would be beneficial to happen during studies rather than after graduation.

The Rewool workshop is a partnership between REDU and the "George Enescu University of Arts" and "Gheorghe Asachi Technical University". The key objective was to discover wool and work through new and old methods of processing it: comparing work with a small weaving warp and a weaving warp with computer-programmed patterns; weaving with a ready-made yarn vs spinning raw wool; feeling wool of different types (thick cloth with natural smoke) and in different forms; exploring the creativity of the participants.

We used a laboratory within the Faculty of Textiles from the Technical University where we had the opportunity to provide the participants with the use of a loom with digital programming of the type of weave, so they could make a comparison with the mini loom provided by us (a basic pattern, with smaller dimensions, 40/60 cm, simple to make by laser cutting).

Open-source files for a laser cut loom and an electric powered laser cut spinning machine were sent to the REDU team by IAAC. REDU prepared and fabricated the machines and gathered the wool from a local supplier.

The outcome was over expectations. Mixed teams formed of students from both universities combined creativity and technical skills resulting in various objects of practical and decorative use. They also learnt to organise themselves efficiently (to be able to deliver/present the project on the next day), to accept their differences of opinion and to make the best decisions for the timely completion of the project.

The objective is to further collaborate and engage the students from both universities, in order to discover new uses for forgotten wool (wet felting, colouring with natural dyes, recycling fabrics/garments made of wool), and to value craftwork.

Figure 11, Pictures from the Rewool workshop. REDU

Key learnings and reflections

- This type of collaboration and documents should be planned at least 3 weeks before the event. The partnership documents need at least a week for approval and official signatures.
- Adapt the space to the audience. For example, by thinking of catering with a zero-waste mindset, or to put good music in the background.
- Important to anticipate materials and tools: raw wool, felt, a spinning machine and a looming machine (self-made from the blueprints that Fabtextiles provided), 100% wool thread, some recovered fabrics and a lot of punching needles.

Analysing the responses from the feedback form[4] - the activity appeared as something new and somewhat out of the comfort zone for some participants. We strongly wanted to inspire them to explore and make mistakes during this workshop, as Romanian education often tends to blame mistakes.

[4] ReWool feedback form responses

3.2.6. Discovery week with Fabricademy and Fab Lab community- 8-13 August 2021

One of the Initial inspirations of the Discovery path was the Fabricademy bootcamp, organized each year in different places, and this year held in the Basque country. It was a week where participants could discover, by demonstrations and hands-on experiences, various modules of the main course. From there, the shemakes labs experimented with a new format of learning path in collaboration with Fabricademy during the international conference of Fab Labs - Fab 16[5] (a distributed event tackling this year's main topic of "Fabricating the commons", with an interesting subtopic about women makers).
Between 08-15 of August, IAAC, MATRIX, WAAG, ONLF, LEON coordinated a "Fabrigathering community event" consisting of a peer-to-peer learning week with a series of workshops open to local and global communities, facilitated by the Lab Gurus and the broader Fabricademy and Fab Lab ecosystem. While the experience fostered internal learning within shemakes labs and could be framed as community activity (in WP3), it has also created an original Discovery learning path for external participants of the Fab16 conference. Participants could choose which module they would like to attend and participate without any charge. During the week, participants could attend up to 7 workshops among "From Soft robotics to biobotics", facilitated by Matrix and IAAC, "Leather moulding and Grasshopper" by ONLF, Modular garments and E-monsters by LEON, Rewool workshops, Gender vision workshop by WAAG, Women opportunity network workshop by all.

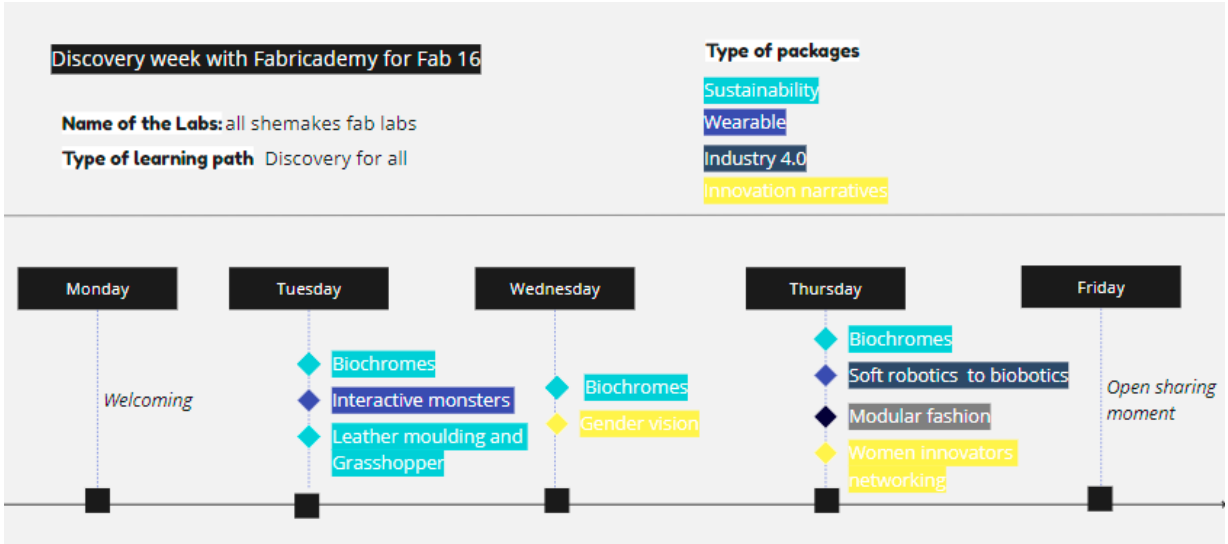

Figure 12, Learning path for the Fab16 Discovery week

Key learnings and reflections

[5] https://fab16.org/

- If labs reinforce their cooperation with universities and schools, week distributed events like the Fab Lab conference could be an active learning place for students from different places to meet, reinforce their curricula on specific topics and gain from exchanges with the community.
- Discovery paths can also be managed in a distributed way, making cross-country/cross-labs events where the labs could facilitate links with local educational institutions as well as providing the materials and skills for running the various workshops.
- Such formulas enable students to customize their path, selecting among the various activities proposed in the conference.
- This pick and choose activity does not focus so much on practical skill sets but on getting a good feel of open innovation and cooperative practices in higher education centres.

3.3. Key learnings and tips for transfer labs

Competences are at the core of the Discovery path. Before approaching a university or Higher Education school with the aim of becoming a partner, be sure to have the right staff and the appropriate level of knowledge for a conversation on an equal level.

When working with schools and universities, the teachers are just as important as the students. Train the trainers about new trends and technologies and empower them to take action, thus the impact of the program will be much amplified as teachers can best represent the Shemakes values and carry on the program without our full support. One key objective of shemakes.eu is to bridge the gender gap in science, innovation and technology, so make sure to have female scientific or technical professionals in your team who can teach e-textile, hardware, etc.

The collaboration with university students (18-25 yo) lays the foundation for life-long partnerships with the local community of designers because art and design alumni generally participate in activities of their alma mater even after completing their studies. Besides, these schools accept students at all ages, thus reaching a public beyond the age target frame of the Shemakes Discovery path.

The following are our first tips for transfer labs:

- allow enough time for experimentation
- allow enough time for research before prototyping
- offer classes that are different from the themes mastered by teachers
- offer a working space that is informal compared to university
- mention opportunities at international levels

3.4. Next steps for Discovery Path

Building on the activities developed in the framework of Shemakes, the collaboration with academies, universities or institutes for fashion should become regular. The next step is to complete the Shemakes learning toolkit by providing concrete examples of successful collaborations and the key elements that made them possible. We will give specific tips for engaging with school directors, teachers and students and help the selected transfer labs to create an ecosystem for the Discovery path by identifying the stakeholders to involve. We will also provide some ideas about new formats that haven't been tested yet but that look promising and worth investigating.

To further facilitate the integration of Fabricademy modules into school programs for students, labs investigate several possibilities that will be consolidated through shemakes:

- Expand the Discovery path to a larger age target, fostering on schools and university needs.
- Keep on promoting and customizing Fabricademy modules, other open-source educational materials and expanded shemakes learning paths among teachers
- Work on an evaluation system consistent with the school standards
- Keep on organizing distributed bootcamps, partnering with international High Educational centres. As an example, ONLF will host the international Fabricademy bootcamp to consolidate their partnership with HEAD.
- Testing the format of Bachelor or Master thesis supervision to foster cooperation between Universities and Labs.
- Systematizing the idea of "clubs" to help students in customizing their curricula and discover the lab environment.
- Diversifying the type of schools and research association, investigating how to work with vocational schools or experts on relevant topics.
- Create a common space for better understanding how to best facilitate such collaborations and events considering the gender approach, maybe exchanging with close external partners on their approach about gender, as individuals, teachers, institutions.

4. The Innovation Path

4.1. Updated description

This Task addresses women innovators aged 25 and up. It focuses on the possible 'routes to job' that are open to women who have been through alternative professional training, ranging from self–built to more traditional career paths.

Mapping out these possible 'routes to job' help us gain insight in the hypothesis that Fabricademy based Shemakes Innovation path will enable women to thrive in the T&C sector by teaching them certain skills and tools. **The aim is to formulate an Innovation Path for the empowerment of individual women innovators, and to strengthen and improve the network as a whole.**

Should certain **difficulties or missing skills** on the 'routes to job' arise that have not (yet) been fully covered or noticed by the network, they **will be addressed and incorporated** in the future. From there, the network will design **Innovation Paths and additional learning path activities** such as workshops, mentoring programmes and challenges to best enable future women innovators on their 'routes to job'.

As explained in the deliverable 2.1, the course of the innovation learning path will compose valuable understanding in a threefold manner. The goals are: first, to identify the skills obtained through the Fabricademy course or other relevant alternative education that have been proven valuable and answer the question "How did the alternative education path enable students and prepare them for their current position in the T&C sector?"; second, to discover the role that these innovative educational programs play within their career path; third, to identify skills that are not yet included in the Fabricademy curriculum but would have been valuable to improve their professional path, from learning innovative skills to positioning themselves in the job market.

Such extra knowledge will help us build a set of additional tools to empower future women innovators for future transition.

With the collected data and development of the innovation path, we aim to understand and trace possible career paths in order to:

- Increase the value and employability of the women innovators in the sector;
- Identify the skills that enabled these women to reach their current position and how they were related to Fabricademy or other training/qualification;

- Understand the gaps and opportunities during this process to craft activities that can provide better support to future women. From the mapping done so far, these are some examples of activities to be performed under the innovation path:
    - Bootcamps with industrial visits;
    - Training with instructors and lab managers;
    - Setting up residencies and short-run projects;
    - Promoting ex-alumni works through exhibitions;
    - Setting up co-creation challenge sessions with (future) women innovators and companies.

4.2. Activities

In order to map the vast range of career paths that comes out of innovative courses such as Fabricademy and alternative education systems, we developed a series of activities that took place on phase 1 of the project. This series of activities was named Innovation Narratives and consisted of a network meeting with alumni, a co-designed survey among women innovators, and a series of in-depth video recorded interviews. The combined outcomes of these three activities are presented in the next chapter.

4.2.1. Innovation Narratives - Kick-off online meeting

What: A meeting to explain and introduce the shemakes.eu project to the Fabricademy alumni community and the additional woman innovators selected by makesense.

When: 3rd June 18:00-19:30pm

Who participated: 10 Fabricademy alumni community and 3 female entrepreneurs (MAKE)

Format: Online via zoom + online co-creation tool Miro.

Why: The meeting had 3 main goals as follows:

Community Networking. Create a networking opportunity for the participants. Each woman was asked to prepare one slide with information about herself so she could have a moment to present herself and get to know the other participants;

Innovation Career Mapping. Map out the current job position / career path these women considered themselves to be at. This was done via the online co-creation

tool Miro, each participant was asked to create post-its and plot themselves in the board.

Introduction of Ambassadors. Gurus Introduced the role of ambassadors in the project and the possibility of participants to be Ambassadors in the next phase of the project.

Outputs: the meeting recording has been uploaded here: https://vimeo.com/605524957/93822334f2

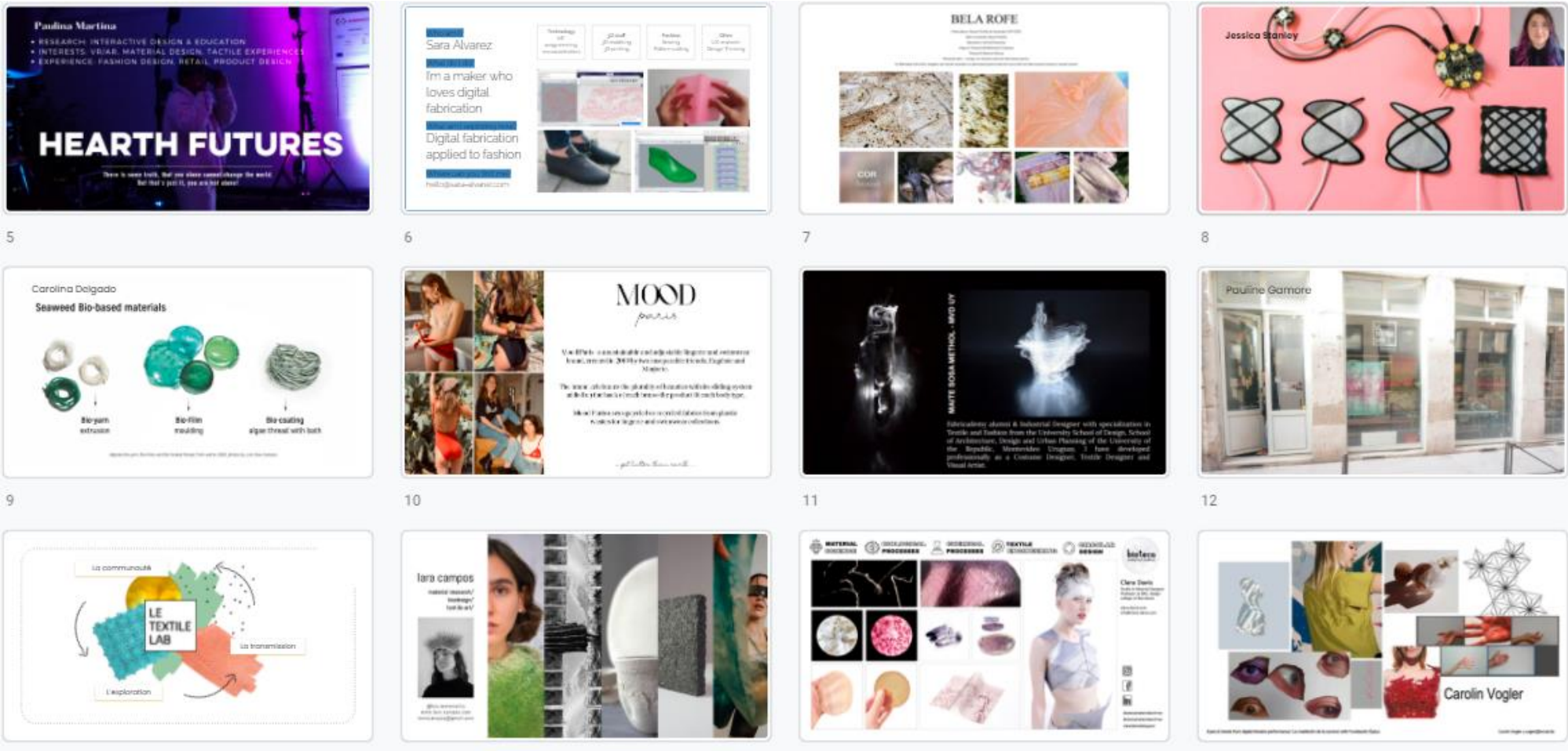

Figure 13, Community Networking

Extract of the introduction's slides presented by participants

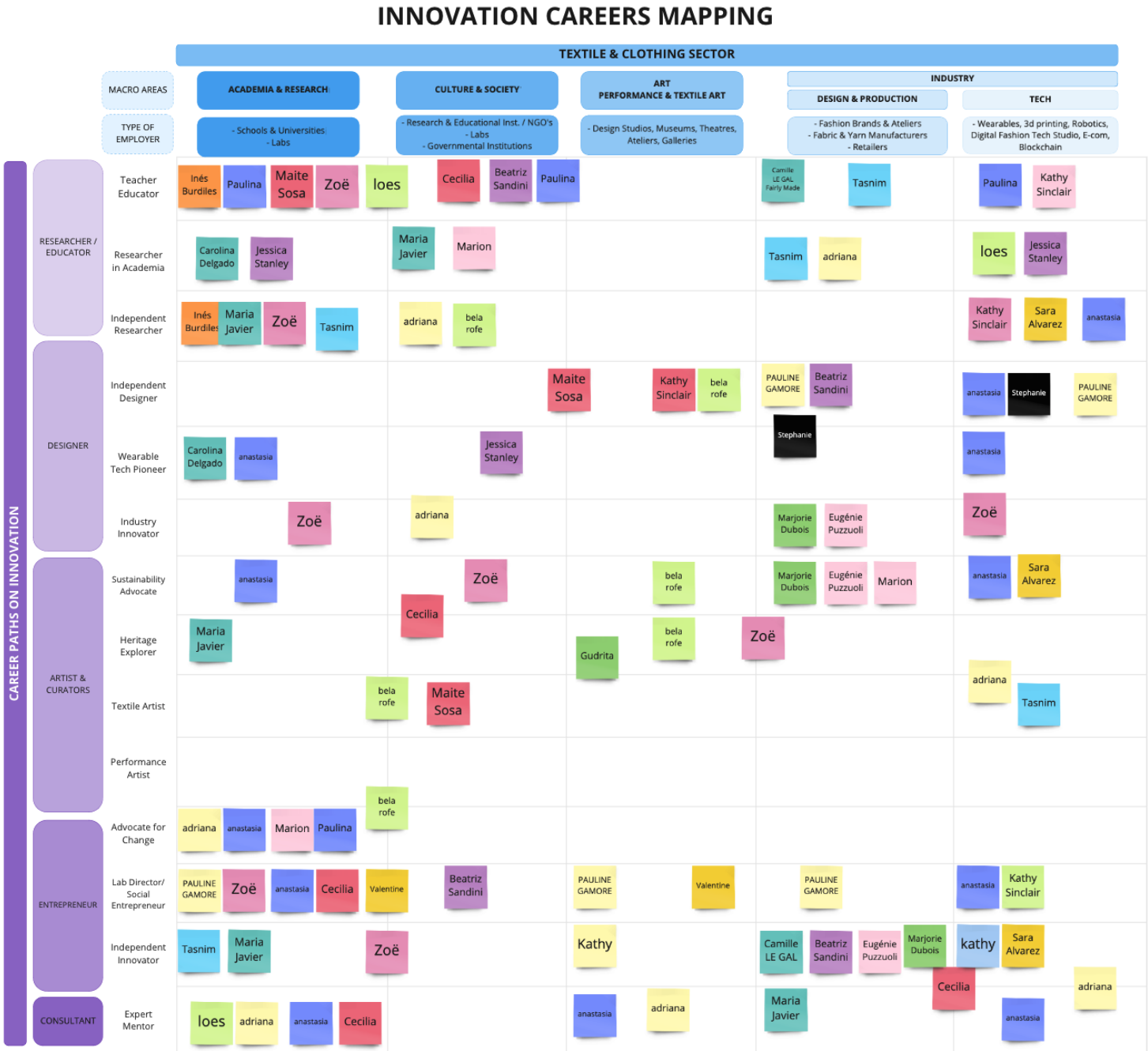

Figure 14, Innovation Career Mapping

For better visualization check the [Miro board]

From the mapping above some initial hypotheses could be confirmed:

- When it comes to possible careers and job routes, the Lab's network is vast and varies both in the sectors that the women innovators are currently working on, as well as the multiple career paths they pursue. This shows the

need of a wide and multi directional innovation path to support different profiles

- The mapping didn't show a significant concentration in one specific type of career or sector
- Most of the innovators plot themselves in multiple places in the Matrix, this also confirms that such interdisciplinary approach as that of Fabricademy is aligned with the innovators reality and with future job formats, that might no longer fit under one single job description/ sector/ linear career

4.2.2. Innovation Narratives - Survey

What: An online survey to collect additional information on our target group

When: Answers collected from 9th June to 15th July

Who participated: 29 respondents (24 via Typeform and 5 via direct interview)

Format: Online survey via the tool Typeform

Why: The survey's main goal was to collect data to give us insights on the different job routes the women from Fabricademy and Makesense networks had taken and map the opportunities to better support the female innovators in the shemakes network

Outputs: The full report generated via Typeform can be reached via this link - https://form.typeform.com/report/VWQ4aaCP/67RKam8I9qfonUSI. The survey's key outcomes and analysis will be available as part of the handbook, http://fabricademy.fabcloud.io/shemakes/handbook/1.-learning-paths/innovation-path/2-survey/

4.2.3. Innovation Narratives - Interviews

What: In-depth video interviews (approximately 1 hour) to deepen the subject with selected participants.

When: Interviews took place between June and August 2021.

Who: Women innovators that participated in either the Fabricademy course or another alternative professional training. Further specifications included that they were aged 25+, and were working or actively looking for a job in the textile and clothing sector.

For the first two activities, kick-off meeting and survey, the whole mailing list of labs was invited to participate. Then, for the interviews a selection of 15 women was

made, in order to have a better opportunity to spend more time and explore deeper research topics with them.

Each lab interviewed a different group of women, so that a broad scope of career paths with a variety of skilled experiences from the network was covered: from wearable tech pioneers to heritage explorers, and from lab directors to independent researchers.

Why: This type of interview, though online for some labs (Covid obligation), allows a closer and safer environment to explore further aspects of different profiles, and often provides more valuable content than self-administered questionnaires. Recording these moments also allows us to share the stories of these women in our network by - and provide them with a platform to inspire and reach other girls and women.

Outputs: Video extracts from the interviews will be slowly released throughout the next phases on social media, website and integrated in the handbook.

4.2.3.1. WAAG

WAAG's interviewees: 5 Fabricademy alumni: Beatriz, Bela, Sara, Stephanie and Jessica.

Format: Due to the pandemic and to geographical limitations (only 2 out of the 5 participants were based in The Netherlands), the interviews were all conducted online via zoom call by Tonya Su, communicator at WAAG.

4.2.3.2. IAAC

IAAC's interviewees: 4 Fabricademy alumni: Lara, Jessica, Betiana, Laura

Format: 8 girls were contacted to set up an interview in Barcelona. 4 could come and participate in the interview day on July 24th. On that day, Anastasia was running the interview with the support of Benny, supporting the communication shooting of the Fab Lab Barcelona.

4.2.3.3. makesense

makesense's interviewees: 5 T&C women entrepreneurs from makesense's network. Eugénie is the co-founder of Mood Paris, an ethical lingerie & swimwear brand. Lisa created Azaadi, a sustainable clothing brand working with Indian craftspersons. Alice, is the founder of a coworking space for fashion creators in Paris, called Hall Couture. Camille, launched Fairly Made, a sustainable sourcing and manufacturing company. Rym created the Clear Fashion app, to inform and sensitize consumers about ethical fashion.

Format: We set up a 1-hour interview with each of the entrepreneurs. The interviews took place on the online tool Zoom.

Specific characteristics of the interviewees: The 5 makesense interviewees are not Fabricademy alumni, consequently they come from different backgrounds and have different profiles. These specific characteristics had an impact on the interview learnings.

- The 5 of them are entrepreneurs. Consequently, the hard and soft skills valuable to empower them as project creators and the gaps they had to fill were different from Fabricademy or alternative education alumni.
- 4 out of 5 interviewees received a business administration education and had no T&C background. The routes to T&C sector knowledge and technical know-how were a key insight during their interviews, which may be less central for Fabricademy alumni.

4.3. Innovation Narratives Main Outcomes

The outcomes presented here for the Innovation path during the first phase of the shemakes.eu project are the combined analysis of all activities that were described above. Four main areas of research were prioritized:

- **Career related skills & knowledge:** Which skills/knowledge (coming from Fabricademy or not) were valuable to empower/enable them as innovators and prepared them to achieve their current job position?
- **Role of an enabling environment:** Which role did Fabricademy and/or the lab ecosystem play in their career path?
- **Gaps & Opportunities:** What are the gaps or opportunities in terms of skills/knowledge these women had to overcome (or still have to)?
- **Gender topics:** Were there specific gender related topics? What were the aspects that enabled or hindered them as women throughout their career?

4.3.1. Main results

Below, we compiled the main topics mentioned in the interviews and completed this thematic analysis with results and quotes from the survey.

The main topics of the interviews are shown in maps.

- There is a **split between Fabricademy Alumni & Entrepreneurs:** under Fabricademy Alumni boxes are presented the respondents from WAAG and

IAAC, while entrepreneurs are the ones interviewed by MAKE. This decision aims to facilitate the analysis of different needs, but it doesn't mean that there are no entrepreneurs coming from Fabricademy alumni nor that the innovation path will be split among these groups.

- The **yellow star** is used to identify answers that were mentioned more than once, therefore highlighting the importance of that specific topic.

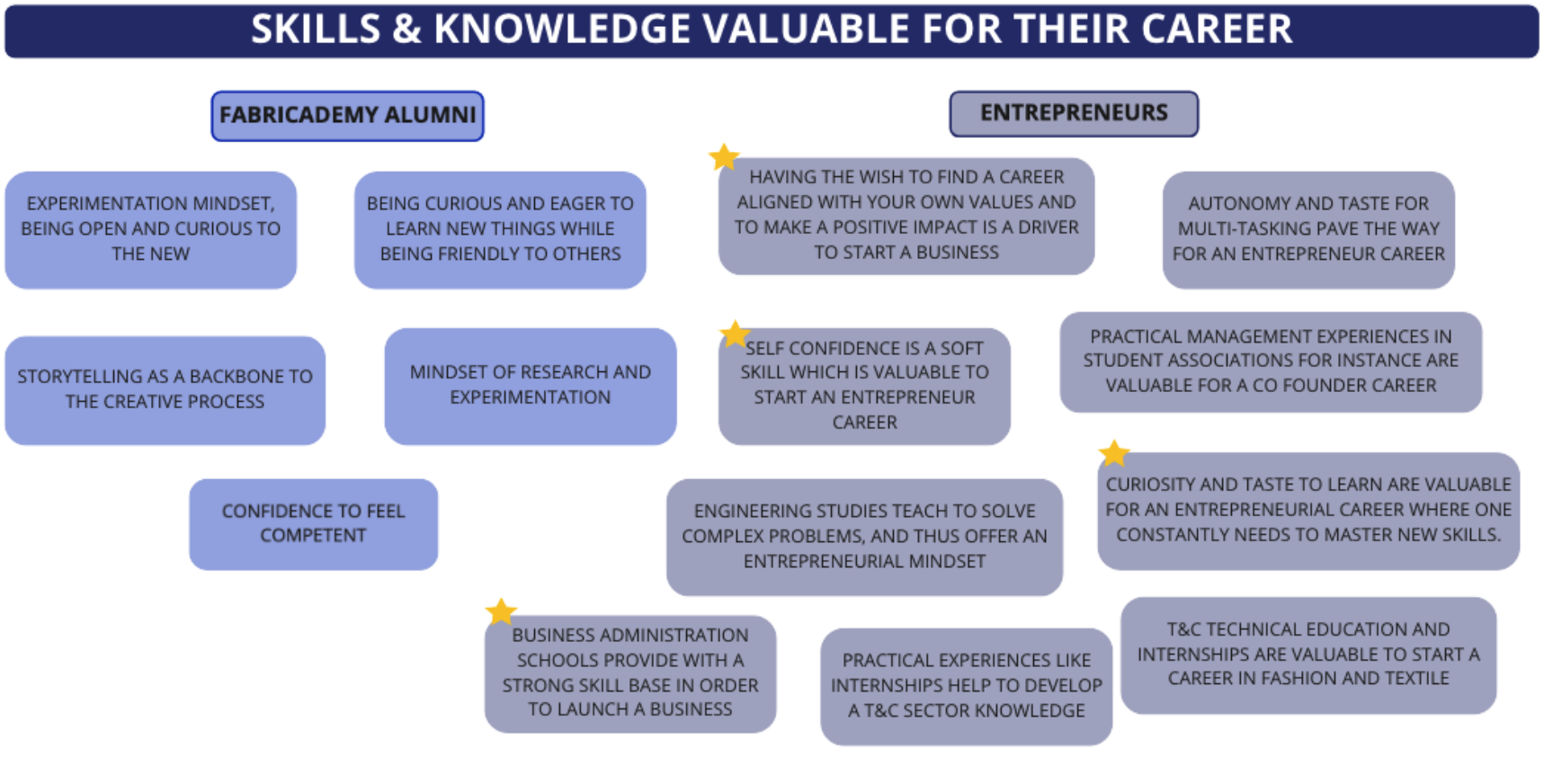

Figure 15, Skills and knowledge - Innovation path outcomes in Miro

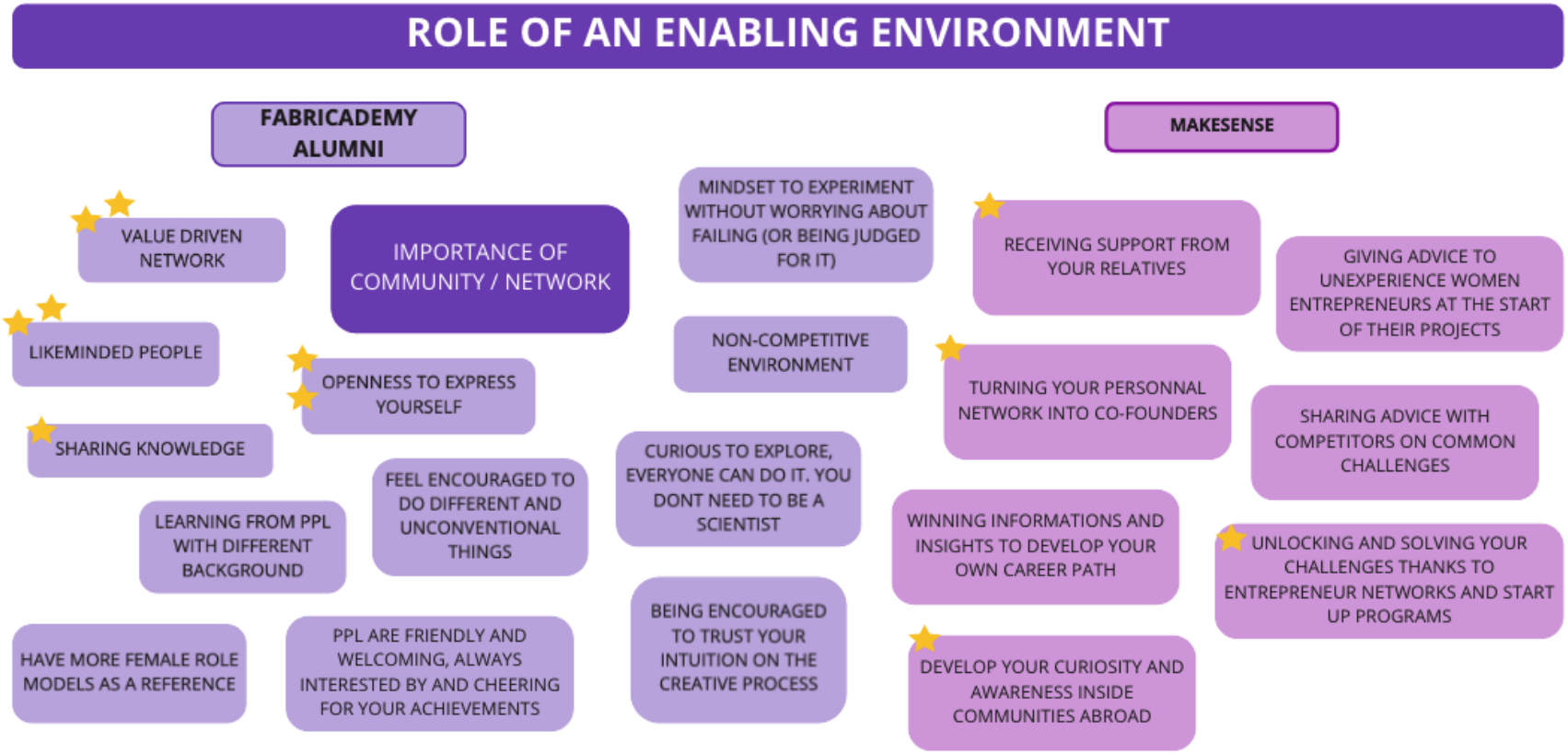

Figure 16, Enabling environment - Innovation path outcomes in Miro

In the Survey, we see that the Enabling Environment is also an important issue.

- The majority of respondents agree with an environment enables to expand connections and knowledge

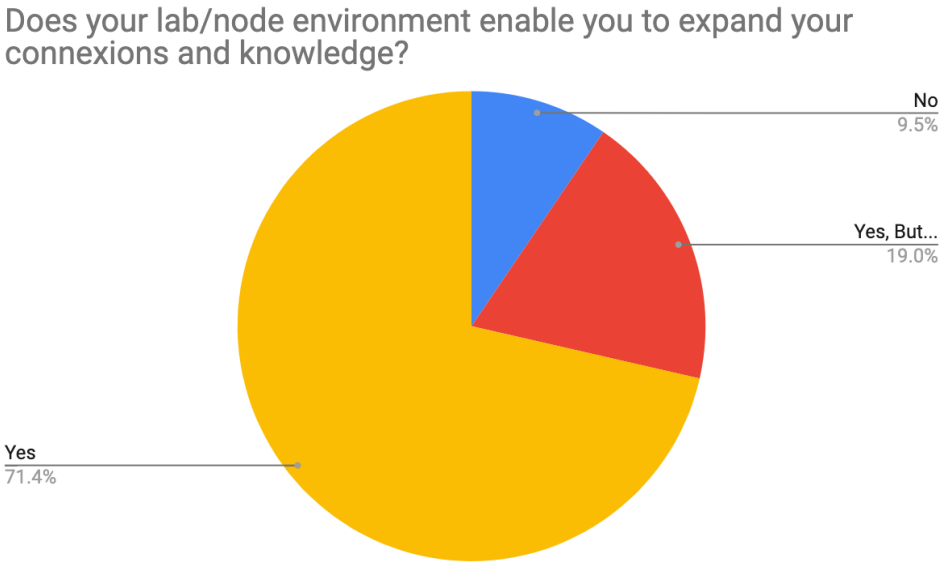

Figure 17, Enabling environment - results from the survey

- Some quotes further explain this position:

*"Yes definitely! Fab Lab Barcelona is a **good environment to meet people and expand your network**. It is located in IAAC school (so other students and conferences) and the lab is generally involved in **different activities and events** throughout the year."*

*"Yes, that is one of the things I loved about studying in Textile Lab Amsterdam. The **network with the local community is well established** and I know they will help out if I need to contact this or that person in the industry. Also, they're **very open to exploring new topics, and flexible to offer guidance and support**."*

*"Yes, but **we are in a very complex moment, where many activities have had to be suspended due to the pandemic**, and where all the funds of the University are being used to solve problems related to Covid and virtual education, so it is very difficult at this moment to expand with certain project"*

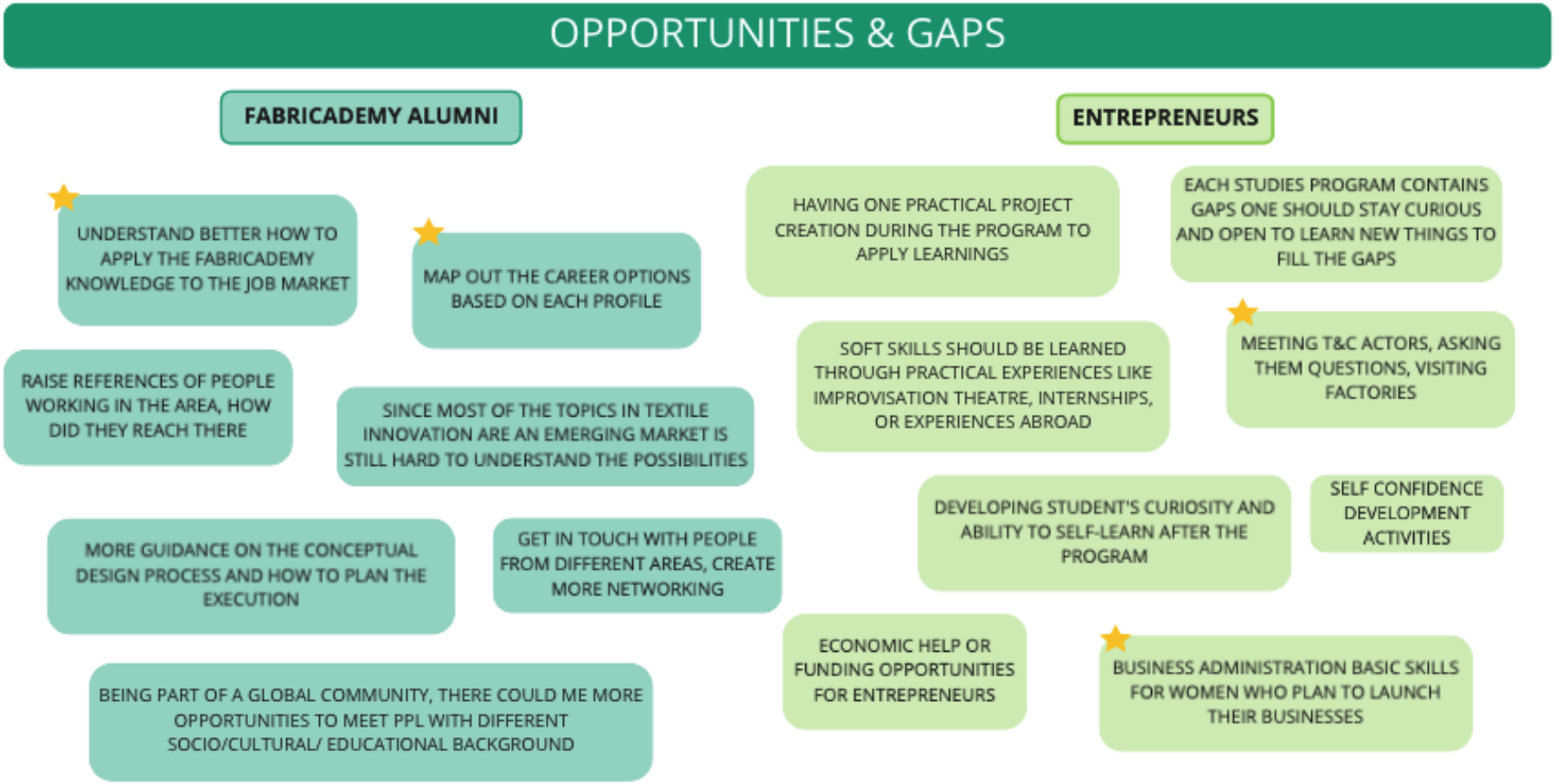

Figure 18, Opportunities and Gaps - Innovation path outcomes in Miro

Opportunities & Gaps - answers from the Survey

The question *"Which topics would you like to have seen more of during Fabricademy? What were the gaps you had to overcome to reach the career position you are at now or aim to be? (Think of content, technical & soft skills, overall knowledge)", was an open-ended one.*

From the answers given, we saw that there were two–thirds of answers on hard skills (the majority) and one-third on soft skills, as represented in the chart below.

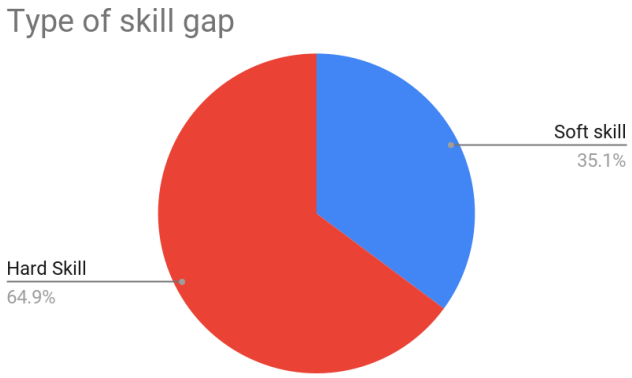

Figure 19, Skills - results from the survey

Details of hard and soft skills are shown below in Figure 20.

- Hard skills were very diverse, related with the field of the respondent:
    - 3d modelling and design applied to fashion, digital simulation, virtual reality, with mentions to softwares such as CLO3D, Cinema 4D, Blender.
    - In the "other" group of hard skills, what came out as relevant was the combo of Bio & Chemistry related topics, often wishing to have more depth in technical knowledge in these fields to further develop research on biomaterials, biocomposites and dyes.
- Soft skills referred to the job market, career opportunities and mapping professional possibilities, ranked first and also to scientific research or project management.
- A quote from the survey illustrates the Job market knowledge topic:

  *"...I would have also liked more information about **how this new craft-tech-fashion industry works, what kind of jobs are there, what are the trends, the needs, the opportunities and the obstacles to solve**... a bit of perspective to get out of the course having some idea of what are the options if you want to dedicate yourself professionally to this field."*

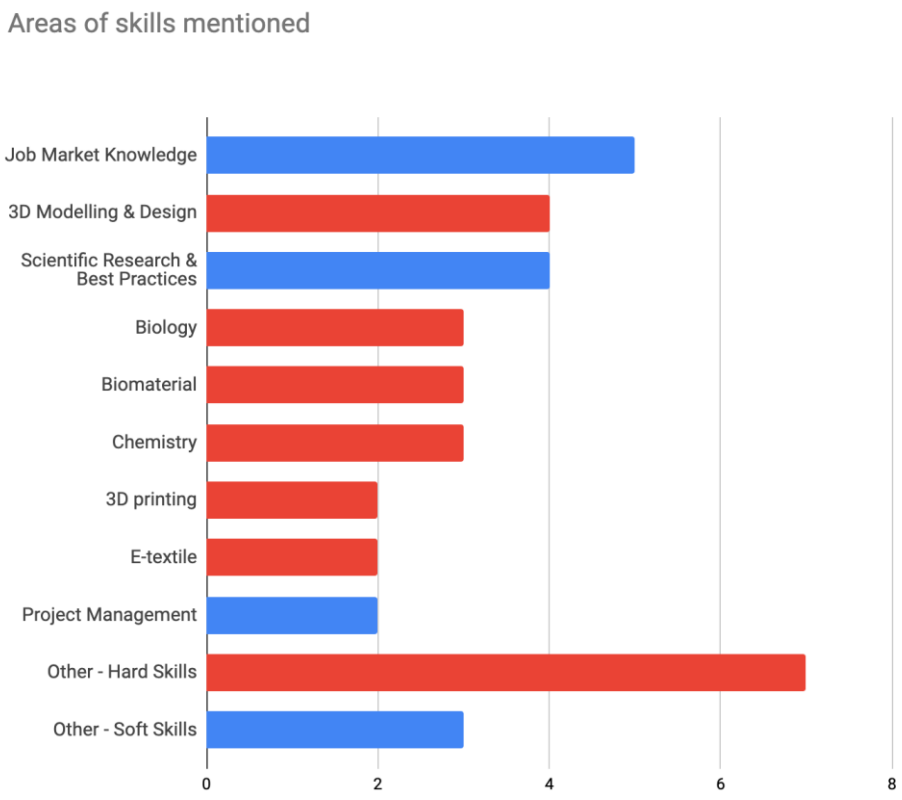

Figure 20, Detailed skills, results from the survey

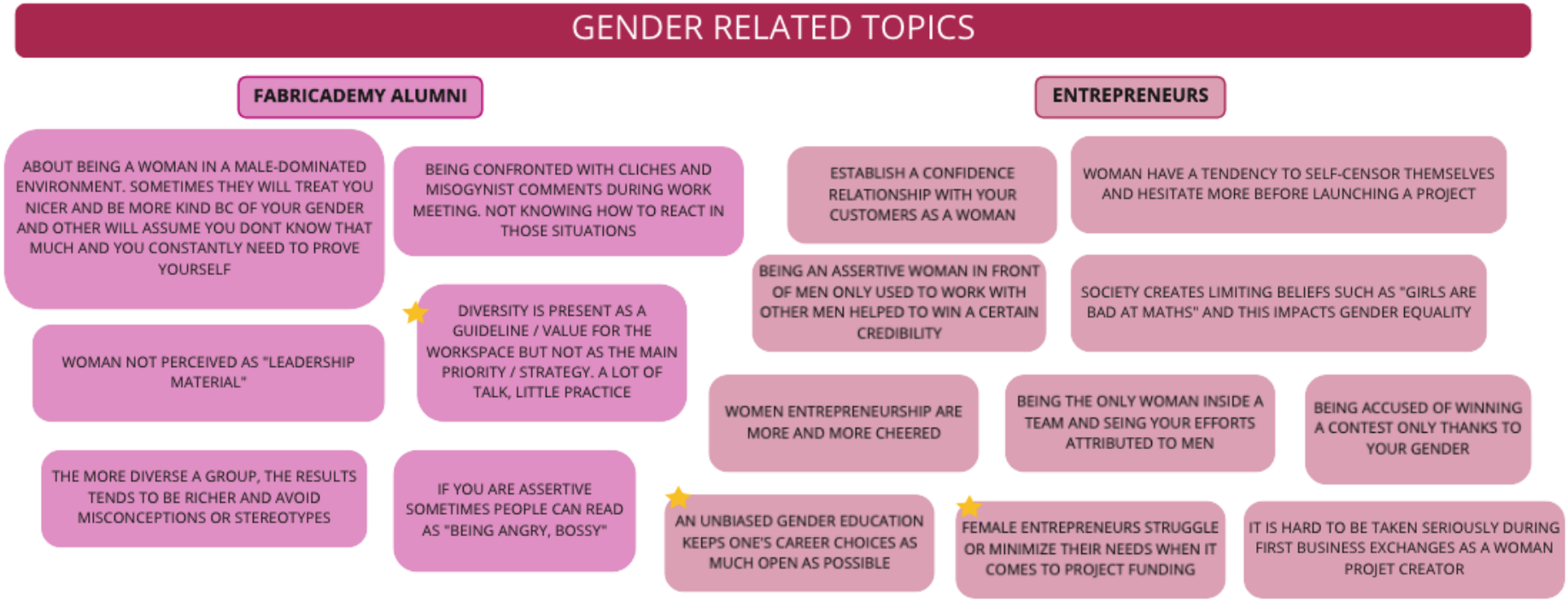

Figure 21, Gender related topics - Innovation path outcomes in Miro

Some innovators shared interesting thoughts and also gave suggestions on actions to limit inequalities and empower women:

*"… **gender equality should be intersectional.** As a privileged white woman I'd like to use my resources to give women who've been less privileged a leg up in discovering their talents. Offer my network, my knowledge, my experience, job opportunities etc. It would be great to work on new structures of support together"*

*"As a woman in a technical field, I've lost count of the number of times I've been talked down to, interrupted, not been listened to, or not been taken seriously, much more so than male colleagues with less knowledge and experience. I think that the most practical ways to support women are providing **mentoring** and **training** opportunities, and access to **communities of other women** working in similar areas, or experiencing similar issues. I've benefited hugely from seeing visible female role models in my field (e-textiles), and from joining female-dominated e-textile communities such as the meetup group E-Stitches"*

*"… a great way **to empower women would be to empower men** to have paid time off with the children after they are born. The biggest drop off I saw in technical women voluntarily leaving their high-powered careers was to care for children. If more men were actively involved and supported to care for children too it would benefit everyone"*

4.3.2. Key Learnings

From this extensive research, we learned that:

Female innovators' needs are aligned with shemakes core values

- **Openness, curiosity and confidence** are the most mentioned **skills** valued by innovators. They are in sync with shemakes values and base pillars. This therefore validates that we are on the right track for the Innovation path.
- **The importance of belonging to a community.** Alumni and innovators agree that having a supportive network is a key advantage on a job route. The community makes them feel they can learn from different perspectives, share knowledge in a non-competitive way, feel encouraged to express themselves and be cheered on by their achievements as well as their failures

As we further develop the shemakes network and community, labs should be able to identify and enhance these enabling characteristics within their activities.

Opportunities & Gaps - the following topics were the most relevant in terms of opportunities to improve the innovators' career paths. They will enlighten the choices of actions to follow on the next phase of the Innovation path:

- Have a **clear job market overview and career options for each local context for T&C innovation.** Innovators feel the need to have more information on how to access jobs in emerging markets or niche technologies, as well as how to better position themselves based on each different profile

- **Expand the network with different professionals, experts and companies**
- Learn techniques on how **to perform better in presentation and ideas/business/projects pitches**
- Innovators coming from business/engineering/other non-creative educational backgrounds feel the need to **deepen their fashion/textile technical skills**. While the ones coming from the creative field often lack skills on **business & project planning**
- **budgeting and overall structuring their concepts for the job market**
- Increased interest in **digital design, 3D modelling and design** as well as the bio & chemistry related topics, **biomaterials, collaboration with living organisms, ecology, material sustainability** and so on

The Gender equation

- Some **positive aspects** of being a woman were celebrated, like the fact of **being able to connect with other women easily, provide and receive support from other women, the fact that female entrepreneurship is a topic in vogue** and opportunities might arise from this
- However, most of the comments were wishes for situations that could still improve, such as the **lack of confidence when in a male dominated environment, being perceived less competent because of their gender and the need for unbiased education so diversity can be really applied.**

4.4. Next steps

The next step for the Innovation learning path is to co-design among WAAG, IAAC and MAKE a series of contents that will benefit future women innovators in their career. The Innovation path will use the format of storytelling to highlight women in the T&C sector through short success stories and testimonials. It will also offer one-to-one personal coaching with engaged women innovators whose needs may vary, ranging from access to funding opportunities, to improvement in pitching, guidance in becoming entrepreneurs, encouraging them to initiate female-owned start-ups.

This group of activities will be carried out in phase 2 by the initial 3 labs and 4 additional transfer labs. They are closely related to the ones in T3.4, business engagement, and will also focus on how to instigate and promote a fruitful network between labs & business.

5. Updating Learning Path Toolkit

From the different activities held in phase 1, shemakes partners could better envision the most appropriate way to create and arrange the documentation, thus facilitating the knowledge sharing between labs and future transfer labs. In this section, we will first remind the objectives of the toolkit, explain the documentation process, give an overview of the existing architecture, and end by describing the future steps.

5.1. Objectives

The learning path toolkit is part of the shemakes.eu handbook and specifically aimed at supporting future labs to engage with shemakes.eu with the necessary documentation to support them in discovering, reproducing, customizing and reshaping the various learning paths. The labs decided in the first phase of the project to use Gitlab to implement the toolkit so it is aligned with the current practices of the learning programs of the Fab Lab community and remain accessible in an open-source way during and after the shemakes.eu project.

5.2. Overview and updates

Since the last deliverable, WAAG has organized the digital handbook structure to integrate outputs from WP2 and WP3 as well as a research part that supports other emerging reflections and activities. This allowed the IAAC team to develop the architecture and the contents of WP2 section. Each lab will be responsible for documenting their activities afterwards.

The learning path section, available at http://fabricademy.fabcloud.io/shemakes/handbook/1.-learning-paths/, is a work in progress. After creating an overview of all the activities documented in each learning path, a first architecture is now available, as follows:

Table 4, Handbook architecture, section Learning path

1. learning paths

- **About**
  - On the origin of Learning paths
  - Overview of the key dimensions of the program
  - Find out how to evaluate your activities
  - Find out how to document your activities
  - Glossary
  - Main inspirations
    - (Biomaterial) exhibition to collaborate with cultural spaces
    - Fabricademy in multiple size
    - Discovering the OS circular fashion platform
- **Curiosity path**
  - Learning with kids, teachers, schools and cultural centers
  - Poderosas
  - Remix The school
  - Micro-bootcamp for teachers
  - Voodoo dolls workshop
  - Wearable for kids
  - Make your own garment
- **Discovery path**
  - Learning with students, universities and design schools
  - Biomaterial workshop, mix and remix
  - Rewooling with close university
  - Design school week
  - Discovery clubs
- **Innovation path**
  - Learning with women innovators, incubators and business ecosystems
  - Discovering and sharing shemakes survey
  - Creating interviews while discovering inspiring profiles
  - Women for circularity
  - Women for craft and manufacturing
  - Women for wearable technologies
  - Tips for pitching, communicating and podcasting

5.3. Documenting process

The process of documentation is a two-step process, refining the structure of the handbook on one hand while creating individual documentation for each replicable activity on the other hand.

5.3.1. Methodological approach for structure definition

A first ideation round occurred during the writing of D2.1 integrating first ideas for the handbook architecture, indicating that it would contain:

"a general section and three sections corresponding to each of the three paths.

The global section will introduce the shemakes.eu project, the learning paths and will also give general information to the labs that will allow them to design their own path and find a relevant way to assess knowledge.

Then, each of the three paths' sections will be composed of:

- *an introductory section,*
- *practical tips for teachers (mentors, coaches etc.) to design and assess their learning paths,*
- *some examples of pathways developed by the labs,*
- *the list of activities categorized in packages where users can click for more detailed information on activities."*

Before the creation of the learning path section, labs have opened a common space in Miro to visualize better and sort the contents emerging from the various activities of each path, by each lab. The miro board appeared as a mock-up of the main pages where labs could dialogue, play and test various modes to present information in the handbook (See Figure below).

Figure 22, Miro's dashboard to ideate and link documentations for each path

From a first mapping of activities, WP Leader proposed an architecture that was presented in the previous paragraph. In the next step, further ideation with the labs will occur to redefine the optimum structure to fit with the emerging practices.

Besides, the gitlab software allows each lab to propose changes, commit and track them in an open, agile and transparent manner. This is an advantage of the tool as each lab can actively contribute to articulate the content of the section.

5.3.2. Individual activity-workshop documentation

The most difficult part of the documentation relies on setting up tutorials for replicating activities. Labs have the responsibility to create the documentation of a set of activities that they have run and find a relevant way to tell the stories and share learning materials so future labs could understand, replicate and customize their future activities.

In the Fab Lab community, documenting is one of the core skills acquired in the academies and is embedded in the practice of fab students and gurus. The following recommendations have been inspired by this mindset:

Think about documentation at the planning stage

While in other processes, documentation arrives at the end, here, the process starts even before running the activities. Each lab needs to ask themselves about their replication strategies so as to create communication materials that could support the documentation. It is about taking pictures, creating pedagogical supports, recording, capturing the process and lessons learned.

Be inspired by the activity canvas and the documentation template to document

In the case of shemakes learning paths, the documentation template provided by WP leader aimed at supporting labs in integrating the various elements to prepare, run and document their activities.

Define which tutorial(s) you will document for the handbook

Only original and innovative practice is worth being integrated into the handbook. By dialoguing with other labs, each lab could select a bunch of tutorials they could create from the activities they have run.

Produce and update the documentation

This step consists in filling out the documentation template. According to labs' preferences, the documentation could be done in a word document internally shared or integrated directly via Gitlab in the handbook. When revising the documentation, labs are invited to update with an appropriate versioning system.

Opt for nice visuals and design pedagogical flyers for participants

Shemakes WP2 team has proposed to make custom flyers for each tutorial so as to gain visibility and facilitate a better appropriation for the transfer labs and especially for the future participants in shemakes workshops. The recommended format is printable and foldable A3, with the core information to replicate the activity from the context definition to the recipe. In Figure 5.4, you can see an example of the flyers designed by IAAC for Biomaterial design.

Peer-review process by labs and selected ambassadors

To improve the quality of the content, the labs will set up a peer-review process so all the documentation of the learning paths that is being finalized can be revised and improved thanks to the review of another lab. The reviewer will check if all key information is present and give some advice for further iterations and improvement. A first review process will be engaged from October between the labs, a second review will be done working hand in hand between gurus and the selected ambassadors until their work with the transfer labs. During the Loop 2 activities, ambassadors will give further feedback as they will have the opportunity to test the tutorials in real conditions. Improvements will be suggested and incremented directly via GITLAB.

Dive into Gitlab and join the team of knowledge contributors.

If labs are novice and interested in joining the gitlab community, tutorials have been made available by the Fabricademy team to help them. They can take a look, try and share the bugs within the shemakes ecosystem. Here the tutorial: http://fabricademy.fabcloud.io/gitlab-documentation-tutorial/

Disseminate widely

The documentation presented in the handbook is a common base that could serve other communication purposes. It will be a great interface for the communication team to create contents for the web page, especially the learning sections but also for social media.

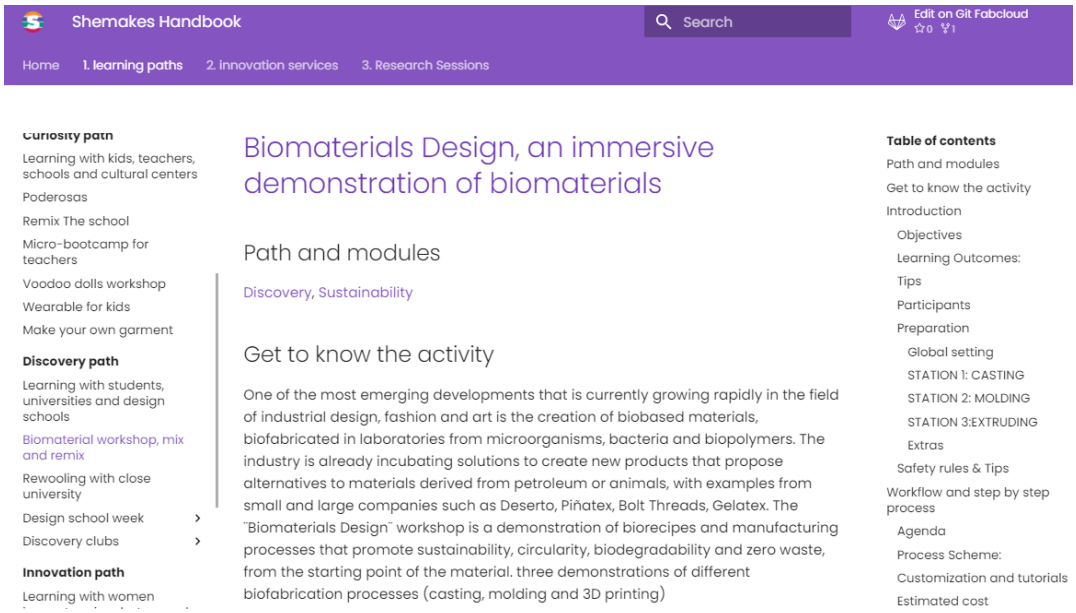

Figure 23, Overview of one documentation activity in the handbook

Figure 24, Example of flyer for participants of Discovery path

The documentation process will be refined and updated in this handbook page.

5.4. Preparation of the next phase

As mentioned earlier, the learning path section will always be a work-in-progress. When navigating along, you will be able to see written but also empty pages. The core documenting process will happen between October and December. Each lab has identified its contribution and is now preparing the documentation pages so Transfer Labs could start with an updated and usable version of the handbook.

Here are some following steps from October to December.

- Finalizing the documentations for each activity
- Harmonizing the structure to avoid redundancy and best fit with the transfer labs needs
- Peer-Review all learning paths with Labs**,** adapt and improve the content
- Refining the documentation process so transfer labs can further feed the repository
- Highlighting best documentation practices through graphical communication
- Keep on experimenting with new activities and learning paths.
- Work with the communications team to determine the most accurate and self-explanatory name for the handbook/toolkit.
- Work closely with communication WPs to promote and disseminate the content created beyond the lab's community.

- Work closely with evaluation for capturing the core insights and outcomes of emerging practices.
- Go through the participants list, recall, evaluate and think who could become ambassadors for the second phase in collaboration with WP4

From January to September 2022, a new phase of activities will start involving both the 6 core labs, the 12 other transfer labs, and the wider shemake ecosystem.

Figure 25, Timeline of activities from October 2021

6. Conclusion and outlook

As mentioned in D2.1," *the learning paths can be considered as an important fuel for the Shemakes ecosystems as they stimulate local dynamics for knowledge exchanges, self-empowerment and create synergies at local / global scale. It is hypothesized that by learning by doing, people and particularly girls from the youngest age could better feel confident and appeal to take part in science, innovation and entrepreneurship. With the Curiosity, Discovery and Innovation paths, labs are experimenting new forms of partnerships and new formats adapted from the main course of Fabricademy that are aiming to motivate, understand and create new vocations. "*

Through the document, we have explained the activities run by labs in each path, presented key findings and the updates on the documentation process. The first loop of experimentation has served for structuring, testing and analyzing the various paths and for producing relevant contents that will be used in the second loop of experimentation with 12 transfer labs.

Our conclusions were drawn collectively and summarized in the following table

Table 5, Core reflections out of phase 1

Complying with engagement objectives: a rich density of activities thanks to passionate and engaged labs	Between March and September 2021, labs have involved more than 200 participants in the learning activities of the three paths. They have reached it thanks to an existing cooperation between labs, the relevance of the activities with the strategies of each lab and the energy present in their ecosystem - from the engagement of gurus to the participation of students and stakeholders of their ecosystems. Additionally, there is a peer-learning environment that puts energy in guaranteeing a better reach, high quality reporting and documenting activities.
Teaching and co-creating with different age groups	Through the proposal of shemakes.eu, the partners highlight the need to engage people from all ages in educational activities. *"Education is for all ages"* is a leitmotif present in the community. By creating paths specifically for some age groups (8-18, 18-25, 25+), labs were invited to find opportunities to enlarge their targets and adapt their training according to the age.

	As mentioned in the Curiosity path, engaging with younger people brings specificities, such as adapting the type of objects created, adopting a more detailed and visual presentation of the topics, integrating other playful activities and formats of the agenda. As mentioned in the Innovation path through the interviews of Fabricademy alumni and women innovators, the focus of the innovation support is more on creating peer-learning environment that can support them in their self-management, to develop their skills and opportunities, their research and business abilities and creative explorations. To counterbalance those reasons for path customisation, labs also felt that limiting the access of workshops to specific age groups does not always fit with the inclusive vision of education they want to promote. They questioned the "exclusion" of some people when running their activities. This was the case especially for the Discovery path where the students from universities and schools tend to have a wider age representation. In response to this feeling, it was informally accepted not to limit the age within each type of path while paying attention to the different educational needs related to age sub-groups.
Cooperating with a large panel of stakeholders	The type of paths also differs depending on the type of stakeholders labs partner with for setting up their activities. Until now, labs have proven working with primary schools, museums, universities, design schools, distributed educational communities, scientist associations, young social enterprises and companies. The diversity of collaboration which has been set up from existing or new partnerships comes with tips and strategies to support the work engaged in WP3 looking for sustainable models for labs to sustain community, research and business engagement. Concerning the Discovery path, ONLF emphasized the importance to adopt the right attitude when structuring partnership with high education institutions, orienting the discussion around skills and cooperation. Beyond activity documentation, further steps

	are to capitalize on those experiences to support core and transfer labs to foster their future collaborations and partnerships.
Framing different sizes of interventions to adjust with the context	Different formats have been tested throughout the three learning paths, from one-shot workshop activity, intense week of activities, yearly set of activities integrated in other educational programs such as student clubs or afterschool programs, research with existing networks (Fabricademy, makesense) to envision and foster innovative programs. Even if some formats seem more relevant for structuring specific partnerships, for instance, the after-school programs with schools in the Curiosity path, it is worth having a panel of possibilities that labs will then replicate as such or customize and adjust to their specific context.
Gap to reach: improving evaluation strategies while finding the right balance between planning, running, documenting and reporting activities.	Beyond the reporting of their activities, labs have been engaged in the design of evaluation strategies concerning the capture of participant feedback. A series of forms have been created via tools like typeform and google form co-establishing a series of criteria that could evolve according to the context: *profile, appreciation of the learning activities, self-assessment of skills, visions and futures, perception of women, gender and technology*. Those are integrated in the assessment section of the handbook. While the documents are now ready to use and replicate, the effective participation in assessment and effective qualitative feedback from labs remains quite low. On one hand, it is frequent that the participation in post-assessment is quite low, especially in post-assessment of short activities. On the other hand, this could also be explained by the fact that it is a new and additional practice for most of the labs involved, that need to be practiced first before being integrated. Changing the format could also be a relevant strategy to encourage more answers from participants, integrating evaluation activities in the format of the activities and using more engaging formulas. The example of the Zine, used by ONLF based on the Science Gallery Dublin practice, raised

	some interest inside the labs' meeting. More than anything, time is running out for labs that took a lot of their time, energy and effort to interact with each other, planning, running, documenting and reporting activities, often sharing a feeling of being overwhelmed and the need to plan further steps rather than taking time to analyze and reflect. In addition, it is difficult to capture the attention of people for such reflexive activities. Hopefully, the complementary survey and other work done in WP5 will complete the first insights captured by the labs.
Sharing new learnings on how to facilitate activities for girls, youngsters and women while reflecting on and spreading the gender vision	The learning activities have engaged with more than 150 women, min 50 for each targeted age. Once again, to avoid fostering feelings of exclusion for part of the population, labs have opted to run activities open to all, whichever gender they would identify with. Then, it is about creating an enabling environment overcoming gender stereotypes, for women to express their creativity, talents and feelings. New practices have emerged thanks to the parallel process of gender vision creation happening in WP1. While they were learning from gender theories, perspectives and participating in gender vision workshops from WP1, labs were creating space in their learning environment to increase a better awareness, skill development and sense of reputation building by and for women. In particular: - Most of the facilitators were women, guided by shemakes gurus to run the activities, passionate around the topics. - By negotiating with external stakeholders, presenting the shemakes.eu project before and during the activities, a first layer of knowledge and values was shared and discussions were opened on the theme of gender. - Adaptation of the activities was done to avoid the diffusion of classic gender stereotypes. For instance, it was proposed to create a rabbit instead of a barbie doll in the Curiosity path. - By caring about gender, labs are better at identifying stereotypes. For example, in one of the activities, it

	was observed that the 3D printing was facilitated by a duo of men. This should be more flexible in the future, as women and men can conduct such technical activities. - By introducing science through making and playing, labs have empowered girls to get closer to technical subjects, which could be an incentive for them to study science in higher education. - In the evaluation of each activity, participants could reflect on examples that could promote women's empowerment in science and technology, on gender stereotypes, and express what they thought about gender issues and what kind of actions they would like to support to limit inequalities and empower women. - Beyond their participation in activities, girls and women have participated in disseminating their practices through social media. - Through the Innovation Path survey and interviews as well as some online co-creation workshops done with internal partners or in the Discovery week of Fabricademy, the gender-related topics show interesting perceptions from women highlighting the complexity of gender equalities and related stereotypes, sharing positive practices to overcome the issues. - Intense bootcamp such as the Fabrigathering event or larger programs as the Fabricademy or the Poderosas seems more engaging than shorter events. The sense of community is deeper, the development of skills is measurable, so the influence of gender-aware facilitation would be more impactful.
Beyond gender: RRI for learning paths and vice-versa	Responsible Research Innovation can be practiced through the integration of strategies around ethics, gender equalities, open access, science education and public engagement. The concept of “Learning Path” as defined by shemakes labs is strongly correlated to RRI dimensions by supporting the values of responsible making, women empowerment, open-source, horizontal peer to peer partnership, interdisciplinary, multi-stakeholder

	engagement, glocal knowledge-based infrastructure. Reversely, it would be worth creating, associating or integrating contents and activities to support the adoption of RRI in the various environments of the project from labs, schools, to more innovative ecosystems.

7. Document information

Revision History

Revision	Date	Author	partner	Description
V 0.1	23.08.2021	Real Marion	IAAC	First draft and table of contents
V0.2	12.09.2021	Task leaders	IAAC, WAAG, ONLF, LEON	Filing chapter 2,3,4 first versions
V0.3	15.09.2021	Marion Real, Anastasia Pistofidou	IAAC	Feedback
V0.4	19.09.2021	Task leaders	IAAC, WAAG, ONLF, LEON	Version sent to reviewers
V0.5	23.09.2021		TIG, MAKE, FLOD	Review
V0.6	25.09.2021	Task leaders	IAAC, WAAG, ONLF, LEON	Revised version sent to LP
V0.7	29.09.2021	Marion Real, Anastasia Pistofidou	IAAC	Final revisions
V0.9	30.09.2021	Frederique Thureau	CEDECS-TCBL	Review and upload
V1.0	30.09.2021	Frederique Thureau	CEDECS-TCBL	Final version

1.1.1.1 Statement of Originality

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Telice Magnetic Anomaly (ES), makesense (FR), Atelierul REDU (RO), Tavistock Institut GGMBH (DE), Matrix GMBH and CO KG (DE) and Flod srl (IT).

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9. Annexes

Presentation for labs
Examples of documentation template
Flyers of bacterial dyeing
Evaluation form
Communication templates