

Fab Academy

Pilot program “How to manage a Fab Lab”

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Introduction

The document you're reading is describing the pilot for a new class of the Fab Academy. After FAB7, Lima, there was consensus that we need a class that doesn't necessarily teach all the technical stuff.

There is a lot of things to take into account when setting up and running a Fab Lab. The new Fab Academy class is filling that gap.

Why this effort

Many members of the Fab Lab community have asked for training in setting-up and running a Fab Lab, not just from a technical perspective, but from a management and sustainability perspective. Fab Academy currently features a semester-long, 20-module diploma course packed with technical topics and skill building. This Fall, in response to requests, we plan to pilot a program in "How to manage a Fab Lab". A workgroup chaired by Klaas Hernamdt (klaas@fabfolk.com), supported by the International Fab Lab Association working with staff and members of the Fab Academy is designing a complementary training program to handle the demand for Fab Lab set-up and management skills. The workgroup intends to start this pilot program in September 2012.

How this document was produced

The first start was given by Neil Gershenfeld during a small meeting in Fab Lab Amsterdam, with a few interested people to talk about the outcomes of FAB7 and about the future of machines and of course the future of the Fab Academy. Klaas Hernamdt was willing to chair a workgroup to produce a design for a new Fab Academy class. The following people joined the group (Frits Hoff, Keimpe de Heer, Peter Troxler, Kley Reynolds, Andrea Maietta, Phyllis Klein, Betty Jo Barret, Brian Evans and later Pieter van der Hijden). The group studied background materials on the existing Fab Academy class on principles and applications of digital fabrication. It organized some Skype meetings and produced preliminary notes from various points of view. Then Klaas and Pieter came together to use the results so far to write a compact and consistent first draft of the intended final design paper.

How it is structured

This document first describes some of the overall goals, methods, structures and history of the Fab Academy.

The bigger part of the document describes the contents and the program of the course.

We end with the plan for implementation and references.

In 2009, the course design for the current class of the Fab Academy (on principles and applications of digital fabrication) was developed by Sherry Lassiter. This document describes the (first class of the) Fab Academy, the design frameworks that were applicable, the course module design, and appendices with a sample module and a description of the Fab Academy knowledge flow (Lassiter, 2009).

While preparing the new class of the Fab Academy on setting-up and running a Fab Lab, we concluded that the major part of the earlier course design is still valid. Of course, the topics are different, but the target group, the context, the intended level of outcomes, and therefore the didactical frameworks will be very similar.

For this reason we adopt the earlier course design as the rationale for the new class as well. We will structure our design document accordingly and create separate

chapters on background, goals and learning outcomes, assessment, methods and supporting technology and program content.

In our report we will summarize shortly the earlier design and stress what is new and different. The full text of the earlier design, however, will be included in the Appendices.

Background

The workgroup considered the grand design underlying the current Fab Academy as useful for the new training program as well.

About the first Fab Academy class

The characteristics of the current Fab Academy class that are useful for the new class as well are:

- The program aims at bachelor level, first year.
- The program is modular in nature; it consists of 20 weekly modules.
- The participants are organized in local groups, convening in a Fab Lab.
- Each module starts with a central lecture via video teleconferencing, followed by de-centralized learning activities guided by a local coach.
- Progress will be measured through all modules.
- It is possible to follow separate modules with / without certificate.

About the second Fab Academy class

In some aspects, the new class will be different:

- The teacher may vary by topic.
- The local coach will be the same person during the whole program.
- Each weekly module consists of a teleconference lecture, followed by individual learning activities, collaborative learning activities within the local group and/or between local groups.
- At the end of the program each participant will produce an individual paper/thesis.

Context of the Fab Academy

The new class will start as a pilot offering a number of certifications in how to manage a Fab Lab. The accumulation of approximately 20 certification courses, which will also serve as the foundational equivalent of the first year of a bachelors degree.

The distributed campus is comprised of approximately 20 module teachers and a number of participating Labs where local coaches guide small groups of participants through their learning process.

Three frameworks were used to form the foundation for our course design: Teaching for Understanding (Stone Wiske, Franz, Breit), Community of Inquiry in Blended Learning (Garrison, Vaughn), and Gilly Salmon's model of teaching and learning online derived from her research on the Open University of the United Kingdom. They have been described in Lassiter, 2009.

Goals and learning outcomes

Here comes a short recapitulation / update of Sherry's paper on

Target learners

- People who are involved in setting-up and running a Fab Lab; they might work for or volunteer in an existing Fab Lab or have plans to establish one themselves.
- Other people with an interest in the Fab Lab community and the management issues involved.
- People who can't have access to advanced management education due to price, age, qualifications, or location.
- Employees of local companies and corporations who need to update skills or develop transferable skills
- Lifelong learners, those interested in ongoing professional development within the community
- Vocational students—those who want skills that are valued by the local economy
- People who seek higher education/advanced technical degrees: bachelors, masters, and doctoral degrees

In all cases our learners have a very specific focus on digital fabrication, Fab Labs and the Fab Lab community.

Learning outcomes

There are two sets of goals that need to be identified, the learning outcomes desired by the Academy in general, and course-specific learning outcomes (Lassiter, 2009). In the course program (see below) specific course outcomes are identified. Below are listed the desired outcomes at the Academy level. These are the throughlines, the overarching goals for the one year diploma, across 4 dimensions: Knowledge, Methods, Purposes, and Forms.

Knowledge of important concepts:

- Understanding how to design and realize flexibly for new challenges and opportunities on setting-up and running a Fab Lab.
- Develop skills and understandings valued (marketable) in the community: setting-up, running and changing a Fab Lab, cooperating with other Fab Labs.
- Develop entrepreneurial capabilities.

Methods of disciplined reasoning and inquiry:

- Use digital analysis and design tools and social processes to express ideas and to create representation and/or function of an object.
- Use collaborative tools to develop organizational changes.
- Iterate designs, problem solve and create when results aren't as planned or there are no examples for students to model their work upon. (Learn and apply advanced management knowledge and skills.)

Purposes and limitations of different domains of understanding:

- Teach others. Empower others.
- Become civic and global activists.
- Learn to collaborate with other people, other communities, and work in a distributed fashion to solve problems, especially where the expertise may not exist in any one community.

Forms of expressing and understanding for particular audiences:

Use email, Web sites, html, videoconferencing, wikis, etc.

Course and content

See the “Program” section below.

Assessment

Ongoing formative assessments will come from several sources:

- student hands-on projects (individual, local groups, cross Fab Lab groups) as demonstrated to the class each week and graded by the module teacher
- weekly online documentation of how projects were conceived, designed and realized as well as where students had problems and how problems were solved
- students assigned overall responsibility for scaffolding their local class for one aspect of the course
- collaboration project with a foreign partner
- peer-to-peer support and group online participation

Summative assessment(s) will come from evaluating the final thesis project and presentation thereof.

Methods and supporting technology

As mentioned earlier, Fab Academy will use a blended learning approach. The environment is designed as a collaborative constructivist one for teaching and learning--serving and enabling an international, distributed learning community. Courses will incorporate some elements of face-to-face, synchronous learning environments through tutorials by local gurus and lectures by videoconference. Courses will also include asynchronous, computer-mediated elements such as e-portfolios, blogs, wikis, email, and collaborative online tools for sharing files and projects.

Program content

The program starts with an introduction module and then follows the lifecycle of setting-up (6 modules), running (7 modules) and changing (4 modules) a Fab Lab. It ends with a concluding module.

The separate modules each focus on certain tasks and activities Fab Lab staff has to cope with. Theoretical models are on the background, but certainly present. They vary with the stage of the Fab Lab life cycle:

- Setting-up a Fab Lab will be modelled after the Business Model Generation approach by Osterwalder et al.
- Running a Fab Lab will be modelled after the Balanced Scorecard Model by Kaplan and Norton.
- Changing a Fab Lab will be modelled after the Learning Organization model by Senge.

These models have in common that they are both modest and powerful. They are manageable for practioners, without loosing the connection with theory.

1. Introduction

The introduction will give you an overview of who you will work with and a background of the Fab Lab community.

Module 1: Getting to know each other

Purpose:

- To get acquainted with the other members of the local group, the program and its format.
- To get a global view on the background of its members and their learning goals.
- To know who is involved in setting-up a new Fab Lab and who is running an existing one.
- To make a connection with participants at other sites.

Module 2: Overview of the Fab Lab community

Purpose:

- To understand who's who in the community
- To understand what information you can get where
- To understand the principles of the community

2. Setting up a Fab Lab

Setting-up a Fab Lab will be modelled after the Business Model Generation approach by Osterwalder et al. (Osterwalder, 2010).

The "canvas" for business models as described by Osterwalder et al. consists of nine building blocks: Customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure.

The 6 modules on setting-up a Fab Lab will start with surveying an existing Fab Lab. Then the nine building blocks of business model canvas will get focus in four subsequent modules:

- Identifying the groups of people you want to reach and serve (customer segments)

- Defining the products and services you want to deliver (value propositions, customer relationships, channels)
 - Specifying the processes and resources you need to realise that all (key resources, key activities, key partnerships)
 - Developing scenarios and budgets (revenue stream and cost structure).
- The sixth module integrates the previous ones in "completing your master plan".

Module 3: Surveying an existing Fab Lab

Purpose:

- To visit a Fab Lab (preferably not your own) for a quick survey.
- To get a first impression of the many concepts related to Fab Labs.
- To come to a common presentation of the results, covering various Fab Labs.
- To see the similarities and the differences between Fab Labs.

Module 4: Identifying target groups

Purpose:

- To generate ideas about potential clients and what you want to offer them.
- To go out and collect information about potential clients, and their organizations, and see whether your assumptions were valid.
- To ask for comments from an existing Fab Lab.

Module 5: Defining products and services

Purpose:

- To have an overview of the values you can deliver to your Fab Labs "customers".
- To explore the ways you want to communicate and cooperate with them.
- To find out how you are going to manage your relations with them.

Module 6: Specify processes and resources

Purpose:

- To identify the resources required to deliver the intended services.
- To identify the key activities that have to be in place.
- To look for partnerships with other local organizations (as supplier) and/or another Fab Lab nearby, with your regional Fab Lab organization, with Fab Central and/or the global community.

Module 7: Develop scenario's and budgets

Purpose:

- To figure out the revenue streams and your operating costs.
- To figure out the your initial costs.
- To explore various scenarios, e.g. varying with the success of your fund raising activities.

Module 8: Complete your master plan

Purpose:

- To prepare a master plan to set-up your Fab Lab.
- To prepare for fund raising.
- To prepare for public relations.

2. Running a Fab Lab

Running a Fab Lab will be modelled after the Balanced Scorecard Model by Kaplan and Norton Kaplan et al., 1993).

The balanced scorecard model is a model for monitoring performance. It helps to cluster a variety of topics that are important when running an organization. They are bundled into four clusters: the client perspective, the internal processes perspective, the financial perspective and the perspective of organizational learning.

The 7 modules on running a Fab Lab will start with securing organizational health and safety which implies surveying an existing Fab Lab from this perspective. Then the four dimensions of the balanced scorecard will get focus in five subsequent modules:

- Managing the client perspective
- Managing the internal processes perspective
- Managing the financial perspective
- Developing a new service, i.e. a new service to be offered to a certain customer group
- Developing a new learning experience, i.e. a new service to be offered to children or students

The seventh module integrates the previous ones in "preparing your annual plan and setting-up control mechanisms".

Strictly speaking, the organizational learning perspective goes further than developing new services alone. This will be the topic of the next stage "Changing a Fab Lab".

Module 9: Securing organizational health and safety

Purpose:

- To prepare a risk analysis and evaluation for your Fab Lab.
- To make a plan for step-by-step improvements.
- To think about the awareness level of all visitors and how you are going to monitor and improve it.

Module 10: Managing the client perspective

Purpose:

- To identify key variables in client perspective.
- To set concrete targets for these key variables and to monitor their actual status.
- To observe gaps between targets and reality, plan actions, execute them and evaluate the results.
- To figure out which standard procedures you would like to apply, and by which policy considerations they are driven.

Module 11: Managing the internal processes

Purpose:

- To identify key variables in internal processes perspective.
- To set concrete targets for these key variables and to monitor their actual status.
- To observe gaps between targets and reality, plan actions, execute them and evaluate the results.
- To figure out which standard procedures you would like to apply, and by which policy considerations they are driven.

Module 12: Improving the sustainability

Purpose:

- To identify key variables in financial perspective.
- To set concrete targets for these key variables and to monitor their actual status.

- To observe gaps between targets and reality, plan actions, execute them and evaluate the results.
- To pay special attention to long term sustainability of the Fab Lab.
- To figure out which standard procedures you would like to apply, and by which policy considerations they are driven.

Module 13: Developing a new service

Purpose:

- To design a new service.
- To build a new service, including staff training and implementing organizational change.
- To launch a new service.
- To monitor and evaluate a new service.

Module 14: Developing a learning experience

Purpose:

- To design a new learning experience.
- To build a new learning experience, including staff training and implementing organizational change.
- To launch a new learning experience.
- To monitor and evaluate a new learning experience.

Module 15: Preparing your annual plan and setting up control mechanisms

Purpose:

- To have a clear view on the daily operations at your Fab Lab and how customers, staff, materials and machines are involved.
- To determine how ongoing processes at your Fab Lab will be monitored and by whom and in which way you can intervene.
- To evaluate your Fab Labs annual performance.
- To compare it with your earlier plans and targets.
- To analyse any differences.
- To formulate (new) policy considerations and to set-up a new plan.
- To translate the plan into concrete targets on client perspective, internal processes perspective, financial perspective and organizational learning perspective.
- To communicate about the new annual plan.

3. Changing a Fab Lab

Changing a Fab Lab will be modelled after the five disciplines of a learning organizations by Peter Senge et al. (Senge et al., 1994)

According to Peter Senge et al., the five disciplines that constitute a learning organization are: personal mastery, mental models, shared vision, team learning and system thinking.

The five disciplines of the learning organization will get focus in each of the four modules:

- Analysing the organization
- Changing the organization
- Upgrading a Fab Lab
- Participating in the Fab Lab community

Module 16: Analysing the organization

Purpose:

- To identify organizational challenges to cope with.

- To investigate the forces driving these challenges.
- To develop a shared vision on causes and effects.
- To conclude on required changes.

Module 17: Changing the organization

Purpose:

- To prepare a plan for implementing organizational change.
- To communicate about intended changes.
- To deal with resistance and setbacks.
- To celebrate the changes.

Module 18: Upgrading a Fab Lab

Purpose:

- To set the outline for a major change of your Fab Lab.
- To go through feasibility study and design phase.
- To develop a global implementation plan.
- To monitor the execution of the implementation plan.

Module 19: Participating in the Fab Lab community

Purpose:

- To study the Fab Lab community and its potential.
- To investigate what the community can contribute to your Fab Lab.
- To investigate what your Fab Lab can contribute to the community.

4. Conclusion

In concluding Class 2 we look back at what we've accomplished and look forward beyond the framework of the class

Module 20: Conclusion and looking forward

Purpose:

- To prepare a personal development plan.
- To prepare a common plan for further cooperation and collaborative learning.
- To make commitments for the future.
- To evaluate the Fab Academy

Plan for realization

Schedule

From here our schedule is:

- May 2012 - The comments will be processed and a second draft will be produced.
- Early June 2012 - Formal decision-making takes place on the design for Fab Academy 2 including the plan to realize it.
- Late June 2012 - The building of the academy can start.
- July - August 2012 - The building continues, the marketing starts.
- September 2012 – January 2013 (20 weekly modules with 2 weeks break around Christmas) - First intake of the new class of the Fab Academy.

Organization

The Fab Academy organizational structure has been built and run for one class until now with an annual intake (in January). Although the second class is still a pilot, it is the intention to make it a recurring class with an annual intake as well (in September). Therefore, it has to be discussed how the new class fits in the Fab Academy organizational structure.

Anyway, the new class recognizes the following organizational functions:

- Board/supervisor: decision-making;
- Coordinator: managing the class during developing, marketing, delivering and evaluating; 1 coordinator;
- Administrator: executing marketing, administrative and financial activities; 1 administrator;
- Module developers: developing learning materials and learning activities; e.g. one developer for each module; may coincide with teachers; 7-20 developers depending on the clustering of modules;
- Module teachers: delivering a certain module (interactive webinar) plus assessing results; 10-20 teachers depending on the clustering of topics;
- Local coach: managing the class at Fab Lab level, coaching the participants.

Marketing

In April 2012 a “preview” has been distributed in the Fab Lab community followed by distributing a draft of the current document to selected recipients. In May the Fab Labs will be informed and asked for feedback (e.g. suggestions for module developers and teachers) and commitment (e.g. willingness to hoast and coach a local group). In June formal decision-making will be finalised. July and August are for attracting participants.

Finance

The new class of the Fab Academy will pay for the coordinator, administrator, the module developers, the module teachers, the local coaches and the use of the participating Fab Labs. The participants have to pay a fee for the whole class. It is also possible to pay for single modules only.

Roughly spoken, the list price for attending the class is EUR 5,000. Nearly half of this amount is used to cover the costs. The other half is available partially at central level, partially at participating Fab Lab level:

- At Fab Lab level: to transfer to (some) participants as local scholarships and as an income generating facility for the Fab Lab;
- At central level: to transfer to (some) participants as central scholarships and as an income generating facility for the Fab Academy (e.g. to develop new classes)

Application

Application procedures and forms will be published in the Fab community and its direct environment.

Certification

In general, certification will be analogue to the certification of the current Fab Academy.

What's more?

To be worked out / discussed:

- Legal framework, for central FA, local labs, teachers, local support and students
- Criteria for scholarships

References

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