







# **Aalto Design Factory Annual Publication**

You are looking at our annual publication, which unfolds a year at Aalto Design Factory (ADF). Aalto Design Factory was born from a research project focused on creating an ideal physical and mental working environment for product developers and researchers. Today ADF is one of the spearhead projects and one of the first physical manifestations of Aalto University, encouraging and enabling fruitful interaction between students, researchers, and professional practitioners.

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## A word from Kalevi “Eetu” Ekman

### The Director of Design Factory

Aalto Design Factory was opened in 2008. Several student generations have started and completed their studies, a significant number of new faculty have joined the university. Who knows anymore why “Defa” was actually founded? And was it always the same as now, fall 2017?

Design Factory opened its doors, when the constitution of Aalto University was still in the making. The concept of Design Factory was built on long term research and development with very modest financial or human resources. The aim was to introduce an ideal operational environment for learning, research and application of product design and development. The old research lab of VTT at Betonimiehenkuja was converted to serve team-based learning, prototyping and testing. While the spirit has not changed, almost everything else has during these years of experimentation. In the course of time, the number and variety of courses and activities has greatly increased. Defa has served as the first home base for Aaltoes, Aalto-on-Tracks, Project Runway, Helsinki Law Clinic, Burning Man projects and many start-ups. Defa has also served as a showcase for those numerous visitors who have come to explore Aalto University, including official visits of presidents, crown princes, kings and prime ministers.

Reflecting on the original plans of Design Factory, we can now say that 90% of the main ideas have materialized – as well as a huge number of other things that were in no way planned or expected. For the first years of Defa, we always underlined its nature as a temporary project to support the transformation phase of our new university. As Defa has become more renowned, the expectations have also turned more towards long term support for the strategic goals of Aalto University.

Continuous development has been an essential part of the Design Factory concept. However, critical self-evaluation and radical renewal becomes harder with mileage and the baggage of past actions and achievements. Luckily, as the Design Factory movement has spread over the globe, the Design Factory Global Network ([www.dfgn.org](http://www.dfgn.org)) keeps us in interaction with new scholars full of energy, passion and courage to question any conventions.

Aalto Works is the working title for one of the most ambitious development projects on our university campus. Located close to the undergraduate centre, A-Grid, Aalto Studios and Väre building, will be completely renewed. Design Factory, Startup Sauna and Aalto Ventures Program, among others, will be relocated to this area. The hopes and expectations for Aalto Works are high, both from university leadership and from external parties. Aalto Works is a colossal and inspiring chance for Design Factory’s renewal. Defa will not move to a new address, Defa will be reborn there. The old dreams and visions have become real, now it’s time to paint new ones with a wide brush - to educate the world’s best product developers in the next decade!

**“As Defa has become more renowned, the expectations have also turned more towards long term support for the strategic goals of Aalto University”**

# 01

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## Education and Learning

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Learning at Design Factory intends to incite child-like curiosity and independent thinking. All of the courses are problem-based, meaning that during the courses students have to develop solutions to challenging industry provided problems. The idea is to simulate the situations that the students might face later in working life, as some work-related tasks might not have clear solutions.

Moreover, students graduating from university are expected to master their disciplinary knowledge in increasingly complex and diverse tasks, while collaborating with people from different fields and backgrounds. They need to step out of their disciplinary silos to efficiently collaborate with people representing a multitude of disciplines and cultures. Hence, Design Factory has its focus in interdisciplinary activities. In the courses held at ADF students often work in teams, and in some courses it is essential that each team has students from the fields of engineering, business and arts.

### Learning contains elements of:

- Having a real-life problem as a basis for learning
- Active information gathering and evaluation of various possible solutions
- Visualizing, prototyping and experimenting with ideas
- Reflection
- Teacher as a facilitator and student as an active knowledge creator
- Interdisciplinary group work



**52**

**COURSES ORGANIZED  
AT DESIGN FACTORY**

**1000**

**STUDENTS PARTICIPATING  
IN THE ADF COURSES**

**“User tests are no longer an inconvenience that needs to be checked off or avoided, but the core of the design process”**

\*Quotes taken from a survey sent to students taking courses at DF.





# Crystal Flowers in Halls of Mirrors

*Photographs by Henri Vogt*

**Crystal Flowers in Halls of Mirrors** is a cross-disciplinary course that unveils mathematics through patterns, compositions, and beauty, giving students fresh perspectives to view their surroundings. The course culminated in a final exhibition “Sensual Mathematics” held in The Finnish Science Centre, Heureka, in May 2017.



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**We asked the students and staff of the course how the DF environment supported the course.**

**Kirsi Peltonen**

Teacher in charge

“To a course like Crystal Flowers in Halls of Mirrors, which is genuinely interested in encountering different fields, Design Factory offers an objective soil on which a new tradition can be built effortlessly. Our course had 40 students over the spring 2017 and the space provided for us was spacious and adjustable enough for our different workshops, group work, and interactive lectures. By virtue of the resources given to us, it was possible for interested parties to come and look at our activities so that the additional crowd didn't disturb our teaching. The helpful, solution-oriented staff of DF assisted in practical challenges we faced during the course. As the main teacher of the course, I feel extremely lucky that we have been able to organize our course for the third time in such a sound environment that Design Factory is.”

**Matilda Tuure**

Student, Fashion and Collection Program

“Working in DF was really easy because of the open facilities that we were free to use. Our installation was quite sensitive so it was very handy to have many kinds of studios under one roof so we didn't need to carry it around that much. We basically found everything we needed from DF, I would say. It was also great to be able to store the installation at DF, even though the storage room was quite full all the time.”

**Taneli Luotoniemäki**

Course teacher, Aalto ARTS

“As a milieu Design Factory encourages students to hands-on doing and prototyping. The open atmosphere at Design Factory helps students make new acquaintances and many of the co-working spaces suit product development purposes very well.”

**Anna-Miia Suominen**

Student, Architecture

“Design Factory is a very friendly and open place with a good atmosphere. And there are a lot of possibilities in the basement!”

**Camilla Leiman**

Student, Mechanical Engineering

“I'm really happy that I now know about all that DF has to offer. I think the facilities are great because they are so adaptable, which to me it seems is their purpose. They function so well to accommodate really any type of activity. The smaller rooms for group work were also nice. Anything one can think of doing can be done at DF.”







# Aaltonaut

Aaltonaut is Aalto University's Bachelor's Minor Programme on interdisciplinary product development. The Aaltonaut courses rely on problem-based learning as well as interdisciplinary teamwork in hands-on projects. The desired Aaltonaut characteristics are curiosity, courage, initiative and the ability to take action. Central to these outcomes are refining interdisciplinary teamwork, communication and presentation skills. The program is designed to be started on the first or second year of studies and is aimed at the students of all six schools of Aalto. It consists of three mandatory and two elective Aaltonaut courses. Students are also offered a possibility of doing their bachelor's thesis in cooperation with the Aaltonaut program.

## 750

CREDITS GAINED FROM  
AALTONAUT SINCE 2013

## 95

STUDENTS TAKING AALTONAUT  
COURSES SINCE 2013

## 80%

OF AALTONAUT STUDENTS GOT  
A SUMMER JOB IN 2017



## Aaltonaut as a part of Game Changer Education

In the past academic year, Aaltonaut development platform participated in developing entrepreneurial education. Aaltonaut pedagogical expert **Maria Clavert** together with Aalto Ventures Program (AVP) staff helped in integrating entrepreneurial topics into the teaching of Sähköpaja course at AaltoELEC. Furthermore, Aaltonaut supported Aaltoes's initiative to develop an introductory course in entrepreneurial ecosystem in Aalto. The course is a joint effort of Aaltoes, Aaltonaut, AVP, Design Factory, and Tuote student association and aims at encouraging the 1st year students to join the entrepreneurial activities of Aalto. The collaboration has contributed to the process of redefining the learning goals of Aaltonaut and resonated with the university-wide attempt to define common objectives for game changer education in Aalto. The course "Yrittäjyys Aallossa" will run for the second time in fall 2017.

## Low threshold international experience

The objective of Aaltonaut has always been to offer students possibilities to gain international experience already during their Bachelor degree studies. For this reason, exchange students have always been welcomed at Aaltonaut courses.

Over the academic year, different setups of international course collaborations have been carried out with Tecnológico de Monterrey (TEC) I2D program (2015-2016), and the Pontifical Catholic University of Chile (PUC) DILab.

The collaboration with TEC brought 10 students and their teacher to Otaniemi in 2015, and one Aalto teacher; **Kirsi Peltonen** (Docent D.Phil. (Math)), to Monterrey in 2016. Kirsi, together with Professor of Architecture **Juan Talamás** of TEC, held an interdisciplinary Estructural Morphology in Architecture course.

In summer 2016, professor **Constanza Miranda** (Director of DILab Engineering Design Initiative UC) along with her four students, came to Aalto Design Factory to pilot their innovation course with three Aaltonaut students and Aaltonaut communications teacher **Maurice Forget**. Over the fall, a team consisting of Aalto University students and teachers visited Santiago.

The experimentations with TEC and PUC displayed the opportunities and challenges related to international course collaboration. It certainly is difficult to plan a course with an international teaching team and develop a product with an international student team, but it is possible and worth trying! The experiment allowed the teachers to meet new colleagues and to get familiar with new teaching environments. For the Aaltonaut teaching team, the experience of planning and teaching a course in an international environment was valuable especially in regard to teaching in Tongji in 2017-2018. Most importantly, international collaboration forces students to

work with people with different backgrounds in a new setup. Communication skills gained in this manner are a valuable asset for students in the ever internationalizing working life.

## Piloting international collaboration with Tongji University

In the academic year, 2016-2017 Aaltonaut prepared to join the new Shanghai International Design and Innovation College (SD&I) established between Tongji University and the City of Shanghai. With Aalto ARTS providing one-third of the Master's degree teaching of SD&I, Aaltonaut was chosen to complement the course selection on a Bachelor's level. In the academic year 2017-2018, two Aaltonaut courses will be running in Tongji with a Sino-Finnish teaching team and two summer courses will host a group of Tongji students in Aalto.

In fall 2016, an Aaltonaut teaching team traveled to Shanghai to pilot a Product Analysis course at the Aalto-Tongji Design Factory (ATDF), also referred to as the Sino-Finnish Centre. As Aaltonaut courses are often held at the Design Factory premises in Aalto, ATDF provided a familiar platform for SD&I teaching as well. The pilot gained positive feedback, the students were motivated, and the hands-on approach to teaching was highly appreciated. The teachers learned that even more emphasis should be placed on supporting interaction with the students and that the operating voltage of electrical devices should be checked before using them in another country. Based on the encouraging experiences of the pilot, Aaltonaut team is eagerly looking forward to working with Chinese Aaltonauts in the Product Sustainability course in Fall 2017.



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# Youth at Design Factory

Over the academic year 2016-2017  
Design Factory participated in multiple  
collaborative and educative projects, that  
aimed at bringing new ways of learning and  
teaching to elementary and high school level  
education.

## Idea Rollercoasters with Haukilahti high school

Students from Haukilahti high school spent two days at Design Factory in April 2017 as part of their project week. Joustoviikko translated as “a flex week” is organized once in a year as a part of the Finnish curriculum. During the week, students study one course they have chosen among few course options.

On the first day the high-schoolers had a two and a half hour Idea Rollercoaster workshop, during which four teams were each given different subjects. The objective of the workshop was to create as many ideas as possible in a short amount of time and then progressively refine the ideas into more holistic concepts. Three of the most feasible ideas were chosen as basis of the second workshop.

The following day the teams polished their concepts into prototypes in the PD6 workshop. For instance, one team came up with an application that would gather together all the amusement parks, playgrounds and other activities for children, in order to make it easier for parents to come up with ideas what to do together with their children.

## Prototyping Experiments with Kauniainen high school

The Kauniainen high school piloted a product development course in January 2017 as part of their newly founded business program for high schoolers. The study program, Lukiolaisten bisneskoulu, offers courses on economy and entrepreneurship, and is part of the school's own business platform GraniWorks. At GraniWorks the students are able to meet and connect with companies. Depending on their desire, the students may also found a start-up of their own. In addition, GraniWorks passes on job opportunities for the Kauniainen high schoolers.

Since product development was a new add to the school's curriculum, Kauniainen high school requested help from Design Factory for organizing and carrying out the course. Therefore ADF community members, **Lassi Liikkanen**, **Matti Hämäläinen** and **Meri Vainio**, helped with planning and executing the content of the course.

In the Design Brief course, the teams, generated ideas and came up with new purposes for second-rate design lamps. The study program culminated in a six-hour product development PD6 workshop where the students' ideas and concepts came to life. The workshop strengthened the team spirit and allowed the students to gain more

confidence in their ideas. The students felt that the workshop day was the best one yet.

Inspired from the successful pilot, the Kauniainen high school and GraniWorks will carry out the course next school year as well.

## PD6 - Prototyping in six hours

PD6 is a six hour facilitated workshop session in which groups are asked to build an quick-n'-dirty prototype after a short design brief. PD6 is a method used to demonstrate the product development process and the “learn by doing” mentality behind it. During their PD6 experience the team members get know each other better and learn how to communicate.

Design Factory's philosophy partly builds on the idea of “failing fast to succeed sooner”. It relies on combining problem-based learning with a hands-on approach and quick-n'-dirty prototyping. We encourage the members of our community to reach out and ask for help by emphasizing the involvement of different stakeholders in the design process.

One way to realize these methods is PD6 - a facilitated workshop for teams that condenses the product development process to six hours. PD6 has been created to boost the starting phase of a project by enhancing the communication of a team and clarifying the task ahead. It underlines the value of making ideas tangible in order to foster open communication in collaborative settings and provides tools for generating, executing and testing ideas quickly. Oh, and it should be fun!

The PD6 workshop starts with introducing problem briefs, after which the teams work on their own phase with coming up with ideas, creating, and testing prototypes. The progress of the project is supported by two checkpoint meetings (CPM) lead by the facilitator. At the end of the workshop, the teams present their prototypes and receive feedback from others. It is also a good practice to conduct a short reflection session, in which the future plans for the project are thought through.

PD6 is for both students and professionals, experts and amateurs. It can be used for tangible or intangible problems, such as products or services. So far PD6 has been organized in a variety of contexts and countries e.g in student projects, corporate new product and service development, as well as for educators and policy makers.

# Opening doors to working life

**“Working at Design Factory was our first work experience. We got a lot of responsibility for our own work: how much we got done depended on ourselves. That was a great way to show how it is like to work in real-life” - TET-trainee**

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Design Factory started offering new working life experience internships (TET-harjoittelu) for elementary school students from Helsinki metropolitan area in 2015. As the experimentations turned out to be fruitful, the trial has now gained a more systematic structure.

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**Elina Kähkönen**, Teacher in Charge of Aaltonaut, says the goal of the TET-experimentation is to encourage young people to take in interest in higher education and the interdisciplinary studying opportunities that Aalto University offers.

The trainees have worked with project-based tasks for a period of one or two weeks. The content of the project is always planned in advance together with the trainees, to make sure that the trainees are able to develop their skills as far as possible during the internship. The objective of the TET-training project is to incite young people to think about what working life is now and how it will change in the future. So far, the students have, for instance, created a video that encourages girls to get involved with mathematical and technical fields and explored how teenage boys could be encouraged to feel more excited about higher education.

In the training program the youth act as experts - the given tasks allow the students to offer their perspectives and views on the subject at hand. The operating model of DF is based on teamwork and accordingly the TET-trainees work in pairs. Following the methods applied in product development, the trainees get to independently share and try out their ideas. Nevertheless, the support and expertise of the whole DF community are always at the trainee's disposal.

At Design Factory the trainees get to familiarize themselves with project-based learning in an international environment. The principal working language of Design Factory is English and the trainees have - if they wish - the opportunity to reinforce their English skills while working at DF.

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**TET-internships are often the first work experience of the 8th or 9th grade students**

**34**

**TRAINEES**

**14**

**SCHOOLS**

**1116**

**WORKING HOURS**

**Kasper Suomalainen**

Director of Community, Startup Sauna

"The younger students are more open and interested towards new ideas and innovations. They're from a totally different tech generation than myself (and I'm in my 20s), which makes it a learning process both for the students as well as the mentors. Overall, young students' have a growth-mindset like no other and the level of enthusiasm towards solving problems is something we rarely see in adults, and something most people seem to forget when growing up.

It's really important for youngsters to get to know the concept of entrepreneurship. Not everyone is meant to be an entrepreneur; however, we want to provide an early contact point towards entrepreneurship which brings forward the mindset most entrepreneurs have. Entrepreneurship is not only about startups; it teaches lifelong skills to cope with different people, stressful situations, and problem-solving. It's crucial that students get a chance to be familiar with start-ups as start-ups play an increasing role in today's entrepreneurially oriented world.

This is probably the most important thing, as these young students will be the ones carrying our ecosystem on after we've moved on to other adventures. Aaltoes, StartuPlifers, Startup Sauna, and Slush are all run by young students, and we're always looking for the next game changers to step up and start running the show. The early-on knowledge that these entities exist is a prerequisite for our ecosystem growth."

**Samuli Mäkinen**

Researcher, Aalto University  
CEO, Riichi

"The TET-trainees took part in Fucam, an EU funded development and research project with and for Airbus, where the goal is to design a future airplane cabin for the Asian markets for the year 2025+. This huge market has a myriad of overlapping user groups, different kinds of younger passengers being amongst them. Working with the trainees helped to bridge the social distance between us researchers and youth as users of the future cabin since the trainees can design for themselves and have a better access to others. In fact, their use of today's communication means via different apps and social media platforms combined with their social circles proved efficient in gathering qualitative data with a high answer rate.

The trainees were quick to grasp the complexity of the challenge and proved to be proactive in their approach. Of course, the project goals need to be well defined and suitable for someone not yet familiar with the professional terminology. This means the need to rephrase and justify why is this significant, how

does this relate to bigger product development process and so forth – always a welcome sanity check for someone working happily in one's bubble. It was a pleasure to work with the bright TET-trainees. They seemed to enjoy the environment and likely learned for example of work community and value of empathy and stakeholder involvement in design. These skills were combined with their technical readiness and skills coming from various school subjects and putting them in use here hopefully allows them to better align their future studies. However, it remains difficult to say who learned the most."

**Tiina Tuulos**

Project Manager, Aalto Design Factory

"If you have gone to a Finnish school you might remember your TET week. You probably went to your parents' workplace or to a nearby store to help out with everyday tasks and duties. It might have been an inspiring experience or perhaps a bit of a dull one, and for some it might have even been an eye-opener for their future studies and steps. With the TET experiment at ADF we want to enable TET experiences for students that make a difference and give them a glimpse into knowledge work and the modern working environment.

The idea is to build on students' own interests and to support them through a problem- or project-based learning method. We want the students to realize that their free-time hobby or other passion doesn't need to be separated from studies and work-life, but instead they could use their motivation and capabilities on a certain field. However, the main goal is that during their traineeship the students have fun and learn something!

The most rewarding thing is to see the transformation that happens in the students during those 1-2 weeks. After they have managed to survive through the uncertainty in the beginning, the students seem to get empowered by the independent working style, the freedom and responsibility that is given to them, and by the community at ADF. As they pitch their end results to an audience at the end of the week, it is very visible that they are proud of their work and even surprised how fun the traineeship has been.

As a coach I have gotten to challenge myself to avoid all kinds of jargon that we use on a daily basis and not to assume anything. I have learned that Facebook is 'so last season' and that students are immensely tech savvy. I think it counts as a success that a few trainees came back to ADF after several months to see the final results of the PdP course in the Product Design Gala, and that I have been asked to be a reference on a summer job application."





# ME310

A global, interdisciplinary, project-based course for Master's level students from all Aalto Schools.

Mechanical Engineering 310 (ME310) is an interdisciplinary, project-based course for Master's level students from all Aalto schools. Thus, it represents a true integration of engineering, business and design disciplines. Originally created at Stanford University, the course has operated continuously for over forty years and Aalto has maintained this intimate relationship with Stanford through ME310 for nearly a decade.

ME310 is all hands-on, all the time. Also, each team in ME310 pairs with another team from a foreign university to jointly solve the proposed design challenge. These partnerships add diversity to the project teams and give students the opportunity to experience true international collaboration – an essential skill required in this highly globalized world. All teams in ME310 typically start their projects at Stanford University where they participate in a design thinking kick-off workshop and experience the entrepreneurial culture of Silicon Valley. Final prototypes are typically presented at the Stanford Design EXPE each June in California.

**15**  
STUDENTS

**30**  
ECTS

**5**  
UNIVERSITIES

# ME310 Project Story: SMEBees

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OP, a Finnish financial and service house, presented the ME310 student team with a challenge that at the first weeks boiled down to “How can we help SMEs?” With such a broad problem space (which is normal for ME310 projects) the team spent the fall period accumulating and broadening their knowhow on the topic. The team talked to dozens of business owners, looked into existing services and websites designed to help SMEs, explored the start-up ecosystem, and much more. Based on the findings, and in agreement with OP, they decided to shift the focus away from start-ups, but not before they first learned everything they could from the ecosystem.

By the winter period, it became apparent that there are vast amounts of support and advice available to the SMEs, yet they still felt they were not understood and cared for – that they were alone. As customary to the period, the team gained a deeper understanding as they explored various ideas from human centered Business Baby Box (think maternity package, but for businesses) to better delivering existing resources through Business Type Finder (complex decisions through simple decision trees). By the end of the period, they were close to 200 user contacts and over 30 prototypes and their most refined ideas started getting good resonance with the users.

The Spring period is all about making it real. The team started building their system where the SMEs would get help in running their business in a way which is easily digestible for people who are daily forced to operate in fields they have no training for (marketing, cash flow, supply chains, etc.). The team could then go even further by setting and tracking milestones for themselves to reach their goals. But they wanted to provide even more value to the SMEs. The big companies have access to data, trends, and analytics, to which smaller companies previously had no access due to economies of scale. By bringing them together under their service, the similar scales are now possible for the SMEs! Bringing all this together is a system that allows OP to better understand the SMEs and the business owners to focus more on what they truly love doing!

**“My greatest learning from ME310 is the value of rapid prototyping and user testing. When you find that users have an unfulfilled need, quickly mock-up your best guess, and test it with them. You’ll learn so much! Then iterate and do it again and again.”**

**“Our students were brilliant and it was easy to work with them. The project was able to validate some assumptions we had made at OP but also gave us insights we had not thought of. The end result is something we will most certainly develop further and perhaps make part of our service offering, but learnings throughout the project are valuable to us. As it always happens in ME310: It’s not just about the destination, it’s about the journey.”**



**KRISTIN SWAN**  
Student,  
Graduate from Aalto Biz



**PIA HANNUKAINEN**  
Senior Research Manager,  
OP Financial Group

## Course projects 2016-2017:

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### Sponsor: Roland Garros

Partner Uni: Paris d.School  
Project: Designing a year-long digital Roland Garros experience

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### Sponsor: Xylem

Partner Uni: Stanford University  
Project: Enabling crowd-sourced water quality monitoring

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### Sponsor: BASF

Partner Uni: Karlsruhe Institute of Technology  
Project: Improving interaction between stakeholders in the farming industry

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### Sponsor: OP

Partner Uni: Swinburne University of Technology  
Project: Supporting SMEs in their everyday activities

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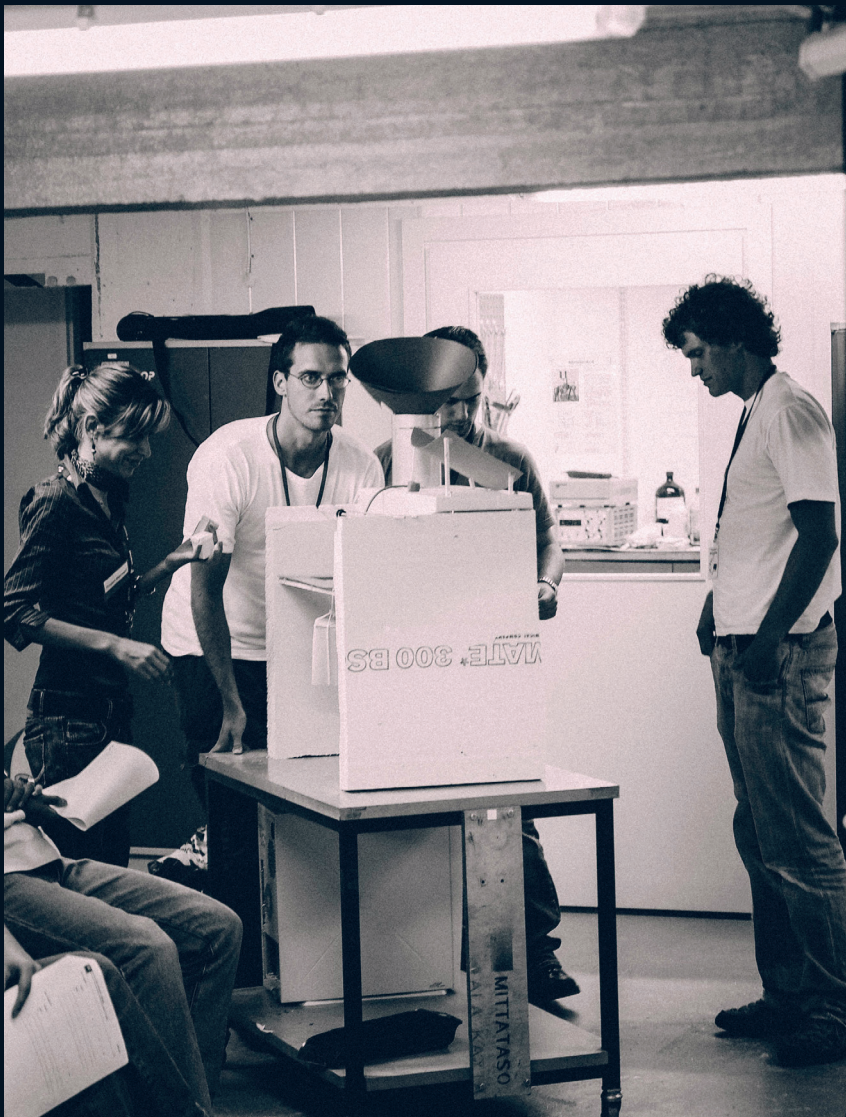


# 20 Years of Product Development

For 20 years PdP has brought 2500 students of engineering, design, and business together to tackle real-life problems and develop state-of-the-art solutions to real problems. Over the years, the core of the course has remained the same, but the facilities, culture, and work methods surrounding it have refined over time. Design Factory's culture and philosophy stems from the PdP course, which is why the course has a special meaning to the whole ADF community.







**In 20 years (1997-2017)  
PdP has had:**

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**85**  
**DIFFERENT SPONSOR  
COMPANIES**

**245**  
**PDP PROJECTS**

**2490**  
**STUDENTS**

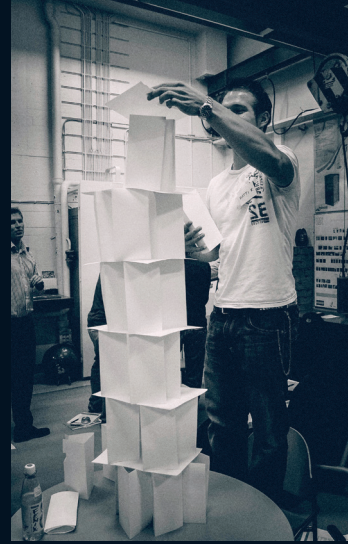
## **The Product Development Project**

PdP is a one-year master's level course hosted by Aalto Design Factory. During the course, interdisciplinary and international teams of ca. 10 students will learn the product development process by completing a comprehensive learning project from idea to prototype in partnership with companies. The teaching philosophy is problem-based learning (PBL) and thus, the course offers a lot of chances to enhance the existing skills or to learn completely new ones.

In the beginning of the PdP course, the students will become familiar with the basic product development process and the sponsor companies will present their design briefs. After that, the PdP teams are formed by team leaders. Each team is provided with a budget to complete their prototype. The results are exhibited to the public in the Product Design Gala during Aalto Festival week in May.

Right from the start, much attention is directed to the building of highly motivated interdisciplinary teams. The course is designed for any Aalto student who is interested in the development of consumer or industrial goods. Some of the students participate the course from foreign partner universities and work remotely most of the course. This will create challenges but also prepare the students for working life.

The PdP project typically includes phases of planning, searching for information, a creation of concepts, decision-making, and detailed computer aided development. The project phases of manufacture, assembly, and testing are strongly related to the most valuable learning experiences. Although immaterial components, e.g. services and business concepts, are often included, the focus is in the development of tangible products.



1980

1995

1997

2001

2004

2005

Professor Matti Kleimola creates the first version of the course. Expected outcomes are plans and machine drawings. Hence, the course was divided to two parts: a machine design course and a student project course. All participants were students from mechanical engineering.

The course gets a new teacher in charge, Kalevi Ekman, and the project part of the course gets its own course code.

The PdP course concept is created and collaboration with the faculty of industrial design begins. Companies begin to fund the PdP projects, and students are expected to present a prototype at the end of the course.

The first collaboration with a foreign university takes place as students from Sweden take part of the course.

Mikko Reinikainen becomes the first course assistant.

The rector of the University of Art and Design, Yrjö Sotamaa, mentions the idea of Aalto University for the first time in his opening speech for the academic year.





**2006**

**2007**

**2008**

**2010**

**2017**

The preliminary study for a research project called "The FutureLab (FLPD) of Product Design" is launched to support the interdisciplinary cooperation and the education of product design. FLPD project is started by 10 students and funded by TEKES (The Finnish Funding Agency For Innovation). FLPD's aim is to study and develop product development facilities, tools and methods.

The second phase of FLPD takes place, and PD6 workshops are organized for the first time. The laboratory of Machine Design is transformed to support the PdP students. The designed places include "Puuhamaa" and "Studio."

Aalto Design Factory is designed, planned, built, and furnished during the summer of 2008 by 7 students in 4 months. The current spatial design relies on the findings and experiences of FLPD.

Aalto University charter is signed in June 2008.

Aalto Design Factory is officially opened on the 3rd of October 2008.

On January 1st 2010, the Helsinki School of Economics, Helsinki University of Technology and the University of Art and Design Helsinki merge and Aalto University starts operating.

ADF is the first official building of Aalto University.

The PdP course turns 20 years old.

The core is the same but the facilities and working methods have advanced.

# Alumni Stories

Nine PdP alumni share what they learned from the course



**Anna Vavilova**

Project Manager of SAKO Safesys Project  
PdP Year 2012-2013

"Our PdP team worked with firearms manufacturer SAKO. Because of mortalities in hunting our objective was to develop the safety system integrated into the rifle's stock. I loved all about this project: the theme, people and our work flow for the solution. Firearms industry has a very certain appeal, it is controversial and makes one develop attitudes. We went to shooting ranges and hunting EXPOs. When presenting the prototype on stage of PDP Gala, my legs were fluttering beneath me. I felt very proud but also heartbroken to let it all go. Not all great experiences can be repeated."



**Heidi Tuulensalo**

Senior Service Designer at Exove Design  
PdP Year 2012-2013

"The PdP course has in a way changed my life's direction. I'll always remember the awesome people and the joy that came when we finished our project. In fact, some of the team members are still my closest friends. I've also had the pleasure to work with some of the team mates after graduation. PdP gives the students the freedom to experiment and start doing. What is more, it encourages them to share ideas, be different, and try different things. Instead of evaluating and estimating whether something would work or not, you are asked to test and "try your own wings."



**Sazan Rexhepi**

Student  
PdP Year 2014-2015

"My PdP memories are warm as it was my first real project. Now, after working for ABB and other big companies I have realized that the PdP project was a real-life project and, thus, a great experience that taught me a lot. I used to believe that being a good guy makes me a good leader. However, during the course, I understood that often you just have to explain everything in plain. You can't assume that everybody is on the same page with you. Although explaining something well might feel time-consuming, it will definitely pay off in the long run as only a few people are able or willing to tell you that they don't understand what you are telling them. The PdP course should be in every university considering the fact that universities' do measure their success in terms of how well the students are employed after the graduation. To me, the course was more interesting than the basic university studies."



**Pekka Korhonen**

Head of Business Development Modernization at Kone  
PdP Year 1998-1999

"I think it says something that even after 20 years, I still remember the course quite well. PdP taught me about group dynamic and helped me to realize, how difficult it is to understand the customer and how challenging and long the "journey" from the commission to the final product is. Design Factory did not exist when I did the course and we had much more modest facilities than PdP students have today. The course was held at the Machine Engineering Faculty and every year the spaces for the course had to be found again. However, there was already some early signs of something permanent, such as a coffee machine. In a way, Design Factory was in the start-up phase seeking for its own place. I encourage to continue on the same path questioning the current methods and attitudes the companies have in the field of product development. Bravely forward while breaking the barriers!"



**Matti Perttula**

Innovation Consultant at Innotiimi-ICG Finland  
PdP Year 2002-2003

"It has been amazing to see the course has evolved into Design Factory with a buzz around it. The core of the course has remained the same but the world around has evolved and refined to a new level by scaling and deepening the idea behind. Back in the days, we worked in teams but met in a random meeting room in the elevator factory. I think the development of the course indicates, how the world around us has changed. In a way, it's now more ready than used to be and thus, you can't just wrap up something and sell it to a consumer via local hardware store. Instead, things have to be understood by focusing the user experience and understanding what you can do with technology."



**Matti Hämäläinen**

Free Agent at ADF  
PdP Year 2003-2004

"The course was an astonishing experience and remember it like it was yesterday. Before the course studying had felt like "pulling a tooth". I learned that product development is not just formulas and structures and that interdisciplinarity is essential. Being a project manager was a personal challenge and gave me a lot of motivation. The course was an amazing opportunity to try new things and take risks. I got practical experiences of things that had been taught only in theory. It was an opportunity to see the bigger picture and gave me a lot of confidence. I learned that you should believe in yourself and in your doings. It bears to be courageous and try new things yet never alone. Everything I learned during the course was through trial and error. PdP has also been a good baseline for other projects I have done."



**Minna Rissanen**

Service Designer at Nordea  
PdP Year 2014-2015

"PdP is one of the best courses Aalto has to offer! I absolutely loved the 9-month period I spent at Aalto Design Factory studying product development, service design, dirty prototyping, and project management. After graduation I wanted to work with business development and service design, and the experience I gained from PdP proved to be very useful. In addition to a set of skills the course taught me to learn from trial and error, stay curious, and to be open for new ideas and opportunities."



**Maria Boychenko**

Digital Industry Business Community Coordinator at EIT Digital  
PdP Year 2012-2013

"I was a Project Manager of the team Arcticum sponsored by Nordic Hug, Finnish health startup, during 2012-2013. Our team was very international and multidisciplinary, we had a lot of work and a lot of fun! We learned that failing is ok and not knowing something is ok. It's ok to ask for help and there is always someone who is ready to give you an advice, feedback, or connect with someone else. This course will push you out of your comfort zone so many times that it will feel like a roller coaster ride most of the time. You will have to push your limits in order to go through. But this will bring the most rewarding results! You will learn a great deal about yourself, real teamwork and product development, of course! You'll make new friends and conquer your fears!"



**Mikko Reinikainen**

Area Manager for Germany at Safera  
PdP Year 2003-2004

"The course was a great real-life simulation and one of the crossroads in my life. After the PdP course, I got a job as a PdP assistant for 3 years. Then, became a researcher and got acquainted with the business and startup scene which led to me to start an own company in 2006. The course gave me courage to challenge myself."





Professor Kalevi Ekman was awarded the José Vasconcelos World Award for Education in October 2016, in Riga.



# Kalevi “Eetu” Ekman,

## What’s the essence of PdP?

**Professor Ekman is one of the founders of the Product Design Project course.**

### **Why was the course born?**

The PdP course was born to fill the gap existing between the practice and the models, drawings, and calculations. Despite the good projects and ideas, the end result of project development courses used to be only piles of paper. The projects were also difficult to evaluate and the grades based only on plans, although you cannot really say whether something works in real life or not before you test it. I wanted to make it possible to actually build and test the designed products and increase interaction between the users and the designers. Moreover, when I was a student, my professor wanted to develop the teaching of product development and collaboration between the companies but didn't really get a chance to put his mind into that. This started to bother me and that is when the lamp went on.

### **What is your greatest memory from PdP?**

After 20 years it is hard to say which is the best memory but many fun memories and extraordinary situations come to my mind.

One good example is the scientific experiment that we did with the UKK Institute. In the experiment, 10 students under a doctor's supervision had to complete a series of tasks with a disturbed sense of balance. Since the students were all young and healthy men, their sense of balance was disturbed by making them drink one bottle of red wine on an empty stomach. After the experiment, the energy levels were stabilized with pizzas. The purpose of buying 10 bottles of wine and 10 pizzas was a bit hard to explain in the accounting.

Another memory is the trip with

students to NATO's artillery rehearsal area in Holland where we participated in an artillery competition. Because of this, I had to request a permission from the Finnish Maritime Administration to close the inland waterways in Vanajavesi lake for the duration of our artillery test. We got the permission.

These are only a few situations that I remember but many PdP projects have included this kinds of extraordinary events. Of course, students have traveled and done much more than me, for instance in Africa and Asia.

### **20 years is a long time. Where do you get the energy to continue the PdP course every year?**

The energy that all the young students have tends to spread. Perhaps, I should start calming down but it is hard. It is a positive thing when students are enthusiastic and do fun, crazy, and sometimes challenging projects. As a professor of such a group, I think it is best to be the craziest.

# Case Trenox

A story about how a PdP course sponsor ended up hiring some of the students after the course.

**Pekka Silén**, co-founder, of ADF's partner company Consair, took the PdP course this year. His team's task was to create an automated crane for a Finnish Crane company, Trenox. The project went so well that already in the early stages of the project it was clear the project would not end at the PDP Gala. Eventually Pekka and three other team members were hired by Trenox during the project.

## Crane challenges in the chaotic building sites

For a person, who is not familiar with the construction industry, it may come as a surprise that building sites have a lot to improve in terms of efficiency, systems and productivity. Much of these challenges are created by cranes. They are hard to control and drive because of the swing movement of heavy objects. Every year, collisions between cranes cause significant financial losses. What is more, the communication between the crane driver and the other workers is often defective, as it is done via radio phones. In addition, the international workers often lack a common language, which makes it even harder to interact remotely. Yet, the chaotic and ever-changing nature of building sites shows that a little amount of existing inventions to solve these problems. The building site managers have to cope under a multitude of demands relating to, for instance, efficiency and yet they have a limited amount of tools to answer the requirements.

In the PdP course, the students' task was to answer to the existing demand and need by adding intelligence into a crane. Led by the PdP team leader **Emma Unonius**, they started by making a background research and exploring existing technologies. Since they did not find a completely suitable technology for controlling and automating a crane, the team had to develop a technology of their own. Moreover, they wanted to create a system to help the communication between the crane driver and construction workers with an application.

## From total strangers to a well-functioning team

Team Trenox consisted of eight engineering students and one business student. One of the team members was a programmer, who was specialized in machine technology. Pekka had gained experience in product development while working at Consair Oy. "I learned the hard way through trial and error," he describes.

Three of the team members participated in the project remotely from Germany while the rest of the team did the course in Finland. According to Pekka, it took a while to get to know each other's strengths since the team members were total strangers to each other in the beginning. However, when the process went forward, some of the members started to take responsibility over what they considered being good at. In the end, the roles ended up being quite clear. "In a way, it was great that we had so many engineers. One of the best things that the course gave us was that everybody had to develop skills outside their study area. Everybody had to step out from their comfort zone. People are often too restricted to specific fields of expertise. You can always learn something. For instance, this year I have learned coding," Pekka reflects.

## PdP - "Real-life learning and important connections"

Pekka finds PdP important for students and recommends the course especially for those who study engineering. He believes that problem-based courses like PdP are beneficial for students in regard to employment: "Many of the skills needed in working life are learned in practice." Moreover, Pekka considers real-life cases as the best way to recruit engineers to industry. "The degree does not basically tell anything about what you can do. You will learn in practice anyway. It is extremely important to build contacts to the real world while studying," he continues.

Pekka wishes that some things in the course could be done differently in the future: "The course should definitely be more intensive and give more credits. In the beginning, I felt frustrated because of the limited time we had to focus on the project. The design brief could have been more problem focused."

Pekka also notes that the communication between remote team members was challenging at times, since in the beginning of the course there was hardly any teamwork: "I was a bit afraid that the group would split up because it was so clear that the members in Finland would continue with the project after PdP gala. However, my fear was somewhat unnecessary since when we finally got a chance to meet and work together at ADF before the gala, we were productive and had a lot of fun."

## Active support from Trenox Oy

According to Pekka the sponsor company Trenox was extremely active and supportive during the process. This was the first time Trenox took part in the course, but not the last. According to the leading crane driver Jussi Tuomola the experience exceeded the expectations. Jussi found the possibility to take part of the course while he was investigating ways to further develop his idea of an automated crane. Now, after the PdP course, four team members are working for Trenox and developing further the three different concepts that came up during the course: the automated crane, the application for communication, and the collision prevention system. Pekka is concentrating on the prevention of crane collisions. At the moment, the possibilities to further develop the concepts are unlimited because of the skilled team, demand and willingness to expand to the international markets.





*Pekka Silén is the co-founder of ADF's partner company Consair Oy. The company manufactures and develops portable workstations that clear the air from the dry construction dust. The system, CAMU 1200, is patented and won the Fennia Prize in the startup division in 2017. Pekka has studied chemistry at the University of Helsinki. As of 2012, he has been studying construction technology in Aalto at bachelor's level and currently works at Trenox crane company.*

**“ONE OF THE BEST THINGS THAT THE COURSE GAVE US WAS THAT EVERYBODY HAD TO DEVELOP SKILLS OUTSIDE THEIR STUDY AREA. EVERYBODY HAD TO STEP OUT FROM THEIR COMFORT ZONE.”**

# 02

## Community

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Industry Collaboration

The ADF community is interdisciplinary and multicultural. Here different backgrounds, fields and experiences are all working together and enriching the outcome.

Our working environment and spatial arrangements encourage informal collaboration and knowledge exchange between students, researchers, companies, staff - and even visitors. The accessibility and openness of DF drives interactions within our community.

DF encourages the community to interact with each other - share ideas and help. If you are stuck with your ideas or have a bad day, just head to Kafis - it's by the coffee machine where ideas are hatched, partnerships formed and spontaneous meetings occur.

# 24

**EARLY-PHASE START-UPS  
BASED AT DF IN 2016-2017**

# 35

**STAFF MEMBERS IN  
TOTAL IN 2016-2017**





**“Answers to every question, even the stupid ones”**

\*Quotes taken from a survey sent to students taking courses at DF.



# Monthly Highlights

A peek into what happened at Design Factory over the academic year 2016-2017

## Aug

### Events & Courses

TEDx Otaniemi: Play to learn, learn to play

Yonsei Summer School, 22 students

### Visitors

High School students, China

Professors from Taiwan

Junior High School students, Estonia

City of Leuven, Belgium

Cass Business School, City University of London

## Sept

### Events & Courses

Teknoloikka kick-off

PDP course starts, 16 projects

ME310 course kick off

New York City DF opening ceremony at Pace University

Burning Man project, Koulu on Fire in Black Rock desert

### Visitors

Univ. of Management and Technology, Pakistan

University of Tasmania, Australia

School and high school teachers from Japan

Prime Minister of South Australia

Minister of Education of Romania

## Oct

### Events & Courses

RTU DF opening ceremony in Riga, Latvia

World Cultural Council award ceremony in Riga, Latvia

Intensive PD6 week, students from 15 universities around the globe

### Visitors

President of Lithuania

Chairman and parliamentary delegation of Kazakhstan

County Mayors from China

University of São Paulo, Brazil

Kaist University, South Korea

City of Lille, France

Manchester University, England

## Nov

### Events & Courses

TEdEx CERN in cooperation with TEDEx Otaniemi (streamed at Stage)

Creativity for Business Innovation Challenge final in Barcelona, Spain

### Visitors

Inter-American Development Bank, Latin America

ESADE Business & Law School, Spain

Haukilahti High School students, Finland

Hyperloop team from Los Angeles, USA

Fudan University, China

Kaunas University of Technology, Lithuania

Ngee Ann Polytechnic, Singapore

Kyoto Institute of Technology, Japan

Tokyo Institute of Technology, Japan

## Dec

### Events & Courses

Crystal Flowers in Hall of Mirrors kick-off

IDBM interim presentations

### Visitors

Students from University of North Dakota, USA

Ambassadors delegation from Latin America & Caribia

Minister of Education of Malta

Ambassador, Embassy of the Kingdom of the Netherlands

Donghua university, China

Mayor of Fukuoka, Japan



## Jan

### Events & Courses

PDP Half-way show

First Bisnesdates  
hosted by ADF

### Visitors

University of Dublin,  
Ireland

Students from Kyungil  
University, South Korea

Lahti Institute of  
Design, Finland

University of Lille,  
France

Ambassador of Japan  
in Finland

## Feb

### Events & Courses

Stage Fright workshop  
by professional actor  
Elina Aalto

Intensive 2-day  
workshop for Lyon  
Business School MBA  
students

### Visitors

Auckland University  
of Technology, New  
Zealand

Jeonju University,  
South Korea

WU Wien, Austria

Avantika University,  
India

Kolegji Universum,  
Kosovo

Helsinki University and  
LUMA Centre

## Mar

### Events & Courses

ME310 Winter  
presentations

IDBM Interim  
presentations

UVP Design Factory  
opening in Valencia,  
Spain

### Visitors

Tallinn University,  
Estonia

University of Tartu,  
Estonia

University of Adger,  
Norway

Students from Brown  
University, USA

Ministry of Science and  
Technology, China

Jönköping  
International Business  
School, Sweden

Journalist of De  
Ingenieur

Province of Jiangsu,  
China

Ministry of Schience  
and Technology of  
China

## Apr

### Events & Courses

IPD final presentations

Intensive 2-day  
workshop for  
Haukilahti High School

4th DF Bootcamp with  
26 participants from 8  
institutions

DFGN Rat Relay:  
36-hour marathon of  
global challenges

CERN Roadshow

Facebook developer's  
F8 conference with  
Junction 18.4.

### Visitors

Education cities  
delegation, Israel

National Kaohsiung  
First Universitiy  
of Science and  
Technology, Taiwan

Students from Espoo  
School of Art, Finland

Suranaree University of  
Techology, Thailand

University of Bergen,  
Norway

Sindicato das  
Mantenedoras de  
Ensino Superior, Brazil

## May

### Events & Courses

Product Design Gala  
20th anniversary

Pack-Age final  
presentations

ME310 Final  
Presentations

Tuote Students of  
Product Development  
Pizza Night & Bruce  
Oreck

### Visitors

CERN Director General,  
Switzerland

KONE CTO office  
delegation, Finland

Slovak Innovation  
and Energy Agency,  
Slovakia

Harvard University MBA  
students, USA

Provosts and Vice-  
Presidents from  
universities across  
Canada

Senior Vice President  
of Fortum Oy, Finland

Tilburg University,  
Netherlands

Students from  
University of North  
Carolina, USA

Nantes University,  
France

University of Tasmania,  
Australia

Tallinn University,  
Estonia

Singapore Institute of  
Technology, Singapore

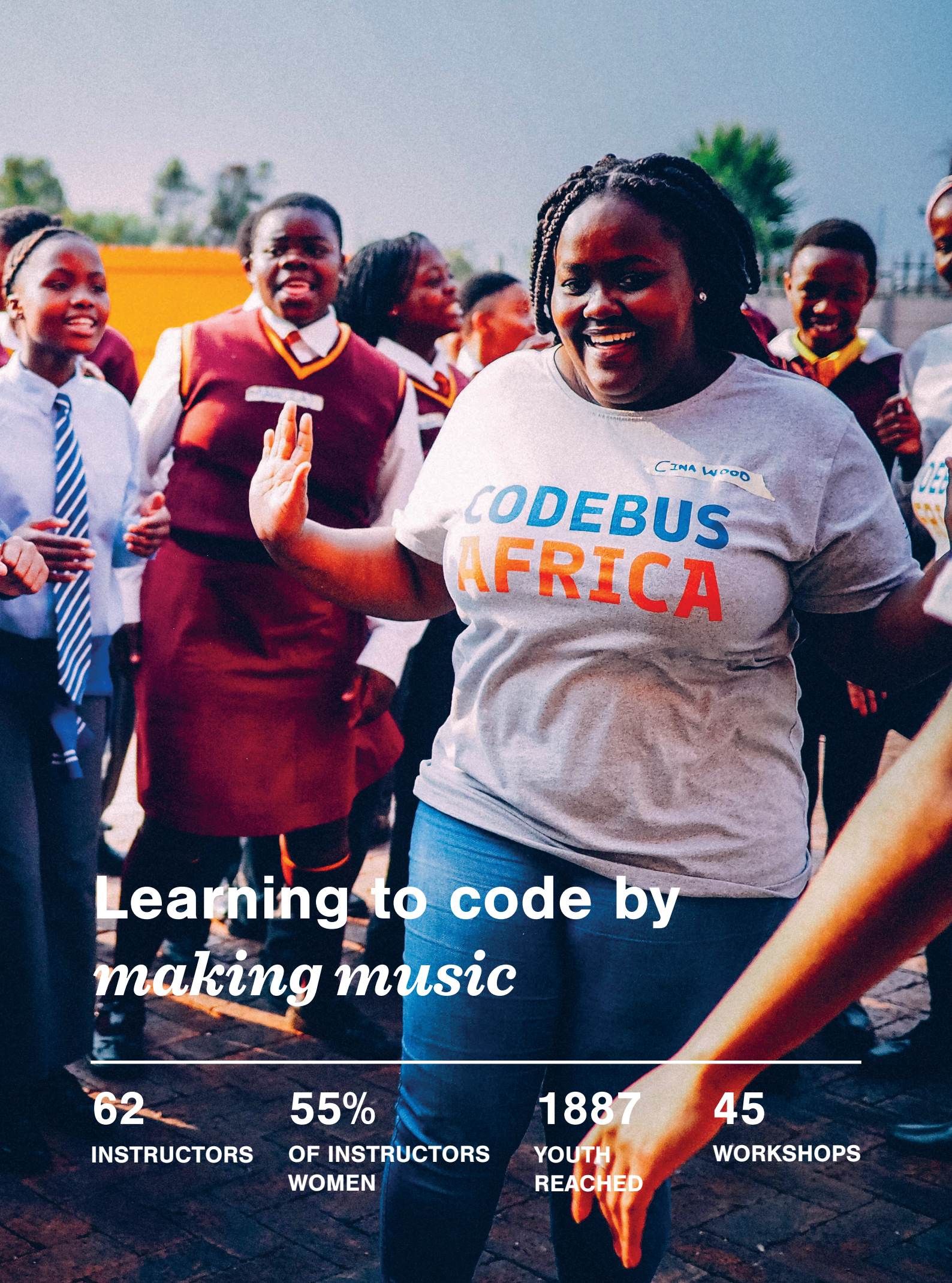


Photo: Emilia Kwiatkowska van Dijk



Photo: Emilia Kwiatkowska van Dijk





# Learning to code by *making music*

62

INSTRUCTORS

55%

OF INSTRUCTORS  
WOMEN

1887

YOUTH  
REACHED

45

WORKSHOPS



**Organised this year for the first time, as part of Finland's centenary celebrations, CodeBus Africa was a 100-day adventure into creative technology and youth empowerment in ten African countries. Two ADF employees hopped on the bus and share what experienced.**

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Between February and May 2017, the CodeBus Africa team organized 45 creative coding workshops throughout the African continent. CodeBus Africa's organising partners were the Ministry for Foreign Affairs of Finland, Nokia, Mehackit and over 15 African technology hubs, educational institutions and organisations. The project was coordinated by Aalto Global Impact, which promotes Aalto University's societal impact globally through education, research and innovation. Codebus Africa was a part of the official Finland 100 Programme and reached some 1800 youth with the the one-day workshops. In these workshops the students learned the basics of computer programming by coding music with the open-source software Sonic PI.

The aim of the project was to inspire youth to discover and make use of technology in their lives, and empower, especially girls, to explore technology's possibilities for their future. Girls made up the majority of the workshop participants in every country.

As the CodeBus Africa project shared the ADF's values of empowerment, creative technology, and interdisciplinary education, it shouldn't be a surprise that members of the ADF community were part of the team making it all happen. The project's coordinator **Irena Bakić** is a PdP course alumni, former thesis worker, and long-term community builder at ADF. Alongside her two of the current ADFers, **Anniina Leggat** and **Sonia El Kamel**, joined the journey as coding instructors. Anniina took part in the project in its first leg in mid-February, instructing in three countries: Ghana, Nigeria and Ethiopia. Sonia, on the other hand, hopped on board for the last three weeks of the project in South-Africa and Mozambique. These kind of projects and experiences allow the Design Factory staff to develop professionally and bring fresh expertise to their work at DF.

### **Anniina Leggat**

**"This project was the experience of a lifetime- both for us organising but for the youth participating the workshops. I was reminded again how capable, driven and passionate the mind can be. For instance, in Ethiopia we got to see how students, who had never seen a computer before, were able to write their first two lines of code after a few hours. To be part of this project was a huge opportunity for me as well; to learn about education, culture and technology"**

### **Sonia El Kamel**

**"Coding can feel distant - even terrifying - to many, especially those who are not encouraged to test and experiment with technology. The most valuable experience for me while instructing in the workshops was witnessing the youth, both boys and girls, discover that coding isn't black magic or something that you can only do after years of experience with computers. It is something that everyone is capable of when given the opportunity."**





“We want to inspire people by demonstrating that a miscellaneous crew can be in contact with the outer space with self-built means.”

# Aalto at Burning Man

Photos: Saara Alhopuro & <http://www.kouluonfire.com/pictures/>

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For three consecutive years an altering group of Aalto University students, faculty and alumni along with people outside of Aalto have together created interactive art installations to be displayed at the Burning Man festival. Burning Man is an annual gathering that takes place at Black Rock City - a temporary city in Nevada. The festival is described as an experiment in community and art.

The team behind the first project, named Aalto on Fire, designed and built a six-meter long wooden pike head at Design Factory's prototyping space, Puuhamaa, and constructed the final version at Black Rock Desert, 8313 kilometers away from the Otaniemi campus. A traditional Finnish musical instrument, kantele, was built inside of the the pike's head. Aalto on Fire hosted discussions and workshops throughout Burning Man and invited people to interact with their art while sharing their teachings and learnings.

Following Aalto on Fire, in August 2016, Koulu on Fire took a fragment of the Finnish education system to Burning Man. Koulu on Fire is a peer-to-peer learning concept that is based on simple, scalable method of training basic teaching skills, "The Five Finger Method", originally developed in 2012 by Finnish think tank, Demos Helsinki. In its core the idea is very straightforward: everyone has something to teach. The approach is based on the latest research that reveals that we are more prone to learn from a peer. During the piloting of the workshops in Burning Man, more than one hundred new teachers were trained to educate others. The teachings varied from how to tie a fine knot or walk on broken glass, to a rudimentary lecture on physics given by an astrophysicist.

After trialling the concept at the festival, a part of the team took the project further: renamed Koulu School, the workshop was taken to Kathmandu, Nepal, and to a refugee camp in Jordan. In fragile contexts and vulnerable communities, peer-to-peer learning is an engaging tool that provides psychosocial support on disaster awareness, along with creating a safe and inspiring learning space. In fragile or low-resource contexts an easy access learning opportunity can make all the difference in supporting the community to access its untapped potential and foster self-reliance and self-worth. **Jami Sarnikorpi**, who has been an active member of the Design Factory community both in Aalto and Tongji University, has taken part in all of the three Burning Man projects. He believes teaching makes one feel good about oneself and reinforces confidence:

“Many might feel that they don't have anything

to share, so discovering the taught subject is actually part of the workshop. It is really inspiring to see people understand that they, in fact, do have something to teach. It is important that knowledge is spreading and people are curious and willing to learn new things. It is the basis of development and creativity.”

In each of the projects, the teams have been truly multidisciplinary, having members from engineering, business and arts to medicine, theatre and makeup artistry, just to mention a few. Jami describes that the diversity of the team prompts new aspects to the projects:

“A truly multidisciplinary environment takes these kinds of projects to a societal level and allows the projects to spread as far as possible”

This year next off was Space on Fire, a project that harnessed Finnish expertise in space technology, wooden architecture and experience design to build an interactive art installation to Burning Man. The installation, called the Cosmic Egg, had its main focus on sound, received data from outer space and turned the data into an immersive experience. For instance, the the Cosmic Egg turned solar bursts and cosmic radiation into soundscape, that were mixed up with music composed by the Space on Fire team. The ground station equipment was even designed to handle real time communication with spacecraft, including International Space Station.

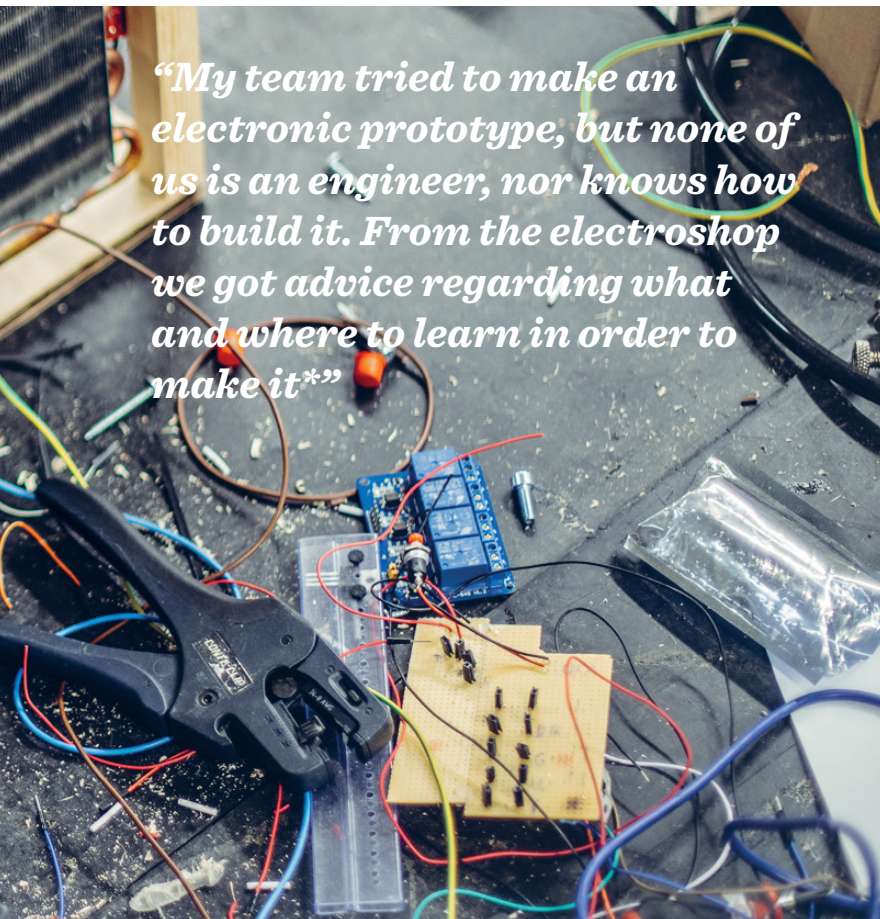
“We want to inspire people by demonstrating that a miscellaneous crew can be in contact with the outer space with self-built means,” Jami explains.

The project organized a number of events in Helsinki, but the main event took place at the Burning Man festival. Jami hails Aalto for enabling and supporting these kind of passion-based projects.

“Aalto has offered good spaces co-creation, such as Design Factory and Fablab where people can fulfill their curiosity. These projects truly bring people together.”

Aalto on Fire has since its piloting grown into a series of various experimental events and a broad network of people from different fields and backgrounds. These kind of communal efforts and passion-based projects are the essence of Design Factory.

# Spaces supporting *co-creation*



*“My team tried to make an electronic prototype, but none of us is an engineer, nor knows how to build it. From the electroshop we got advice regarding what and where to learn in order to make it\*”*

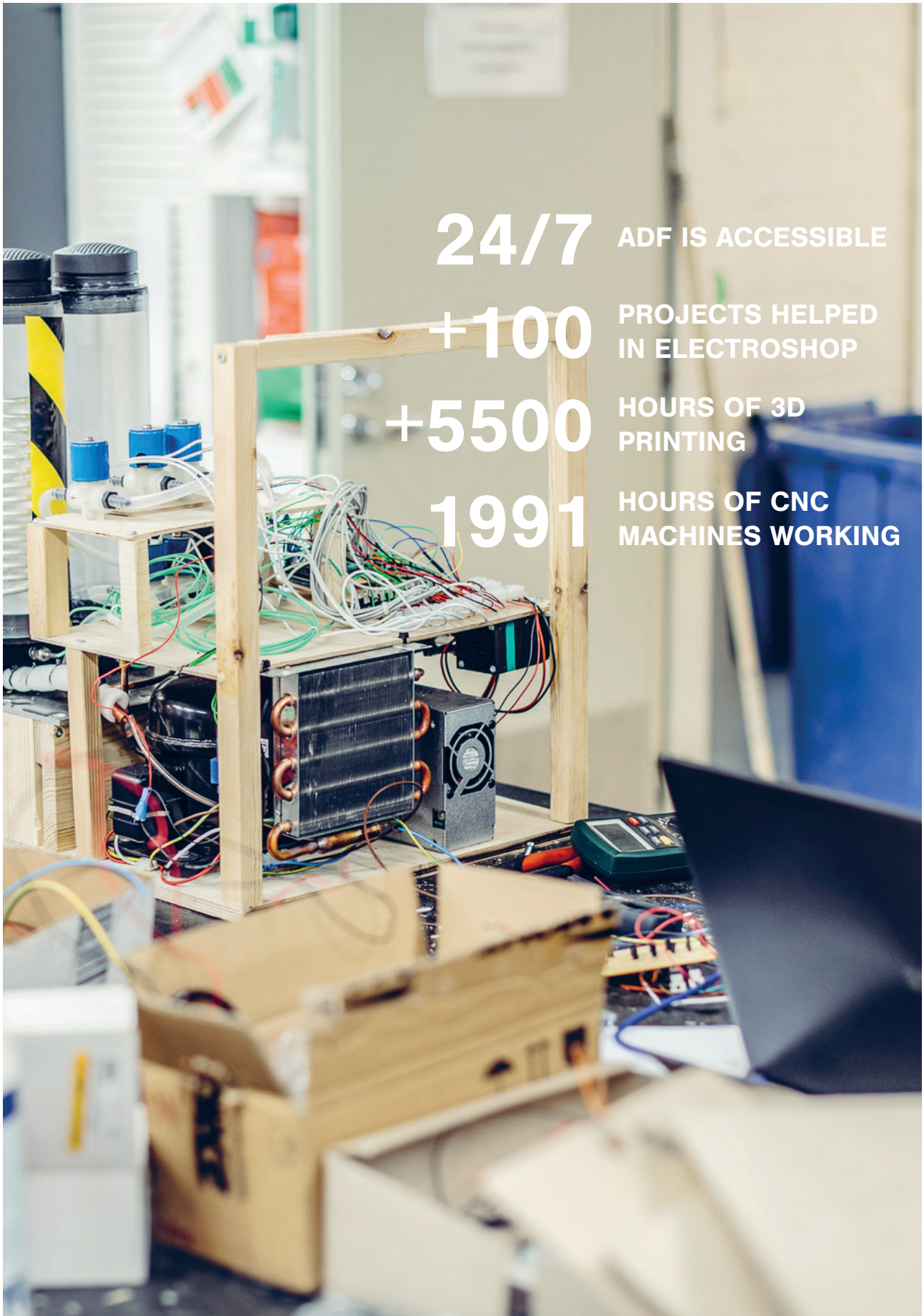
\*Quotes taken from a survey sent to students taking courses at DF.

In the past, the Aalto Design Factory building at Betonimiehenkuja 5 served as a wood research laboratory. This can still be seen in the foundation and structure of the building with its high room heights and rough surfaces. The constantly developing spaces, that are open round the clock, are designed to be easily accessible and host everything from lectures, workshops and seminars to community breakfasts and spontaneous encounters that can lead to fruitful collaboration.

ADF has various different spaces for prototyping. The main purpose of these spaces, Machine Shop, Print Shop, ElectroShop, Paint Shop, Wood Shop, Mushroom and Proto Bunker - is to serve the students that take courses at ADF.

The biggest asset for students who use the workshops, is the people who run the workshops and who instruct and help in different matters regarding product development, design and acquisition of materials. The staff is able to manufacture parts for the prototypes and products, and they also incite the students to try out their ideas independently.





24/7

ADF IS ACCESSIBLE

+100

PROJECTS HELPED  
IN ELECTROSHOP

+5500

HOURS OF 3D  
PRINTING

1991

HOURS OF CNC  
MACHINES WORKING



# TUOTE

**Bringing the students of product development together**

Founded in 2015, TUOTE Students of Product Development is an association for Aalto University students studying or interested in interdisciplinary product development. The society aims to build a community by reforming the boundaries of conventional disciplines and to bring product development students together.

Aalto University has numerous product development courses, many of which are held at Design Factory. In fact, it was the interdisciplinary courses held at ADF which brought the founding members of TUOTE together to discuss the need of a student organization as there were very little joint activities for the students outside the course programme and the students felt they had no way to stay informed about all the other interdisciplinary activities in Aalto. The idea was to start with the students at ADF and after them, expand to whole of Aalto.

## **The PMC Project Management Community**

Being a project manager is a challenging task. And that is why each year the PdP project managers are invited to join the Tuote Project Management Community, in where they can get support and useful information relating to project management as well as enjoy the benefits of a small community consisting of like minded people with similar experiences.





### Pizza and Project Management

Today TUOTE is an active member of the ADF community. In the beginning of the academic year 2016-17 they launched their new monthly event, Pizza and Project Management Nights for TUOTE Project Management Community (PMC). In each event guest speakers share their experiences about project management and knowledge of the industry practices, followed by pizza and discussion. These events were tailored for anyone who is interested in project management, especially for the ones acting as one in course projects. These evenings covered themes such as leadership, organizational culture, testing and examples of failures and how to come back from them.

In the last P&PM event of the year 2016-17, the stage was given to Bruce Oreck, the former ambassador of US to Finland. With many accolades such as the author of several tax treaties, and the center of unconventional Christmas greeting cards, he is also Executive in Residence at Aalto and has been a public speaker for over 20 years. In his speech he addressed topics as diverse as creativity, envisioning the future, entrepreneurship and marketing. This last P&PM night of the year showed how the community had grown: the event gathered around 120 people interested in project management to DF!

### AIMANE BLEJ

PdP Project Manager 2016-2017

**“The Pizza and Project Management events were a great opportunity to get in touch with previous years PdP project managers, hear about their PdP journey and the challenges they had faced within their teams when it came to team dynamic, communication with different shareholders, and how they tried to solve them. The discussions we had, exposed me to different perspectives on how to manage a team and a PdP project through its different stages.”**

# Industry collaboration and start-ups at Design Factory

We support companies in their early stage  
to become the new success stories.

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Design Factory is home to everything from nonacademic, student driven and ambitious projects to early phase startups and already well-established companies. We have in-house partner companies, located in our Partner Plaza, who are enriching the ecosystem diversity and participating to the daily activities in the community. We support companies in their early stage to become the new success stories under our loving care and attention, and we encourage companies to make the most of the potential co-operation that Aalto University offers. Hence, partners are selected according to their motivation for close collaboration and the mutual benefit potential within the vast community in DF and Aalto University.

However, the most intensive users of Design Factory are the various product design courses working with several companies doing projects ranging from tiny to huge in size. Most of these courses are working globally having partner universities and sponsoring companies from all over the world. During one academic year we host over 30 industry sponsored learning projects. Altogether these course projects collect annually about 0.6-1 million euros external funding to cover the realisation of the projects and prototyping.

Sponsoring a course project can be an inspiring and inexpensive way to bring new ideas, technologies or business plans to life. What is needed from the sponsor is support and evaluation during the course and the idea for the project: perhaps a problem that exists with current products or technologies, or just some interesting idea that cannot be investigated internally at the moment.







## Start-up story from ADF: Entocube & Arctic Crickets Finland

+2

BILLION PEOPLE  
INCLUDE INSECTS  
IN THEIR NUTRITION

19,5%

OF PROTEIN IN  
ONE CRICKET

17,5%

OF PROTEIN IN  
ONE CHICKEN

20 000

LITERS OF  
WATER IN ONE  
KILO OF BEEF

Due to the rapid growth in global population, the need for food and water is increasing. However, the natural resources required to produce food are not limitless. The environmental impact of for example meat production is indisputable - in California, for instance, 20,000 liters of water is consumed to produce a kilo of beef. How are we able to keep up with the growing need for food in a way that is sustainable not only for us, but also for the future generations?

Aalto Design Factory is home to two student-run startups, EntoCube and Arctic Crickets Finland, that aim to solve this puzzle by breeding edible crickets, since insects are a more sustainable source of protein than meat. In comparison, the production of crickets requires remarkably little water, feed, and space compared meat production.

EntoCube has designed and built controlled atmosphere shipping containers of various sizes that can be manually operated to farm food-grade insects. The startup has licensed the technology for breeding crickets, and sells the breeding system to producers/cricket breeders. The crickets are sold as raw material for businesses, as well as refined products for consumers, such as cricket granola.

EntoCube is currently the largest consumer brand and producer of insects in Finland. The first EntoCube container was built in 2014 in Vantaankoski, a suburb near Helsinki, by the current Chief Innovation Officer of EntoCube, **Robert Nemlander**, and his father. It was the current CEO of EntoCube, **Perttu Karjalainen**, who came up with the idea to move the container to Design Factory. Having lived at the Otaniemi campus, Karjalainen, who was at the time active

in the Aalto student community, was already familiar with Design Factory, its facilities and network. Soon after having the idea of moving the company, the first EntoCube container stood firmly at Design Factory's back yard.

"We were welcomed at Design Factory, even though we had very little resources. We are extremely grateful for the love and support we have gotten!" Perttu says.

Both of the start-ups hail DF for its facilities the different work, prototyping and storage spaces - and broad network of various different stakeholders.

"Through Design Factory's broad community, fascinating ideas come into existence and begin to spread," says **Tommi Nieminen**, the founder of Arctic Crickets Finland.

Arctic Crickets Finland was founded in 2016 and moved to DF soon after the start-up was established, for the desire to cooperate with EntoCube. Nieminen, describes the relationship between the two startups working in the same field as an equally beneficial symbiosis: EntoCube buys their crickets from ACF's cricket farm and all the materials required for production are purchased together.

Moreover, by belonging to the DF community the startups have the opportunity to participate in all the communal activities based at DF. For instance, as an alumni of PdP, Perttu from EntoCube hosted this year's Product Design Gala, where all the course projects from the academic year at hand were presented.

"We are happy to give back to the community that has enabled so many things for us", Perttu smiles.

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## Research

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Two Highlights of Research at ADF  
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The roots of research at Design Factory trace back to its very beginning. Design Factory was after all born from a research project Future Lab of Product Design (FLPD), which explored physical and mental approaches to supporting design and development work as well as educating product developers.

A common denominator for all the research at Design Factory is its practice-oriented nature. Researchers within the community work, in close collaboration with students, teachers, industry and the public sector, often adopting approaches that generate impact already during the research process.

The Design Factory research community consists of researchers from various disciplines, universities and nations. On one hand, members of the ADF staff conduct research on the phenomena related to DF, such as design practices, design thinking and university education, while on the other, the community at large explores design, development, and innovation from a wide variety of disciplinary perspectives and with diverse methodological approaches.

In addition to the in-house research supporting the development of the ADF platform, Design Factory hosts a lively research community with a multitude of research agendas and approaches. This community consists of both visiting and permanent individual researchers and research groups. Research that is carried out at Design Factory drives great impact beyond academic fields and ties in close relations with industry partners.

### ADF researchers' activities:

- Conduct and publish multidisciplinary research
- Mentor teachers on developing their courses
- Instruct Bachelor's and Master's thesis workers
- Plan and organize workshops
- Teach in different courses
- Develop "soft skill tools" for students e.g. facilitated feedback sessions
- Coach students





**67%**

**OF DF RESEARCHERS HAVE  
COLLABORATED WITH  
COMPANIES IN THEIR RESEARCH**

**30**

**ACADEMIC PUBLICATIONS  
PUBLISHED IN 2016-2017**

A common denominator for all the research at Design Factory is its practice-oriented nature.

# Doctoral dissertations

Two innovative perspectives to development by ADFers

## Advancing the Lead User Method and its Adoption in Organizations

*Words by Pia Helminen*

A key to being a successful business is not only being able to respond to demand but being able to anticipate future demand. This is easier said than done, as understanding what users need is one of the areas of most persistent and costly failure in product development. Innovation by so called lead users can be found in all fields ranging from post-it-notes to sporting equipment and surgical instruments to banking services. The lead user method is a process companies could apply in their product or service development to benefit from the lead users. Despite its documented advantages, the LU method has not gained ground as a standard part of companies' development toolbox. This thesis explores the challenges involved in the use of the LU method and aims to provide remedy and direction for its use in organizations.

It was found that instead of general resistance to user ideas or new ways of working, or the cost and time required by the LU method, it is the difficulty of transferring and retaining the knowledge of how to conduct a LU project that hinders its adoption in an organization. The case analyses demonstrate that the LU method features skill components that are more costly and difficult (i.e. "sticky") to transmit among employees than the adopter organizations were prepared for. Rather ironically, it is the same phenomenon that user innovation research has identified as one of the key reasons for why users hold solution and trend information and why lead users should be utilized in the first place.



*Pia Helminen*

**“Innovation by so called lead users can be found in all fields ranging from post-it-notes to sporting equipment and surgical instruments to banking services.”**





Maria Clavert

## The role of academic communities and change agency in educational development\*

*Words by Maria Clavert*

**Pedagogically oriented and discipline-specific academic communities mediate academics' processes of educational development**

**Change agents act as connectors of university level development strategies and community level teaching traditions at the interfaces of pedagogically oriented and discipline-specific academic communities**

**Success of informal change agent activities is mainly dependent on the extent to which they are supported with formal leadership and collegial involvement**

**In organizational transformations, universities should turn their focus from individual development courses and separate discipline-specific development projects to ways of supporting informal change agency at the community interfaces**

In recent years, a term 'change agent' has been applied to describe professors, researchers, and lecturers that engage in educational development beyond their own courses. This kind of informal 'grass root level' activity is often included in a university-level development strategy and is especially called for during organizational transformations that require fast implementation of new teaching practices throughout the university. In Aalto University, change agency is supported with a Design Factory platform that provides the academics an interdisciplinary community supportive of collaborative experimentation with new teaching practices. In order to harness the ADF concept in organizational transformation, we need to understand how exactly do academic communities and academics as informal change agents contribute to educational development processes.

In my doctoral dissertation, change agency is defined as 'dual citizenship' within the university: simultaneous involvement in both pedagogically-oriented academic communities, such as in-service training, and discipline-specific academic communities, such as departments, laboratories and research groups. Change agent activities are defined as promoting exposure to new pedagogical meanings, identities, practices, and ways of belonging in discipline-specific communities. The data was collected with interviews of 23 engineering educators with a 'dual citizenship' in a Finnish university before and during a period of organizational transformation in 2009 and 2011-2013. The participants were asked to describe their experiences of educational development during the academic career.

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\*Based on Maria Clavert's doctoral dissertation 'Academics' transformative learning at the interfaces of pedagogical and discipline-specific communities' accepted for publication at University of Helsinki Faculty of Educational Sciences.

# Studying courses at DF

Looking into the skills that graduates will need in the future and taking baby steps towards evidence-based education.

## Promoting empathy between designers and users

*Words by Tua Björklund*

Typically institutes join the Design Factory Global Network (DFGN) in search of a better way to teach students and effect change in their universities. It is perhaps fitting then that our research collaboration has also sprung from looking at teaching project-based courses on innovation. This year, our first multi-Factory concerted research effort was run by Aalto Design Factory, Design Factory Melbourne, Porto Design Factory and Stanford University, studying the multidisciplinary student teams of the ME310 design innovation project course. We've recorded and coded meetings between the student teams and the teaching teams, and collected two waves of questionnaires to look at how, and to what effect, can we build empathy in the prototyping and user-testing intensive course. We've measured perspective-taking, interest and confidence in engaging in innovation activities, as well as self-confidence in leading teams. This data serves a double benefit to the DFGN community: not only do we increase long-term generalizable academic understanding of design processes, we can use the gathered data immediately to develop our teaching further.

Empathy played a role in another key research activity of the DFGN in the past academic year as well. Staff from the Design Factories in Finland, Portugal, Netherlands, Spain, Latvia, Chile and the IdeaSquare in CERN, Switzerland, have been scoping out together with other international partners what kind of research consortiums could be possible. We applied for EU2020 funding in the Fall to jointly study and run pilots of design thinking for user-driven innovations. Although we did not get the funding, we now know much of the different Factories insights and work on user benefits and business impact as well as their design capabilities such as promoting initiative, empathy, and creativity. This lays an excellent groundwork for the next steps of research co-creation in the DFGN.



*Tua Björklund*

**“We’ve measured perspective taking, interest and confidence in engaging in innovation activities, as well as self-confidence in leading teams.**

**This data serves a double benefit to the DFGN community: not only do we increase long-term generalizable academic understanding of design processes, we can use the gathered data immediately to develop our teaching further.”**





## Exploring university students' working life skills in Bachelor's level studies

*Words by Maiju Sairanen*

Supporting the development of working life skills has been a central goal of the Aaltonaut minor program since its establishment in 2013. In the academic year 2016-2017, Aaltonaut hired **Maiju Sairanen** from the University of Helsinki to write her thesis on the development of working life skills in Bachelor's level studies in Aalto University. The data was collected with narrative interviews of six Aaltonaut students who had completed their Bachelor's studies in Aalto by 2016. The participants were asked to describe their learning experiences during the Bachelor's studies from the perspective of working life skills. Even though all participants were former Aaltonaut students and the motivation for the study sparked from the Aaltonaut program, the data collection focused on all Bachelor's level studies and did not separate Aaltonaut from other learning experiences.

The findings reveal that basic and major studies support working life skills mainly related to teamwork, information retrieval and scientific research. However, the majority of working life skills were reportedly developed during minor studies. While Aaltonaut studies were found to support students' academic skills, such as information retrieval and scientific research, they also supported a wide range of other working life skills, including working with different people and having an entrepreneurial mind-set. Aaltonaut studies were the only learning experiences that were reported to develop oral and written communication skills in English and the ability to reflect on what had been learned. The study suggests that the combination of first-hand experiences of applying working life skills in various settings, reflection, and theorization result in a wider skillset than mere theorization, such as attending a lecture on teamwork.

\*Data gathered from a survey sent to 71 Aaltonaut students.

### The three main learning experiences in Aaltonaut\*

**28%**  
INTERDISCIPLINARY  
TEAM WORK

**17%**  
PROJECT WORK  
AND WORKING AS A  
PROJECT MANAGER

**17%**  
OPEN PROBLEM  
AND HANDS-ON  
EXPERIMENTATION

# Publications

Some examples of conference papers and publications published over the academic year 2016-2017.

## Multidisciplinary education

Pink, S., Rieken, B., Björklund, T.A. & Sheppard, S. (2017). What makes an inquisitive engineer – **An exploration of question-asking self-efficacy and outcome expectations among engineering student**. American Society for Engineering Education, ASEE Annual Conference, Columbus, Ohio.

Levine, A., Björklund, T.A., Gilmartin, S. & Sheppard, S. (2017). **A preliminary exploration of the role of surveys in student reflection and behavior**. American Society for Engineering Education, ASEE Annual Conference, Columbus, Ohio.

## Contract Design

Passera, S., Smedlund, A., Liinasuo, M. (2016). **Exploring contract visualization: clarification and framing strategies to shape collaborative business relationships**. Journal of Strategic Contracting and Negotiation. Vol.2 , No. 1–2

Passera, S., Kankaanranta, A., Louhiala-Salminen, L. (2017). **Diagrams in Contracts: Fostering Understanding in Global Business Communication**. IEEE Transactions of Professional Communication. Vol.60, n. 2, DOI: 10.1109/TPC.2017.2656678

Forsström, P-L, Haapio, H, Passera, S. (2017). **FAIR Design Jam: A case-study on co-creating communication about FAIR Data Principles**. In E. Schweighofer et al. (Eds.), Trends and Communities of Legal Informatics. Proceedings of the 20th International Legal Informatics Symposium IRIS 2017 (pp. 433–440). Wien: Österreichische Computer Gesellschaft.

## Design Factory studies: An experiential learning platform

Tuulos, T., Kauppinen, T., Riveros Ospina, D.I. & Ivorra Peñafort, L.R. (forthcoming). **Around the world in 36 hours - understanding the dynamics of the global product design hackathon**. 45th SEFI Conference, 18-21 September 2017, Azores Islands, Portugal.

Tuulos, T., Vainio, M. & Taajamaa, V. (2016). The role of an external facilitator in developing new co-creation platforms in university education. 44th SEFI Conference, 12-15 September 2016, Tampere, Finland.

Tuulos, T. & Hämäläinen, M. **Bridging physical and social space: Practices and behavior in co-creation platforms**. In: Björklund, T., Laakso, M., Kirjavainen, S. ed. Designing Change – Fostering passion-based co-creation in modern work.

Tuulos, T. & Kirjavainen, S. (2016). **Creating a home for experiential learning – a case study of an interdisciplinary product development course**. Proceedings of NordDesign 2016, August 10-12 2016, Trondheim, Norway.

## Human factors - trust in automation

Yang, Y. J., Wickens, C. & Hölttä-Otto, K., 2016, **How human operators adjust trust in automation: Contrast effect and hindsight bias**, HFES International Annual Meeting, September 19-23, 2016, Washington DC.

Siah, Kewin. T., Yang, X. Jessie, Yoshida, Naohisa, Ogiso, Kiyoshi, Hölttä-Otto, Katja & Yuji Naito, 2016, **Effects of Experience, Withdrawal Speed and Monitor Size on Colonoscopists' visual detection of polyps**, HFES International Annual Meeting, September 19-23, 2016, Washington DC. Contract design

## Model based design

Björklund, T.A. & Krueger, N. (2016). **Generating resources through the co-evolution of entrepreneurs and ecosystems**. Journal of Enterprising Communities, 10(4), 477-498.

Kirjavainen, S., Björklund, T.A. & Laakso, M. (2016). **Framing activities and the co-evolution of products and operations in new ventures**, NordDesign 2016, August 10-12, Trondheim, Norway.



## Design methodology: Creativity

Laakso, M., Björklund, T.A. & Kirjavainen, S. (2016). **Collaborative fixation in early problem exploration and idea generation workshops**. The Fourth International Conference on Design Creativity (ICDC), Atlanta, GA, Nov 2-4, 2016.

Raviselvam, S., & Hölttä-Otto, K., 2016, **User Extreme Conditions to Enhance Designer Creativity and Empathy: Application Using Visual Impairment**, ASME IDETC International Conference on Design Education, Charlotte, NC, August 21-24.

## Design methodology: Need finding and users

Helminen, P., Ainoa, J., & Mäkinen, S. (2016). **Designing user innovation toolkits: exploring the interrelation between solution space and module library**. International Journal of Design Creativity and Innovation. 4(3-4), pp. 162-180.

Helminen, P., Mäkinen, S., & Hyysalo, S. (2017). **Organizational adoption of the lead user method: a follow-up study on intentions versus actions**. International Journal of Business Excellence. 12(4), pp. 508-536.

Hölttä-Otto, K. & Raviselvam, S., 2016, **Guidelines for Finding Lead User Like Behavior for Latent Need Discovery**, NordDesign 2016, August 10-12, Trondheim, Norway.

Raviselvam, S., Tam, V., Hölttä-Otto, K., Wood, K. & Nagarajan, K., 2016, **A Lead User Approach to Universal Design – Involving older adults in the design process**, International Conference on Universal Design (UD2016), August 21-24, York, UK.

Raviselvam, S., Wood, K., Hölttä-Otto, K., Tam, V., & Nagarajan, K., (2016) **A Lead User Approach to Universal Design-Involving Older Adults in the Design Process**, Studies in health technology and informatics, 229, 131

## Design methodology: Prototyping

Camburn, B., Viswanathan, V., Linsey, J., Anderson, D., Jensen, D., Crawford, R., Otto, K. and K. Wood, **Prototyping: State-of-the-art in Techniques, Methods, and Design Science**, Design Science Journal, 2017.

## Product Architecture

Niutanen V. and K. Otto, **Field Isolation As A Basis For Modular Product Architecture**, ASME International Design Engineering Technical Conferences, DETC2017-67751, Cleveland, 2017.

Min, GK, Suh, ES, & K Hölttä-Otto (2016) **System Architecture, Level of Decomposition, and Structural Complexity: Analysis and Observations**, Journal of Mechanical Design, 139(3), 034501 Brief. (Jan 12, 2017) (5 pages)

Sanaei, R., Otto, K., Hölttä-Otto, K. and K. Wood, **Incorporating Constraints in System Modularization by Interactive Clustering of Design Structure Matrices**, ASME International Design Engineering Technical Conferences, DETC2016-60510, Charlotte, 2016.

Sanaei, R., Otto, K., Wood, K. and K. Hölttä-Otto, **A Rapid Algorithm for Multi-objective Pareto Optimization of Modular Architecture**, International Conference in Engineering Design, 2017.

Sanaei, R., Otto, K., Wood, K., Hölttä-Otto, K. (2016) **Trade-offs Among System Architecture Modularity Criteria**, DS 85-1: Proceedings of NordDesign 2016, Volume 1, Trondheim, Norway, 10th-12th August 2016

## Design and entrepreneurship

Tan, J., Wood, K. and K. Otto, **Concept Design Trade-Offs Considering Performance Margins**, NordDesign 2016, Trondheim, 2016.

Tan, J. Otto, K. And K. Wood, **A Comparison of Design Decisions made Early and Late in Development**, International Conference in Engineering Design, 2017. Reviewer's Choice Award-winning paper.

## Sustainability

Heiskanen, E., Jalas, M., Juntunen, J., & Nissilä, H. (2017). **Small streams, diverse sources: Who invests in renewable energy in Finland during the financial downturn?** ENERGY POLICY, 106(2017), 191-200. DOI: 10.1016/j.enpol.2017.03.013

Jalas, Hyysalo, Heiskanen, Lovio, Nissinen, Mattinen, Rinkinen, Juntunen, Tainio, Nissilä 2017. **Enriching the engagement formats of sustainable practices research**. Published in Journal of Cleaner Production. Journal of Mechanical Design; Design Science

Heiskanen, Nissilä, Tainio 2017. **Promoting Residential Renewable Energy via Peer-to-Peer Learning**. Published in Applied Environmental Education and Communication. Journal of Mechanical Design; Design Science

Granqvist, N., Kallio, G. & Nissilä, H. (forthcoming). **Doing Qualitative Research on Emerging Fields and Industries**. In Mir, R. and Jain, S. (eds.), Routledge Companion to Qualitative Research in Organization Studies, Routledge

Nissilä, Granqvist, Holopainen, Rajala 2017. **Solar energy in the North: temporal legitimization in nascent fields**. European Group of Organisation Studies Conference, Naples, July 2016.

# ADF Related theses

Every year, a variety of theses result from research activities at DF. These are some of the theses directly linked either to development of the Design Factory concept itself or related to ongoing research projects.

## Bachelor's Theses

### Future studies in aircraft product development

**Teemu Penttala,**

Aalto University School of Engineering,  
Spring 2017

The aviation industry continues to grow with the amount of aircrafts estimated to double between 2016 and 2035. Estimations of how the aviation industry will develop in the future can have an effect on the future visions and trends of product development. This thesis looks into the methods of forecasting in development of new aircraft and results of published forecasting studies. The biggest trend in the aviation industry is digitalization with aircrafts being constantly updated with new entertainment systems, internet connections and technological seats. A rapid growth of the aviation industry in Asian markets is a likely scenario of the industry's future."

### The Future user groups in the Chinese air traffic

**Aleksi Miettinen,**

Aalto University School of Engineering,  
Fall 2016

Studying future user groups is an important part of product development. Airlines and other organizations in the travel industry need information on travellers when designing services and products. This thesis explores future user groups and trends in Chinese air traffic. During the last few years, the civil air traffic market in China has grown dramatically and gone through major changes. The number of both domestic and international flights has multiplied with an increase in the amount of both business and leisure travel with seniors and female business travelers being especially interesting user groups. Significant trends in Chinese air travel include the generalization of mobile services, the increasing use of budget airlines, a more diverse traveling culture, and a desire for more personalized travel experiences.

### Design to develop university - Designing Services to Develop an University Course

**Anniina Mansikka-aho,**

Aalto University School of Arts, Design and Architecture  
Fall 2016

"This thesis studied the possibilities to utilise the methods of service design to develop university course activities. The subject of closer observation in the Product Development Project course. This thesis was done in collaboration with the Aalto Design Factory. In the literature review the possibilities to use established of service design and corporation development, as in stakeholder approach, to develop universities. Research conducted in qualitative. Second part of the thesis is the presenting the course manual book that was designed during the process"



# Master's Theses

**Anticipating plausible futures for innovative experimental ecosystems using foresight approach - How Design Factory educates students by year 20x6 {x = 2, 3}?**

**Vikram Munigala,**  
Aalto University School of Engineering,  
Summer 2017

"Educating the students to be change-makers will evolve with future; the aim of the study is to holistically anticipate plausible futures for innovative experimental ecosystems utilizing foresight approach. The focus of the study is on Design Factory's ways of working, spaces, and teaching methods which will support students learning by year 20x6 {x = 2, 3}. This study is about drawing virtual lines that connect the trends, future drivers, visions, and scenarios, using a contemporary approach that fuses qualitative and quantitative methods. The results from the study are six future scenarios for the Aalto Design Factory. These results are expected to further foster or trigger new research and development experiments, directions on building radical environments, new teaching methods and ways of working."

**Customer value and product development course - Multiple case study in university-industry collaboration context**

**Karri Hiekkänen,**  
Aalto University School of Business,  
Spring 2017

"The thesis first introduces the relevant customer value literature and the university-industry context. Then an existing framework for customer value dimensions is introduced, which is then utilized in the analysis of the data. The findings suggest that companies expected and perceived value from the promised end results, the final prototype and the final report, and additional value from the course concept. The course concept includes the events, activities, and interactions between students and companies. The identified customer value attributes and outcomes provide specific, context related knowledge for the studied topic and context. Additionally, the findings suggest that the companies with more experience with the course had more realistic expected values, compared to companies with less experience. The findings provide both theoretical and practical implications. The findings suggest that the chosen framework provides a fruitful basis for analyzing customer value dimensions in new contexts, including university-industry collaboration. Both universities and companies can benefit from the findings."

**A New Business Model with a Plan for Alternative Revenue Streams for Design Factory Global Network (DFGN)**

**Oluwaseun A. Dada,**  
Aalto University School of Science,  
Summer 2017

"The objective of this study was to develop a new business model with a plan for alternative revenue streams for Design Factory Global Network (DFGN). - - The key finding of this research was that new members of the network were willing to pay annual membership fees with the expectation that they will get returns on their investments. Old members were not willing to pay annual membership fees but they were ready to provide financial support through other means. Data also revealed that there was a need for improvement in the governance guidelines of the network, especially as they relate to documentation and decision rights of all stakeholders."

**Gathering user insights to drive the design of an airplane cabin for Northeast Asia**

**Ilkka Kallonen,**  
Aalto University School of Engineering,  
Spring 2017

"The themes that stood out strongest and occurred most often were, for example, the increasing amount of Asian female passengers and their special needs, the etiquette of reclining the seat and the absence of a common language which caused communication problems. It was also surveyed whether the cabin crew had encountered any so-called lead users, i.e. those who have a special need for something and solve it by themselves before there is any commercial solution for it. These kinds of lead users were not identified which could have been because the cabin crew did not pay special attention to these people while they were working."

# 04

## Global Activities

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DFGN  
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The DF Bootcamp  
DF Internship Stories

Internationality is strongly tied to the everyday life at Design Factory. Our students, researchers, teachers and community members come from different parts of the world or are ready to go out to the world. Hence, the working language at Design Factory is English.

Being international is fundamental to the courses organized at Design Factory. For example, in the Product Development Project -course there are remote team members from universities around the world in each team. Also, all team members in ME310 are globally distributed, so that half of the team is made up off students in another country in another university.

Many projects are done in collaboration with international partner universities in the Design Factory Global Network (DFGN). Shared understanding and common ways of working enable Design Factories in the network to collaborate efficiently across cultures, time zones and organizational boundaries, fostering creativity in organizations.

### PdP partner universities 2016-2017

Pace University, USA  
Philadelphia university, USA  
University of São Paulo, Brazil  
KTH Royal institute of technology, Sweden  
Technical university of Munich, Germany  
Warsaw university of technology, Poland  
Porto Polytechnic, Portugal  
Swinburne university of technology, Australia

### ME310 partner universities 2016-2017

Paris d.School, France  
Stanford University, USA  
Karlsruhe Institute of Technology, Germany  
Swinburne University of Technology, Australia





**21**

**DESIGN FACTORIES  
AROUND THE WORLD  
BY THE END OF 2017**

**10 000**

**PEOPLE VISITING  
AALTO DESIGN  
FACTORY ANNUALLY**

**“Sharing the passion for doing\*”**

**\*The DFGN motto**

## Design Factory Global Network (DFGN)

**Design Factory Global Network (DFGN)** is a network of innovation hubs in universities and research organizations on five continents of the world. DFGN is on a mission to create change in the world of learning and research through passion-based culture and effective problem solving.

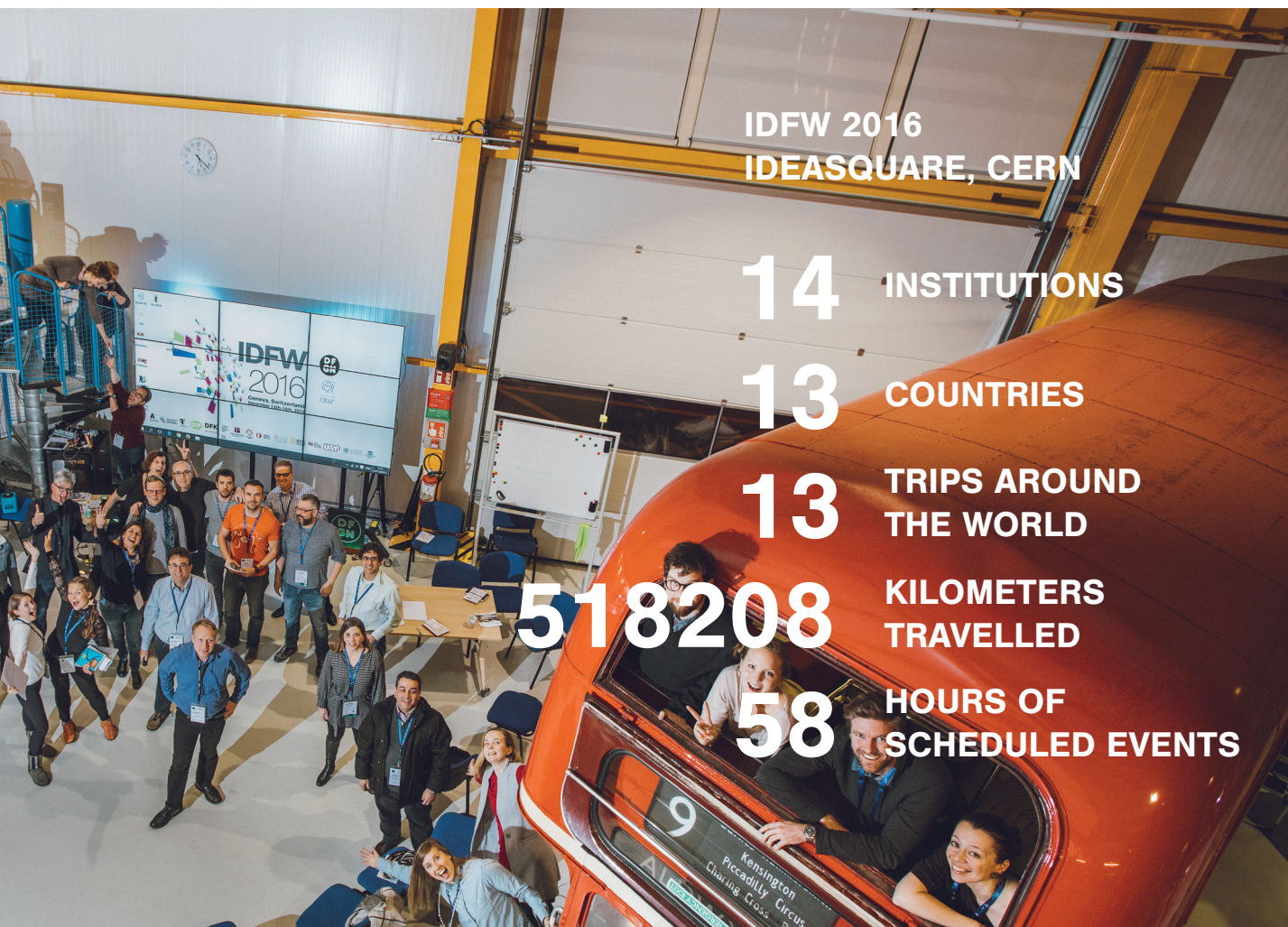
**Design Factory** is first and foremost an understanding of how to spark and support creativity and innovation. All the **Design Factories** bring together research, students and business practitioners not only to create a new learning culture, but also to generate opportunities for continuous experimentation. Every **Design Factory** is a space, with a midset to enable serendipitous interactions between the different stakeholders.

At the core of the activities at **Design Factories** are interdisciplinary problem-based project courses. In those courses students work together with industry sponsors. These projects are often the first form of collaboration within the DFGN. ADF supports the development of both the platforms as well as the courses. This support fosters similar ways of working despite the sparse geographical distribution.

**Design Factory**, as a model, has attracted a lot of interest abroad, and further platforms are under development ensuring that the growth of DFGN will continue in the near future.







## International Design Factory Week (IDFW)

Is the annual opportunity for DFGN members to meet and plan for collaboration as well as learn more about the best practices in the network. IDFW is also the main decision- making platform for the network. Every year, the week is organized in a new location offering the opportunity to learn more about the hosting Design Factory.

# The Rat Relay

## *DFGN Global*

## *Design Sprint*

Aalto Design Factory

Frisian Design  
Factory

Porto Design  
Factory

Design Factory Javeriana

- Design Factory Cali
- Design Factory Bogota

Duoc Design Factory





**The Rat Relay is a unique three-day global product design hackathon organized within the Design Factory Global Network. It simulates a real-world situation in industrial product development where very often one individual person or team is only working on a project for a limited time and not from beginning to end. In Rat Relay the projects are real-life global challenges provided by sponsoring companies, startups, or NGOs. The challenges rotate around the world in six-hour slots and in the end the challenge returns back to the originating country for finalization of the outcomes.**

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In April 2017 the Rat Relay was organized between six Design Factories in Helsinki, Porto, Leeuwarden, Cali, Bogotá and Santiago, with a total of 166 students and 30 coaches participating. The Rat Relay process was roughly built on six phases of product design, each one developed in a six-hour slot; starting from identifying the user and empathizing, to defining; from ideation to prototyping and testing; and finally to finalizing and pitching. However, as design processes are not linear, the teams were advised to jump between phases when necessary.

In the Rat Relay participants get to learn vital capabilities for the modern work life. In addition to handling the time pressure and understanding how to work in a globally distributed team, they get to practice their communication skills locally within an interdisciplinary team and globally to convey their ideas and progress of the work in the best possible way for the next team. The biggest challenges during the Rat Relay are also related to the global communication - how to provide visualizations, videos, photos and other content to support the decisions and highlight essential information so that the next team can easily build on the team's ideas. Also, how to communicate effectively so that the challenge develops to the desired direction?

Despite this challenging global setting, all projects were carried out successfully and both the partner organizations and the participants were happy with the end results. For example, the International Red Cross challenged us to look into new solutions to ensure immediate and reliable off-grid access to light in disaster areas during the first stages of humanitarian help. After 36 hours of work, in five different locations in the world, the final solution was a solar panel system with one central unit, and smaller units across the camp connected with cables to a central pole charging system to serve both individuals and communities. In this case, the 36 hours was not enough to build and test a functional prototype, but it served as a starting point for future development of the concept.



# The Design Factory Bootcamp

The Design Factory Bootcamp is a week-long intensive training about the basics of Design Factory. The fourth consecutive Design Factory Bootcamp was organized 3rd to 7th of April at ADF.





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Once again ADF acted as the home base for enthusiastic people interested in starting up their own experimental platform in their home institution; to drive change for better learning cultures. During this intense hands-on experience, ADF staff and other experts of the community assembled their intellect and experience to teach the participants to become masters of the Design Factory concept.

From the three previous DF Bootcamps, 13 out of 14 participating institutions have decided to launch their own Design Factories, or are planning to launch one in the near future. The first to launch their own factory from the '17 participants was Escola Politécnica da Universidade de São Paulo in Brazil in June 2017

The DF Bootcamp program is built around the following themes:

- Problem Based Learning
- History of ADF
- Students of ADF
- Interdisciplinarity
- Industry collaboration
- DFGN network
- Teaching & spatial development

### Sanjay Jain

**“My golden nuggets from the fascinating Bootcamp experience were to create places and situations for interaction, to empower students from the beginning. What is visible and manifests is just the tip of the iceberg - go down and you find norms and rules, values and assumptions”**

### Davi Nakano

**“Bootcamp was an intense week when I could not only listen about, but also experience Design Factory. The BC program and facilitators created an open environment that invited me to challenge some ideas, try new ones, and have fun”**

# Internship Stories

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This year, we had the privilege to have two international interns working at ADF. Now they share, what they learned during their time at ADF.



## Marie Ligocká, Czech Republic

"Before my exchange, I had a vision. Very abstract vision – learn something, go somewhere and experience great moments. I was a bit confused by endless choices. But in the end, one recommendation was enough. Fellow student who visited ADF during project "Mapping creative centers of Europe" told me that Aalto Design Factory is the best. I found out more and I fell in love.

I spend two months at ADF. My main task was gathering content for the DFGN Family Album. It meant bunch of emails, Skype calls... communication through the oceans and the continents...throughout the world. But also in the Factory.

My abstract vision transformed to real progress of my own skills and knowledge. I had chance to communicate with almost 100 people from 19 different countries. Being part of the DF community was great opportunity to see people creating really cool products in the awesome environment, having fun and being friends. Whenever I had a question I wasn't afraid to ask. I perceive DF team as a family.

I feel that exchange in ADF is just a start of the journey. I want to learn more and visit another Design Factories. Next stop is Leeuwarden in August and then I would like to apply for course in Porto Design Factory. Also I am sure that I will use gained knowledge and experience to support similar activities in the Czech Republic."



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## Glenn van de Lageweg, Netherlands

"When I first heard I was going to be able to come to the Aalto Design Factory for my internship, I was excited. I had just finished a semester at the Frisian Design Factory in the Netherlands, and had liked the projects and the way of working very much, so I wanted to do an internship on the topic. I figured it would be fun to go abroad and compare my own Design Factory at home to the one that started it all. And after arriving in the beautiful Finland, I was not disappointed. The DF in Netherlands is quite small, since it is not located in one of the bigger cities, and it was still fairly new. My semester consisted of about 25 people working on 4 projects, and 90% of the students had a background in communication and multimedia design. When I came to the ADF, I felt very impressed with the sheer scale of things. The projects were so much bigger than the ones we had, and the groups were also a lot more varied, with people from engineering, design and even business participating in the courses. This allowed for very impressive end products during the final Gala. Those products really show the impact DF has on the world in general. By having innovative new ideas and implementing them in creative ways, they help improve the world and allow it to grow and continue on in developing for the better.

I have learned a lot about the sense of community during my stay here. By for instance organising a weekly breakfast, prepared by the course groups, there is a regular contact between both the students, the staff and even some of the companies that work at DF as well. This allows for a relaxed atmosphere and opportunities to talk about the projects and possibly ask for assistance. I feel it is very important for the students to have an easy way of coming into contact with the staff, because it makes talking about possible issues or getting tips a lot easier, and getting to speak with companies can also be very good for networking.

All in all I had a really great time during my internship at the ADF. My colleagues were all very friendly and fun, we worked on fun projects and it was nice to see the students shine on their gala after all their hard work."



## **Thank you!**

The annual publication team wants to thank everyone from the ADF community who have contributed in producing this publication, whether by writing articles, providing support, advice and ideas.

With love,  
Sonia & Vivi



# Aalto Design Factory

## Annual Publication

### 2016-2017

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