THE FUTURE OF USER MANUALS

Augmented Reality and Smart Glasses

Step 1a: **Consider**

Step 1b: **Act**

Step 1c: **Innovate**

User Attributes:

> Work environment

Plan 7.2

5 m

Progress:

62%

iPOLE in cooperation with ALSTOM
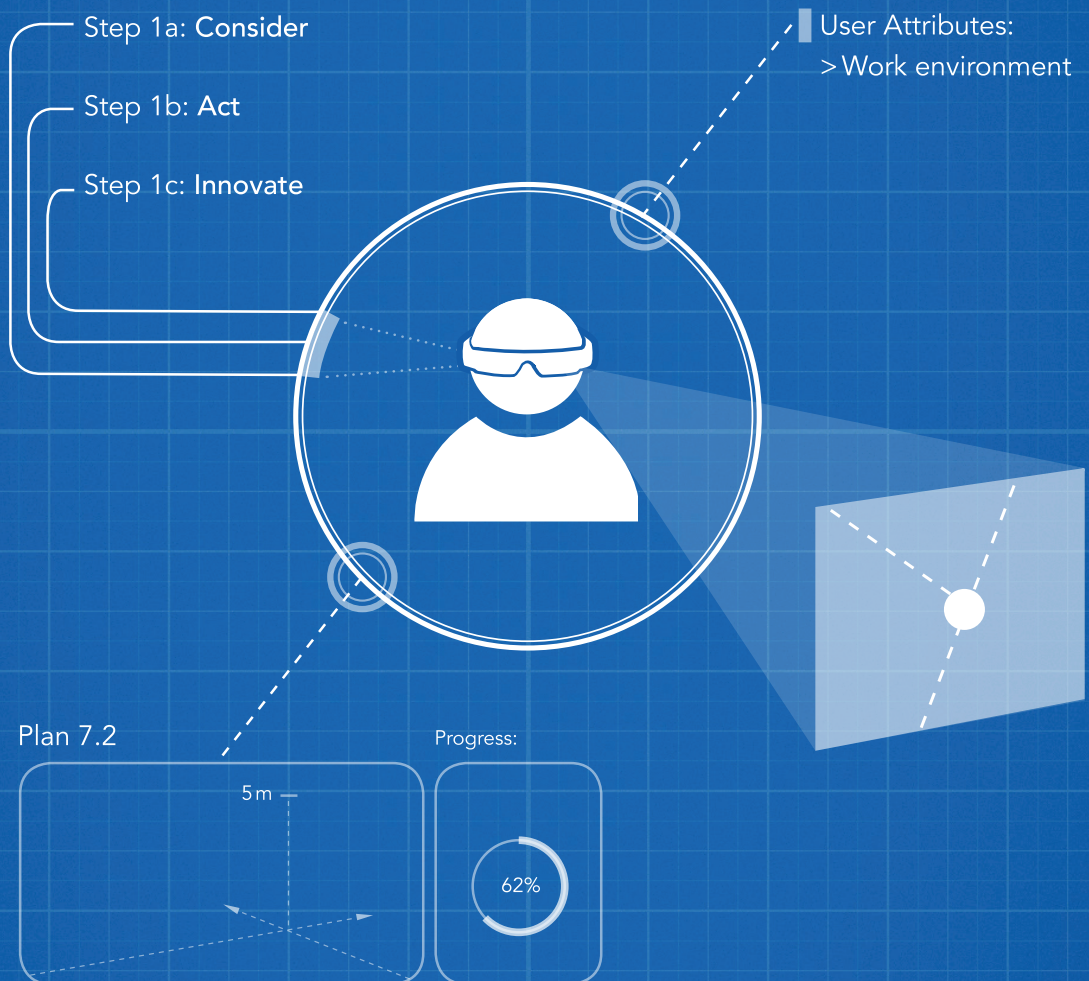
2014

iPOLE Team 2014

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1. iPOLE - An Introduction

iPOLE (integrated Project Oriented Learning Environment) is an international and interdisciplinary study platform that permits the development of innovation projects in coorperation with industry partners. This helps strengthen and combine the students' disciplinary knowledge with collaborative project-oriented working within a multicultural environment. iPOLE specifically targets industry-relevant topics in the field of human-computer interaction, with elements from computer science, interface / industrial design, digital media and management.

This year's iPOLE is carried out in collaboration with Alstom. Participating educational institutions are the University of Applied Sciences and Arts Northwestern Switzerland FHNW; Merz Akademie, Stuttgart; Northumbria University, Newcastle upon Tyne and HSE Design School, Moscow. The course is lead by the Computer Science Department of FHNW. Approximately 30 students in five (possibly six) trans-disciplinary teams will work on the design and development of augmented reality concepts for future user manuals under the guidance and supervision of more than 10 faculty members.

Team Innovation Projects:
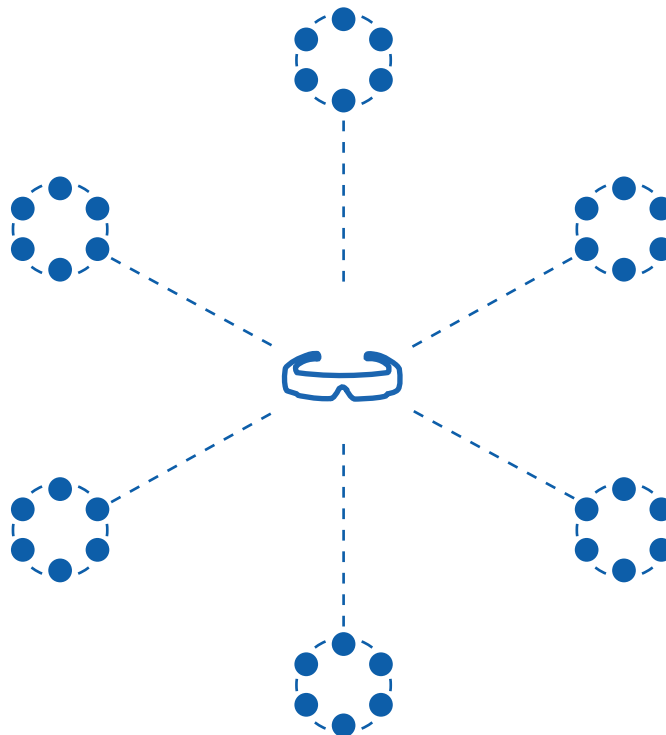
2. Project Task 2014 – ALSTOM

About our Industry Partner Alstom

Alstom is a global leader in the world of power generation, power transmission and rail infrastructure and sets the benchmark for innovative and environmentally friendly technologies.

Alstom Power provides turnkey integrated power plant solutions and associated services for a wide variety of energy sources, including hydro, nuclear, gas, coal and wind, and it offers a wide range of solutions for power transmission, with a focus on smart grids. Alstom holds leading positions in turnkey power plants, power generation equipment and air quality control systems, and services for the installed base. The Thermal Power Sector designs, manufactures, and delivers solutions which allow customers to generate competitive, eco-friendly, reliable and flexible power. With over 100 years' experience in supplying power plants worldwide, Alstom Thermal Services also upgrades, refurbishes and retrofits all components for existing thermal power plants to maximise returns on customers' assets over their entire lifecycle. Alstom is committed to being a reliable and flexible partner for power plant owners and operators. The industry faces a rapidly evolving regulatory and market environment, so a long-term global perspective supported by a strong local presence is essential.

With its experience of building and maintaining power plants, Alstom has the presence, technology and solutions to meet power generation challenges as an efficient partner. The Alstom lifecycle management approach redefines the concept of after sales support: teaming up with customers to improve the return on their assets while minimising the lifetime environmental footprint of each process and the whole plant. Alstom works for creating affordable, sustainable and secure energy solutions for society and customers, expanding the scope of its service portfolio to embrace new technologies and equipment made by other Original Equipment Manufacturers (OEMs).

Task description

There are many technologies emerging that aim to assist people in their daily work by replacing the paper manuals of a product, with respect to operation and maintenance. Such technologies can be in the form of:

- Videos and animations, supported by audio or images
- Hardware that allows hands-free working such as wearable displays, tablets, etc.
- Context sensitive links to parts identification, settings, technical data, limits, environment, health and safety (EHS) information etc.

- Augmented reality, where the physical world, information and communication technology meet
- Direct remote support through bidirectional video conferencing

The task of the teams is to start from an exiting disassembly/assembly instruction manual, together with additional information on parts (drawings), tools, EHS, etc. and to convert this information into an augmented reality supported solution for training or on-site work potentially including real-time assistance. The source documents are not always simple, straightforward instructions: e.g. they may indicate a certain pre-processing of parts that is not detailed in the manual itself. The task will be accomplished using the existing information on paper and the support of Alstom in understanding the matter.

The teams are not limited in their use of technology, which can be any combination of hardware and software tools, i.e. only audio instruction, commented pictures, a video, a video with guidance, no video but working with wearable displays and provide picture based guidance through the screen up to 3D overlays automatically aligned with the physical world. A remote assistance may be anticipated for alleviating difficulties during the execution of the disassembly/assembly but it is not a requirement. We expect the team to be visionary, think out of the box and redefine what a user manual means in the light of state-of-the art user experience, hardware and software.

The aim is to see technologies being applied differently by the individual teams to the same problem, and to come up with evaluation parameters to judge their approaches in respect to clarity, ease of use, correctness, and ergonomic as well as EHS factors. These evaluation factors should also help to target specific technologies to training situation versus field situation where a "contractor" is to be instructed how to disassemble/assemble a part. A ranking and recommendation shall conclude the work, possible with a demonstration of the best solution to Alstom management.

The outcome will be a prototype on a specific use case defined by alstom. The data to this use case will include:

- 3-D model (Catia)
- Several detail drawings of the valve components
- Parts list
- Assembly Instruction with EHS requirements
- I&T plan
- Test certificates
- Bolt torque values

3. Project Agenda

3.1 **Virtual Kick-Off**

September 9th, 2014 - 5pm CET
Videoconference from Home Universities

3.2 **Physical Kick-Off**

October 2nd until October 5th, 2014
All Students, Faculty, Industry Partners at FHNW Campus,
Bahnhofstrasse 6, Windisch, Switzerland

3.3 **Review 1**

November 11th, 2014 - 5pm CET
Videoconference from Home Universities

3.4 **Review 2**

December 18th, 2014 - 5pm CET
Videoconference from Home Universities

3.5 **Final Presentations**

January 15th, 2015
All Teams, Faculty, Jury, Industry Partners at FHNW Campus,
Bahnhofstrasse 6, Windisch, Switzerland

4. Project Deliverables

iPOLE as a platform for learning and teaching not only focuses on the product but puts strong emphasis on the structuring of the design process. The following list of deliverables shall facilitate the work process for the teams as a backbone.

At the Institute of 4D Technologies at FHNW, a weekly 'Pecha Kucha' in performed in which one of our colleagues has the opportunity to present a subject they want. Each 'Pecha Kucha' lasts 6 minutes and 40 seconds (20 slides, each 20 seconds long), subsequently condensing the time in which one has to present an idea. We wish to implement this technique this year during the Design Review sessions. Each team has 6'40" approximately to present their ideas, which is then led by a quick discussion. Through this we wish to push the students in their presentation skills by communicating their ideas in a short time constraint.

At the end of the physical kick-off week – October 5, 2014:
Written statement of team's objective(s)
Distributed collaboration and information management framework
Description of the expected contributions of each team member

Design Review I – Videoconference - November 11, 2014:
(duration of presentations 20 minutes/team, i.e. 6'40" Pecha Kucha and remaining time for questions)

- Discussion of teams' concept/product requirements
- Discussion of initial concept/product characteristics (guided by requirements and research)
- Discussion of ideation process
- Reflection on distributed collaboration and information management framework (including the role of each team member)
- Project timeline and milestone check

Note: FINAL versions of all of the materials that will be used in the design review presentation (PowerPoint presentations, spreadsheets, sketches, etc.) must be uploaded to the team's shared folder (Dropbox, Google Drive) 1 day prior to the review to make sure that all sites have access to them.

Design Review II – Videoconference - December 18, 2014
(duration of presentations 20 minutes/team, i.e. 6'40" Pecha Kucha and remaining time for questions)

- Discussion of teams' down-selected product concepts (in accordance with the product requirements and research)
- Discussion of decision-making process
- Reflection on distributed collaboration and information management framework (including the role of each team member)
- Project timeline and milestone check (including identification of remaining tasks and deliverables for project completion)

Note: FINAL versions of all of the materials that will be used in the design review presentation must be uploaded to the team's shared folder.

Final presentation – January 15, 2015

A. Oral presentation of project outcomes for colleagues, faculty and jury (duration: 30 minutes/team)

- Proof of concept demonstration (functional and visual via «works-like» and «looks-like» prototypes)
- Discussion of why and to what extent the proposed design fulfills the requirements; illustration by example(s)
- Discussion of potential for future research and development of The Future of User Manuals.
- Reflection on distributed collaboration and information management framework (including the role of each team member)
- Discussion of individual learning insights

B. Oral presentation of an executive summary for a delegation of Alstom's directorate (duration: 7 minutes/team)

C. Physical deliverables (due at final presentation)

- (Interactive) prototype(s) demonstrating the proposed concept
- 5 copies of a comprehensive Final Project Report, which should include the following sections:
- Executive Summary clearly outlining the key points of the proposed design and why Alstom should pursue it.
- Background research section documenting any relevant background research that was conducted.
- Requirements or Scenarios/Use Cases section documenting the final list of design requirements that the team has generated and how they relate to the different stakeholders.
- Design development section documenting the different ideas that were generated and the decision making process that was used to select the

final concept (with rationale).

- Design specification section documenting the specifications of the proposed design (detailed engineering drawings, programming protocols and materials information should be placed here).
- Design process section documenting the overall design development and interdisciplinary processes that were used by the team (including reflection on the multi-cultural and trans-disciplinary aspects of the project).

Evaluation Criteria

The evaluation of the project results will be in the duty of an international jury. It will consist of one member of each discipline and two members of the iPOLE directorate as well as of members of Alstom. Each team will receive a report with an acknowledgement of the contributions according to the following criteria:

- Fulfilment of Alstom's requirements (a list of expectations will be presented during the kick-off week by the patron)
- User experience
- Innovative potential of solutions
- Presentation of prototypes
- General impressions

Emphasis should be placed on the following:

- A comment on the provided written documentation, comprehension, readability, correctness and user friendliness.
- Measured times and records for each way that was investigated to improve the disassembly / assembly work
- A demonstration, judgement and pro/con-comparison of the methods regarding effort, didactics, methodology, for people who are not familiar with the task.

Note: All relevant final deliverables must be uploaded to iPOLE shared folder by January 14th, midnight.

5. Project Information

5.1 Confidentiality Agreement

Due to the high potential of such a novel product Alstom and iPOLE have agreed to respect a confidentiality agreement, which in turn has to be signed by all partners involved in the project. Individual copies for each participant will be sent to the selected students in advance and shall be ready for signature at the kick-off event.

5.2 Cost of Travel and Accommodation

Thanks to the financial support of FHNW and the industry partner Alstom, iPOLE is able to partially subsidize travel and accommodation cost and consts for the documentations and hand-outs for the participating students.

5.3 Insurance

Each participant is responsible for her/his own insurance matters.

5.4 Responsibilities of iPOLE and its Partner Universities

iPOLE considers itself as a learning platform which enables and facilitates interdisciplinary processes. It has also proven to offer an excellent test bed for research in the field of modern teaching and learning as well as in the field of evaluation of novel learning spaces. At the same time it is important to put on record that the responsibility for the disciplinary supervision of the students remains with the sending home universities. This relates also to the grading of the students' contribution. iPOLE on the other hand will provide a qualification on the team processes and on their interaction patterns. (It is suggested that students who successfully participate in iPOLE projects receive academic credits based on the ECTS).

The experience during the previous iPOLE courses has revealed that this double responsibility of the student towards his or her iPOLE team and towards the home university and professors, respectively, may also bear conflicts. iPOLE demands that team decisions be respected what the approach and the agreed objectives is concerned; iPOLE leaders are convinced that within this frame work there is still ample tether to adhere to high academic standards in the disciplinary work.

Saying this makes it obvious that a close accompaniment and monitoring of the project by the faculty of the partner universities is essential and highly welcomed by iPOLE. The involved faculty will receive full access to

all documents of the iPOLE project. Their participation during the kick-off events, the reviews and the final presentations will add to the interdisciplinary depth and thus to the quality of the project and to further developments of iPOLE.

5.5 Information and Communication Technologies (ICT)

iPOLE is offering a modern infrastructure with respect to information and communication technologies (ICT). iPOLE encourages the partner universities to support their students with respect to ICT as much as possible, in particular granting them access to their own information technologies and video conferencing facilities.

5.6 Assessment

iPOLE has the ambition to continuously improve its learning and teaching platform. One step to do so is by integrating an external assessor into the process, who will participate in as many of the iPOLE design activities. iPOLE has cooperated in this field of evaluation and assessment with the Department of Education of the University of Applied Sciences Northwestern Switzerland and with Stanford University since the very beginning in the year 2000. The participatory assessment will focus on the effectiveness of the design processes and the adequate use of collaborative communication technologies.

5.7 Accommodation and Transport

FHNW Address:

Bahnhofstrasse 6, 5210 Windisch, Switzerland

Student Accommodation:

Jugendherberge Baden, Kanalstrasse 7, 5400 Baden (AG)
Tel: +41 (0)56 221 67 36

Coaches Accommodation:

Hotel Terminus Brugg, Bahnhofplatz 1-5, 5200 Brugg
Tel: +41 (0)56 460 25 25

SBB Transport:

http://www.sbb.ch

6. POLE/iPOLE Philosophy

University students are nowadays increasingly challenged within their specific core disciplines; in addition however, they are also supposed to develop skills in order to apply this particular knowledge in practice. This ideally goes hand in hand with a sense of maturity of the individuals' characters vis-à-vis the social, cultural, and economical environment. The practical application of theoretical knowledge can thus only be implemented successfully if these three basic elements are taken into account.

International Collaboration

Industry Partner

Partner Universities

Student Teams
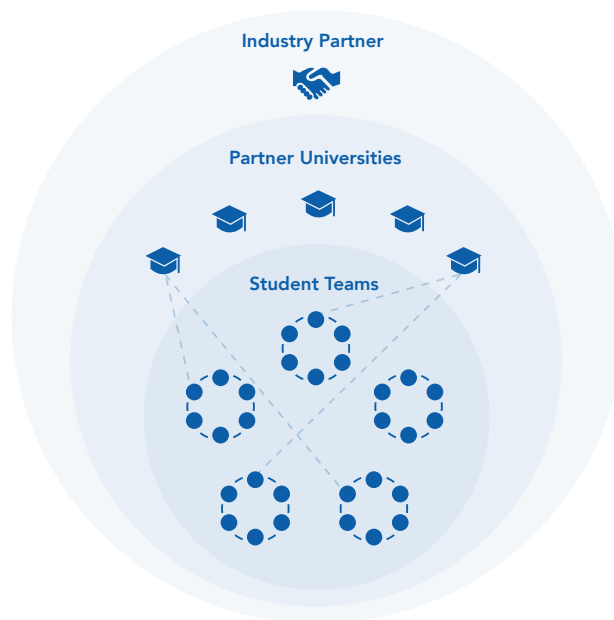
In addition to university students' disciplinary knowledge, the ability to work efficiently within multicultural environments has become increasingly important. Universities are therefore looking to expand and deepen this particular aspect in order to provide the necessary expertise in this field. This realisation has led to universities becoming more proactive with regards to networking and offering joint courses, which is where POLE (Project Oriented Learning Environment) and iPOLE (see below) are actively involved in. In the course of this new collaboration, it has become apparent that the complementary aspect has gained in importance. An example for this is the liaising between strongly research-oriented and more practically oriented universities with the common goal of being able to implement the according results as soon as possible. Apart from contributing to more comprehensive and efficient processes, the POLE courses lay particular emphasis on improved

cultural know-how. In order to do this, students are encouraged to contribute their experiences within international teams, regardless of geographical and language barriers.

POLE sees itself as a learning system cooperating with other European or international universities. It does so within a reflective context, taking into account the various cultures involved in order to create new methods of resolution regarding teaching and learning methods. The students are at the core of this concept, and are given the option to develop process-oriented expert knowledge through interdisciplinary teamwork. Simultaneously, they learn to work independently and to deal with current problem cases through the use of modern information and communication tools.

Processes within POLE are largely organised within the individual teams themselves. The according goals are set and committed to within the teams; in case of resulting conflicts, weight is given to iterative processes in order to find solutions. A further characteristic of POLE is an increasing tendency for the overlapping, or even amalgamation, of various lines of work in order to give way to new, holistic, and interdisciplinary perspectives. POLE is a comprehensive platform that gives students the opportunity to contribute their full potential. Each individual's attitudes, characteristics, and abilities are taken into account as a whole in order to allow as much space as possible for independent development of students' responsibilities and skills. A contribution to the concept of 'Campus in Mind' is made by POLE in providing the multi-disciplinary teams with learning facilities that are based on experimental and interactive technologies.

Transdisciplinary Competences

The teamwork in the POLE courses allows the students to further expand their specific professional skills. In addition, it gives them the opportunity to develop more generic competences, which are required to adapt to continuously changing environments. The course further enables students to evaluate their ability to function in a team and to analyse their styles of communication. Through practical examples, students are given the opportunity to explore how well they are able to work in a team, and to what degree they are flexible to accept members' concerns from other disciplines, i.e. how they can integrate these into their own work and patterns of thinking.

Projects in Cooperation with Industry Partners

Experts and mentors from industry and businesses are an essential part of POLE courses. Their participation contributes a high degree of practical knowledge to the projects, pointing out the actual 'state of the art'. In

this manner, POLE manages to link academic education and professional practice. The intensive interaction between these two elements guarantees a rapid transfer of technology, while at the same time ensuring that the students involved are motivated to a high degree.

POLE is not only about to significantly remould the landscape of teaching and learning at universities, but it also intends to yield substantial influence concerning decision-making and the creation of practical work processes. In association with university teaching staff, the mentors are instrumental in contributing expert knowledge and regular feedbacks to the teams, while they are also actively involved concerning the evaluation of processes and related products. The latter will be of increasing importance in the future, as scientific research has been initiated in connection with reflections of certain POLE processes. It is the intention of this kind of research to support students with regards to the awareness of their personal learning styles. The findings will then be made accessible for future work in a broader context.

About the Beginnings of POLE

The initial POLE courses had been launched as a result of the ever increasing demands in the current building trade, which is of a highly complex, segmented, and competitive nature. Experts from the fields of architecture, civil engineering, and construction management are clearly demanding a broader education, along with more diversified core skills for engineering students. The POLE learning environment and its associated methodology is not limited to this initial context, but allows students from practically any discipline to apply their theoretical knowledge in practical cases. Through collaboration in interdisciplinary teams guided by process management students, students from fields such as architecture, urban planning, civil engineering, interior design, plastics engineering, mechanical engineering and economics were given the opportunity to cooperate in POLE projects and thus better understand the individual processes involved and acknowledge their relation to the social, economical, and political dimensions.

This year, POLE moves towards its 15th anniversary. Since 2012 it has become an integrated part of FHNW's iCompetence programme – hence the name iPOLE. iCompetence is an interdisciplinary programme of studies in computer science with a strong focus on design and management. The iPOLE projects that are carried out in collaboration with iCompetence take place in the autumn term (September to January). They propose projects with an impact in the field of human-computer interaction and bring together the disciplines of computer science, design (namely interface design, industrial design), digital media, psychology as well as management.

7. Physical Kick-off Agenda

Thursday, Oct. 2nd

FHNW Campus Brugg Windisch, Bahnhofstrasse 6, 5210 Windisch,
2nd Floor Passerelle

11:00 Welcome and Introduction to the Kickoff
Organisation (FH Cards, Internet, Confidentiality Agreement)

11:30 Presentation of all Students

12:30 Lunch (Mensa)

14:00 iPOLE Lectures
Simon Schubiger: *Cyberscapes*
André Csillaghy: *Challenges in Managing Big Data*

15:00 Presentation Research Results by selected students
Moderation: Stefan Müller Arisona

16:30 Break

17:00 Introduction to Task and Expectations, Gianfranco Guidati

18:00 Team Building, Christoph Holliger

19:30 Apéro

Friday, Oct. 3rd

Alstom Factory, Portier 1, Zentralstrasse 40, 5242, Birr

08:30 Arrival in Birr

09:00 Welcome in Vindonissa

09:30 Factory tour

10:45 Transfer to training center

11:00 Demonstration of the steam turbine

12:30 Lunch

13:30 Presentation of the task on the scaled-down model

14:30 Group work

15:30 Q&A

16:00 Start Social Event in Baden (includes dinner at Lemon Restaurant)

Saturday, Oct. 4th

FHNW Campus Brugg Windisch, Bahnhofstrasse 6, 5210 Windisch,
2nd Floor Passerelle

09:30 iPOLE Lectures
Egor Larichev: *Interacting with culture - can hi-tech make the change?*
Jamie Steane: *Design realities to design fictions*

10:30 Workshop in Teams
Project Plan

12:30 Lunch

13:30 Presentation time management, individual committment and
disciplinary contribution

14:00 Workshop in Teams
Ideation and Concepts

Sunday, Oct. 5th

FHNW Campus Brugg Windisch, Bahnhofstrasse 6, 5210 Windisch,
2nd Floor Passerelle

10:00 Presentation: *Common understanding of the task,
Vision Statement and Concepts*

10:30 iPOLE Lectures
Mario Doulis: *Well Done*
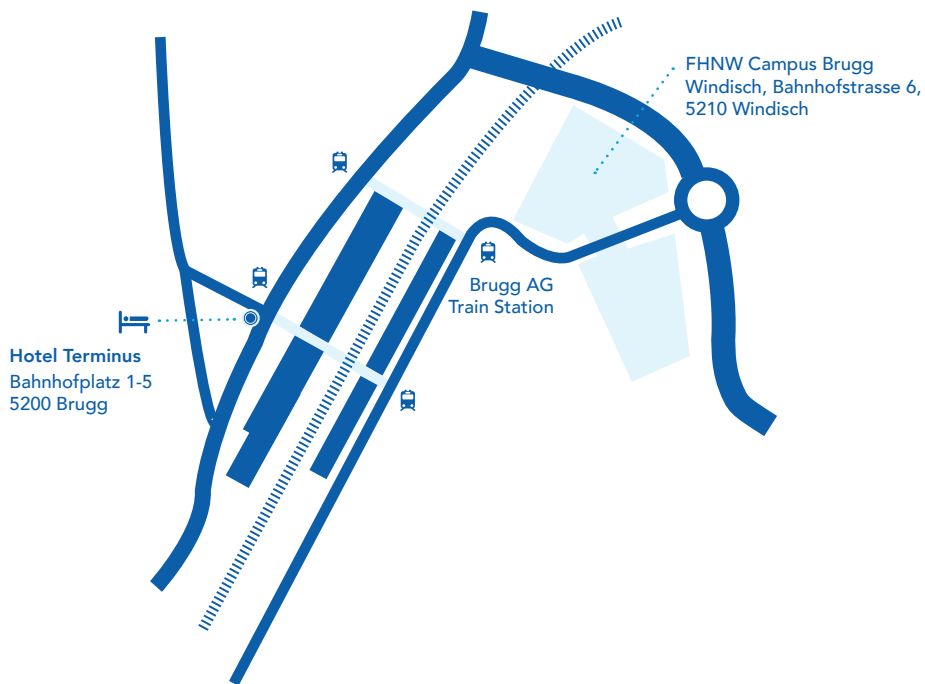Magdalena Mateescu: *Research Methodologies*
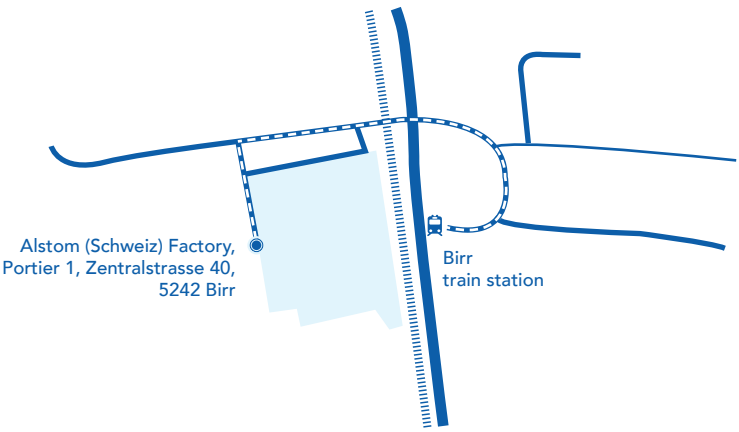
11:30 Workshop
First Prototypes

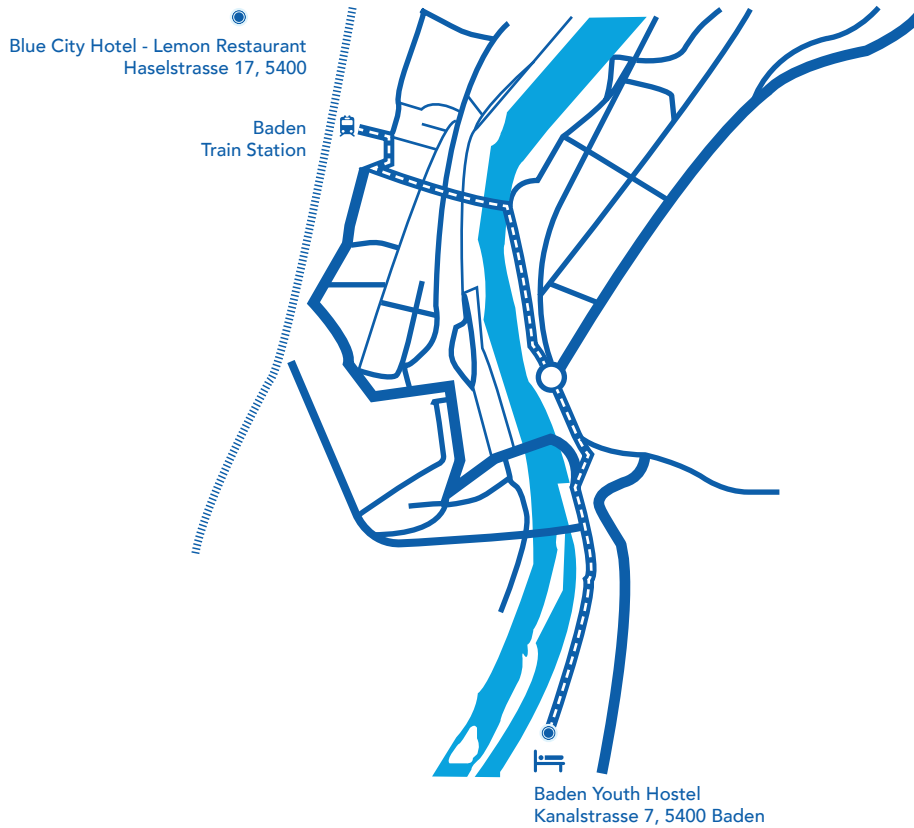**17:00** Presentations of first Prototypes

18:30 Farewell Apéro

Brugg / Windisch

FHNW Campus Brugg
Windisch, Bahnhofstrasse 6,
5210 Windisch

Brugg AG
Train Station

Hotel Terminus
Bahnhofplatz 1-5
5200 Brugg

Birr

Alstom (Schweiz) Factory,
Portier 1, Zentralstrasse 40,
5242 Birr

Birr
train station

Baden

Blue City Hotel - Lemon Restaurant
Haselstrasse 17, 5400

Baden
Train Station

Baden Youth Hostel
Kanalstrasse 7, 5400 Baden

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