



The goal for Sunday is to settle into ETH Week. You will meet your team members and exchange your personal viewpoints on the topic of manufacturing. Discuss your expectations and understand both the goals and the process of the week.

sunday
sep 10

12.00 — Registration and Snack at the ETH Week Hall.

13.15 ◆ **OPENING ETH WEEK**
Welcome by Lino Guzzella and
Alexandra Waskow at the ETH Week Hall.

14.00 ◆ **DESIGN CHALLENGE**
The Wallet—a demonstration.

↘ **Team building.**

↘ **STEEP Analysis.**

↘ **Template check out.**

18.30 ▲ **ENTREPRENEURSHIP NIGHT**
Hans Hess and Detlef Günther
together with the founders and CEOs
of Spin-offs from ETH Zürich at ETH Week Hall.

Dear participants!

Welcome to 'Manufacturing the Future', the third edition of ETH Week. This year, you and 180 students from over 30 countries and all across ETH Zürich will come together to work in interdisciplinary teams. Our aim is to design an inclusive and positive event, where you learn the state-of-the-art from professors and where professors learn from your critical attitude, enthusiasm and drive to rethink the world we live in today.

This year's ETH Week is organised in collaboration between ETH Sustainability, the ETH Competence Center for Materials and Processes (MaP), and the Chair of Technology and Innovation Management at D-MTEC. As organisers, our role is to provide you with just enough structure to engage in a process that fosters creativity and critical thinking.

Creating a spirit of collaboration among a variety of different people is the foundation on which ETH Week rests. This set of workbooks contains those who had a part in making the third ETH Week possible. The short bios will introduce you to your tutors and facilitators, to your trainers and the people running the event, to your professors and over 100 experts that join us during the week, to your Rector and President, and to us who designed the programme.



LEX SCHAUL graduated as an engineer from EPFL and as an architect from ETH Zürich. He is interested in applying creative processes in the fields of science, technology, and education. His role in ETH Week was to bring the different perspectives together and build the third prototype of ETH Week. He can't wait to see all the planning turn into action!



LARISSA SCHEFER is managing the ETH Competence Center for Materials and Processes (MaP), combining her interest to advance complex scientific and technological grand challenges and the passion to engage people following a transdisciplinary approach. She studied Food Process Engineering, holds a Dr.sc. in Soft Materials from ETH Zürich, and gained experience in applied R&D projects during time spent in industry.



STEFANO BRUSONI is Professor of Technology and Innovation Management at ETH Zürich. He holds a DPhil in Science and Technology Studies from SPRU at the University of Sussex, UK. Earlier, he worked as a firefighter, which he enjoyed tremendously. His research interests include the emergence of alternative product architectures, firm dynamics and modularity.



ALAN CABELLO LLAMAS holds a PhD from EPFL focused on human-centered innovation processes, having been a Visiting Researcher at Stanford's d.school. He is the founder of Spark Labs, an initiative with the purpose of teaching Design Thinking as an approach to innovation, as well as a Research Associate at ETH Zürich, and the Central and Eastern Europe Innovation Manager for Allianz ACGS.



CHRISTINE BRATRICH is the Director of ETH Sustainability. Research and applied projects on the topic of sustainability as well as interactions with interest groups in business, politics, and NGOs have characterised her career. She has always loved to work in interdisciplinary groups of engineers, natural and social scientists during her doctoral studies in Environmental Science at ETH Zürich and before.



ANDREAS VATERLAUS is Professor for Physics and Education at ETH Zürich. In October 2012, he was appointed as Vice-Rector for Curriculum Development. In this role, he assists the Rector in matters related to curriculum development and innovation processes. He chairs the Teaching Commission.



RETO KNUTTI is the Associate Vice President for Sustainability and Professor in Climate Physics and Climate Science at D-USYS. His research focuses on changes in the global climate system caused by anthropogenic greenhouse gases, like carbon dioxide. He is also a member of the 'Intergovernmental Panel on Climate Change' (IPCC).

WELCOME SPEECHES AND THE ETH WEEK TEAM

The ETH President Lino Guzzella will open the third edition of ETH Week. He will show his motivation to start the Critical Thinking Initiative, how it relates to the core values of ETH Zürich and how he would like to see those aspects come alive during ETH Week. Elaborating on his view on interdisciplinarity as one of the most important keys to innovation, he welcomes you from your respective departments in the ETH Week Hall to collaborate and actively shape an ETH spirit of togetherness.

Alexandra Waskow will share a personal story about what ETH Week has meant for her as a student in our first prototype in 2015 and as a tutor in 'Challenging Water' in 2016. She will tell you about her hopes of what you as the participants of the third edition will gain from the process of just six days in critical thinking.

The members of the ETH Week team are in charge of implementing your day-by-day activities: the keynotes and expert inputs, the excursions, the knowledge fair, the panels, the feedback loops, morning sports programme and inspiration nights. They are also responsible for the first level support of the tutors, and the setup in the ETH Week Hall, including the food and the invisible logistics that hold everything together.



LINO GUZZELLA is Professor for Thermotronics and, in addition, from August 2012 to December 2014 Rector of ETH Zürich. Since January 2015 he is President of ETH Zürich. With his group he focuses in research on novel approaches in system dynamics and control of energy conversion systems.



ALEXANDRA WASKOW holds a Master's degree in Microbiology and Immunology from ETH Zürich. She worked at the interface of Microbiology and Mechanical Engineering and believes interdisciplinary teamwork is crucial for tackling challenges holistically. As a former participant and tutor, she is looking forward to ETH Week.



ANNA MARIA STALLMANN is a cabinet maker and architect from Germany. After finishing her Master's degree at ETH Zürich this year, she joined the ETH Week team and contributes with a knack for problem solving and her passion for crafts and design. In her free time she enjoys rooftop gardening and swimming in the Limmat, close to ETH Sustainability headquarters.



PATRICIA HEUBERGER-MEYER is a senior programme manager at ETH Global, the international office of ETH Zürich. Her background is in Geography and Environmental Sciences. As part of the ETH Week team, she is responsible for the Knowledge Fair and the relationship to the company representatives.



DANIEL KOTTMANN has worked in the business of event management for 10 years, in Switzerland and abroad, and has organised conferences, gala events, and TV shows. He recently joined ETH Zürich and loves the diversity of his new job. When he is not working, you will find Daniel on his bike touring through forests.



ANN VAN DER AA has a fascination for languages and has followed an education as a translator in Belgium. However, she soon moved to event organisation and has since travelled the world creating exhibition booths as well as managing customer events in highly demanding circumstances.



MONIKA MOLNAR is starting her Bachelor in Physics at the University of Zurich, after having spent one year at EPFL studying Microengineering. Sciences, innovation, but also theatre, arts and languages fascinate her. She looks forward to meeting interesting people and supporting creative learning at ETH Week.



PIA AESCHLIMANN has worked for various international companies before joining ETH Academic Services seven years ago. People, cultures, celebration of differences and the joy in the little things are important to her. Pia is a mastermind when it comes to Excel. Since we realised this during last year's ETH Week, we can no longer imagine the Info Desk without her.



MARION LEHNER works for the ETH Zürich Educational Development and Technology (LET) unit, where she is a faculty development specialist and conducts didactic programmes for teaching assistants. Her particular skills lie in the areas of attitude development, coaching and didactic consulting.

GOOD TO KNOW

ETH WEEK HALL

The ETH Week Hall is the central meeting place of ETH Week. It is the location for plenary sessions with all participants: the opening event and your final presentations, as well as input talks, the knowledge fair, panel discussions, and inspiration nights. The Hall is also the space where all ideas come together. During dinner or at the InfoBar in the evenings, there is plenty of time to meet other students, experts, guests or our team and exchange informally.

INFO DESK

The info desk is located in the entrance of the ETH Week Hall. We support you in case you have questions, e.g. regarding the organisation of the event, lost and found, access to the team spaces. You can subscribe here for the sports sessions.

TEAM SPACES

When working in your team, you will be located in one of the pavilions. The large ones have space for four teams, the small ones for two. Material is provided for you. In order to keep costs under control and respect the environment, we kindly ask you to use these materials in a smart way.

SPORTS CENTRE

The sport sessions take place in the ASVZ Sports Centre. You can find more information related to our sports program on the following page. The sports centre opens early for ETH Week, i.e. at 7.00. Classes start at 7.05.

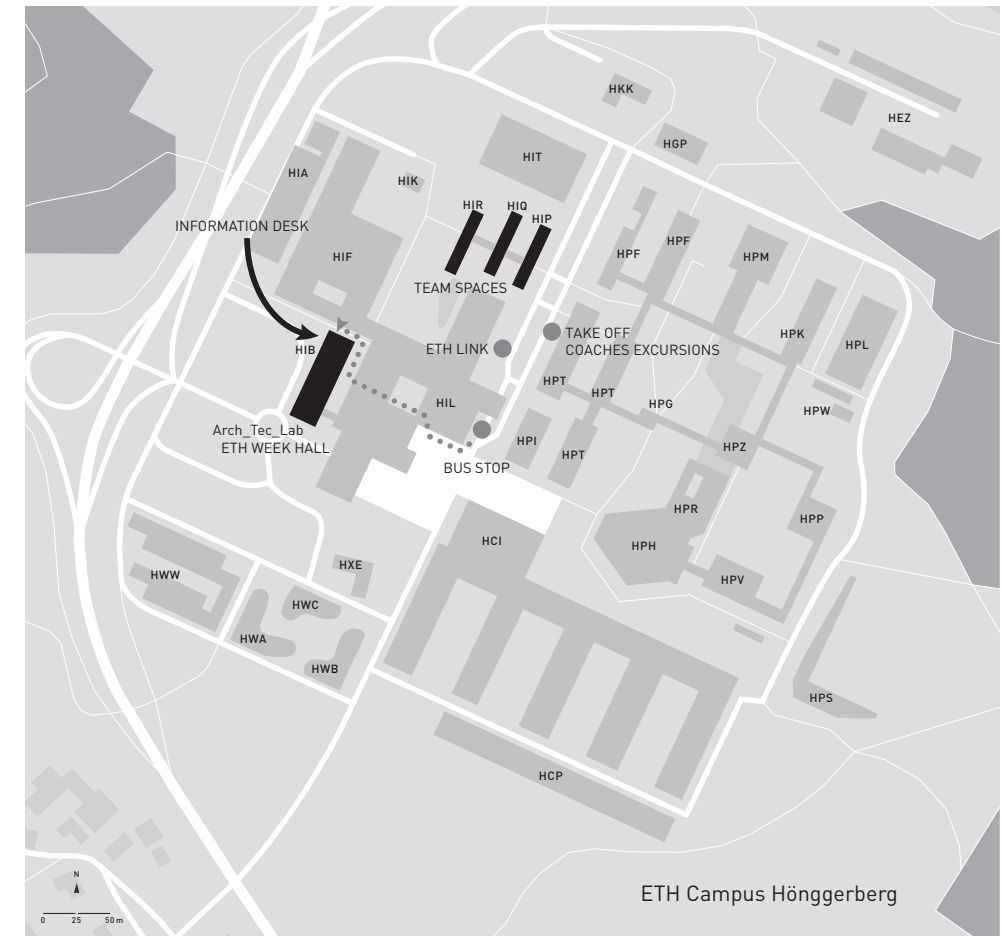
HIB C51 / is the official acronym of the ETH Week Hall.

HOTLINE / call the info desk using the following number: +41 44 633 99 10.

HIQ, HIR, HIP / are the official acronyms of the team spaces.

BE RESPONSIBLE / please use the provided recycling bins for paper and PET. At the end of the week, each group is responsible to tidy up their space.

HPS / is the official acronym of the sports centre.



ETH WEEK HALL
Usually open: 7.30–23.00.
Closes during excursions on Monday (10.30–15:15).
Meet participants from other teams here during breaks and plenum events.

INFO DESK
Usually open: 8.00–20.00.
Opens at 12.00 on Sunday and closes during excursions on Monday 10.15–15:15. It transforms into the InfoBar at night.

TEAM SPACES
Usually open: 7.00–23.00.
If you want to continue working in the evenings, ask for an access badge at the Info Desk. There is one per pavilion.

FOOD & WATER

A small wake-up breakfast with tea and coffee is ready in the ETH Week Hall every morning before the kick-off.

For in-between snacks, go to Ann's Energy Bar in the ETH Week Hall. You will find some fruits and other snacks to boost your energy levels during team work. We also provide you with a water bottle. Refill it at Ann's Energy Bar where you will also find a selection of syrups to take with you into your team spaces.

On Monday you will receive a lunch bag on your way to the field trip.

To foster informal exchange and so that we can all come together in the evenings, dinner is served in the ETH Week Hall. Vegetarian options are available for those who have specified this via the registration form.

BADGES

Please wear your ETH Week badge at all times. The keychains are color coded.

SPORTS PROGRAM

Together with the ASVZ, we offer sport sessions in the mornings, starting on Monday. You can choose to join the morning run through the forest around Campus Hönggerberg each morning. In addition, we offer Yoga (Monday), Body Combat (Tuesday), Pilates (Wednesday), Muscle Pump (Thursday) and Tai Chi (Friday). The sports centre opens at 7.00. Classes run from 7.05–7.50. Rector Sarah M. Springman will join the morning run on Thursday.

BREAKFAST / 7.30–8.30.

ANN'S ENERGY BAR / available all day.

DINNER / Usually: 18.30–19.45.

WHERE / find the sports classes at HPS arena 3. The meeting point for the morning run is in the lobby of the HPS building.

SIGN UP / the sports programme has a limited amount of places and requires a subscription at the Info Desk the day before! Access the classes with your ETH Week badge.

EMERGENCIES

In case of an emergency, inform the info desk directly or call the ETH Week hotline (+41 44 633 99 10). In case of urgent emergencies, call the Emergency desk of ETH Zürich (+41 44 342 11 88). They will transfer your call to the ambulance (144), police (117), or fire brigade (118). Please immediately inform the Info Desk afterwards.

INFOBAR

On some nights, the Info Desk transforms to the so called InfoBar, where you can tie up the loose ends of the day and meet the students of the other teams. You can purchase alcoholic and non-alcoholic drinks there. Only guests with an ETH week badge can obtain drinks at the bar. Payments in cash only.

LAPTOPS

You are welcome to bring a laptop or tablet device. However, it is not necessary for all group members to bring one. Please note that you are responsible for your valuables.

PRINTING AND LOCKERS

Close to your team spaces, in the middle pavilion, is a VPP printing station where you can print PDF documents through the webform or the app. There are eight lockers available in some of the team spaces. If you do not have your own lock, the ETH Store sells cheap options.

CREDIT POINT

To receive one credit point (1 ECTS) you must take part in the core program of ETH Week in full (8:30–18:30) and be present during the final presentation. Please subscribe for the course 701-0901-00L on mystudies.

DRINKS / available from the InfoBar in the Hall on Sunday, Thursday and Friday night.

THE TUTORS

The goal of ETH Week is to embed your learning processes in real-life problems. Your work will be self-directed to exercise your ability for problem solving. Your team will be accompanied by a tutor who is familiar with the different steps that you are expected to complete. He or she will explain if tasks are unclear, and will encourage constructive teamwork and team-forming processes. Marion Lehner of the Educational Development and Technology (LET), a central unit of ETH Zürich, is a teaching trainer and responsible for the tutor training program. During ETH Week, she will be present to assist and supervise the tutors.



ANDREA POPP has a Master's in Hydrology from the University of Freiburg and is now pursuing a doctorate at Eawag and ETH. For her doctoral project, she uses environmental tracers and numerical modeling to investigate the interactions between streams and groundwater. Besides water, Andrea loves music, mountainbiking, ultimate frisbee and all other outdoor activities.



CAROLE GUGGENHEIM holds a Master's in Chemistry and is currently finishing her doctorate in Aquatic Chemistry studying methane oxidation in freshwater lakes. She considers ETH week as a great opportunity to work with students from diverse fields, to come across different personalities, ways of thinking and traditions and she is looking forward to gain further experience in project management, group moderation and creative and critical thinking.



DANIEL CHIUMIA is a specialist in dairy cattle production and animal physiology. Daniel studied Animal Science at the University of Malawi and Dairy Science at University of Edinburgh. Prior to joining ETH Zürich as a doctoral student at the Institute of Agricultural Science, he worked as a lecturer at Lilongwe University of Agriculture and Natural Resources in Malawi.



DHIVYABHARATHI RAMASAMY is a Master's student in the Computer Science Department at ETH Zürich, specialising in Information Systems. Prior to her Master's, she worked as a Software Engineer. She considers ETH Week as an opportunity to create innovative solutions to society's most important issues.



FABIO BARGARDI holds a Master's in Materials from ETH Zürich and is currently a doctoral student in the Complex Materials group studying Lithium-Ion batteries. He also helps manage the Makerspace at the Student Project House. He is looking forward to working with an interdisciplinary team of creative minds to tackle a new challenge.



EEVA TERVAHARTIALA is a Finnish-Swiss master student at D-MTEC with a background in Computer Science. She would describe herself as a human-centred problem solver and she is fascinated with the intersection of technology, business and human behaviour.



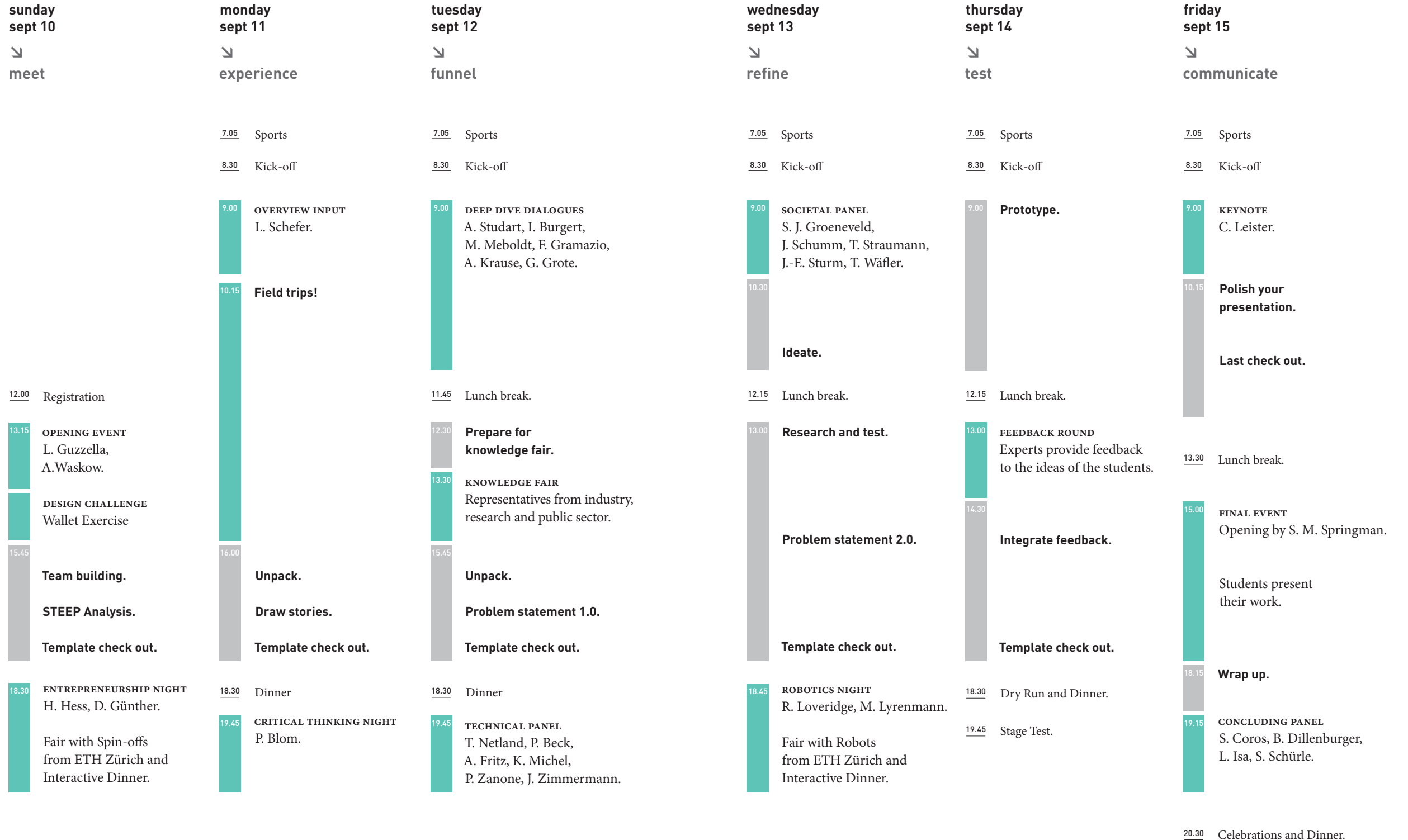
GREG BURMAN is from South Africa, and studied Electrical and Computer Engineering. He then took a two year break from academia to work at a start-up doing mobile web development. He is currently interested in principles of neural computation, and is looking at building neural-inspired hardware and applying machine learning algorithms.



EVA AHBE studied Physics with a focus on Environmental Science. Driven by the wish of working on solutions for the problem of climate change she switched to Engineering in her doctoral thesis, where she is now engaged in the automatic control of a novel wind energy technology. In her free time she enjoys travelling, cooking and doing all kinds of sports.



JONAS BOESKEN grew up in Rheinfelden in the very south-west of Germany. Besides his scientific education in Chemistry at ETH Zürich, Jonas is a talented musician who has played over 300 concerts with Cello and Drumset. In his free time, Jonas likes to ride his motorbike, go scuba diving or have a barbecue at the lake.



MORE TUTORS



KERRIN WEISS is in the last year of her Master's in Mechanical Engineering at ETH Zürich with a focus on Biomedical Engineering and Product Design. She sees the ETH Week as an opportunity to engage and help others, to learn and to be challenged.



MICHAEL AUGSBURGER is currently finishing his Master's degree in Environmental Sciences, focusing on Environmental Systems and Policy. As an ETH Week alumni, he's looking forward to again be part of an interesting, fun experience together with a lot of cool people.



MARIE FRANCINE LAGADEC is currently a doctoral student at D-ITET, and conducts research on lithium ion battery separators. She obtained a Master's degree in Micro- and Nanosystems and a Bachelor's degree in Materials Science from ETH Zürich. During her studies, she did an internship in a battery manufacturing start up.



MILA LEWERENZ is at the end of her Master's degree in Interdisciplinary Science with a focus on Physics and Material Science. She especially likes fabricating devices in the micro- and nanoscale. When she is not in the clean room, you'll find her somewhere actively engaged: Be it at a book reading, a poetry slam or the Rhetorikforum.



MENGJIAO XING is currently pursuing her Master's degree in Environmental Engineering at ETH Zürich. She spent one exchange semester in Göttingen, Germany, during her Bachelor's studies in China. Sports, travelling and cooking take up most of her free time. She has been a big fan of the football club Bayern Munich for almost ten years.



NICOLAS PILATTE is a Master's student in Energy Science and Technology. He realised the power of interdisciplinary teamwork when working for a humanitarian association in Togo. As a last year's ETH Week Alumni, he's really looking forward to exchanging ideas and tackle a new project with students from diverse backgrounds.



PASCAL WEBER is a Physics Master's student focusing on theory and computation, after finishing his Bachelor's in Interdisciplinary Sciences at ETH Zürich. Pascal used to skateboard for twelve years and is nowadays involved as a committee member of an old Zürich club, which keeps up the tradition of driving wooden boats on Swiss rivers.



PATRIC RYSER is currently doing his Bachelor's degree in Environmental Sciences at ETH Zürich. He enjoys the spirit of teamwork of the ETH Week. In his free time, he is an accomplished piano player and likes to travel around the world.



SARA TATIANA ROLDAN VELASQUEZ is a Honduran and Guatemalan Materials Science Master's student and holds a Bachelor's degree from Brazil. She has always been motivated by understanding how things work and she enjoys hiking, travelling and Zumba.



RAPHAEL PORTMANN spent his youth with music and soccer in beautiful Lucerne. He studied Environmental Sciences at ETH Zürich and he tries to live by his convictions and ideals. Currently he's working on his doctorate, where he is trying to figure out why weather forecasts sometimes go really wrong. Please don't ask him for a personal weather prediction.



VIKTORIA GERKEN grew up in Bonn, Germany and came to ETH Zürich to study chemistry. During her studies, she was very active in the Chemistry Student's association (VCS), starting as representative for student's affairs all the way to the president of the association. Besides her studies, Viktoria enjoys cooking, BBQing and photography.

Team-building.

We have set aside time for you to get to know the people you will work with over the course of the next six days. Your tutor has prepared this initial team-building session. He or she will make sure that you become familiar with working in an interdisciplinary group setting. Take this time to learn about your different backgrounds, experiences, and motivations for joining ETH Week.

During the week, you will need to collaborate closely, take decisions together, share tasks, coordinate, and produce a presentation by Friday afternoon. This will be challenging. The role of the tutor is to help you navigate through the different phases of the team process so that you can eventually become a well-functioning team. A first step to becoming this team will also be your first decision: You must select a team name.

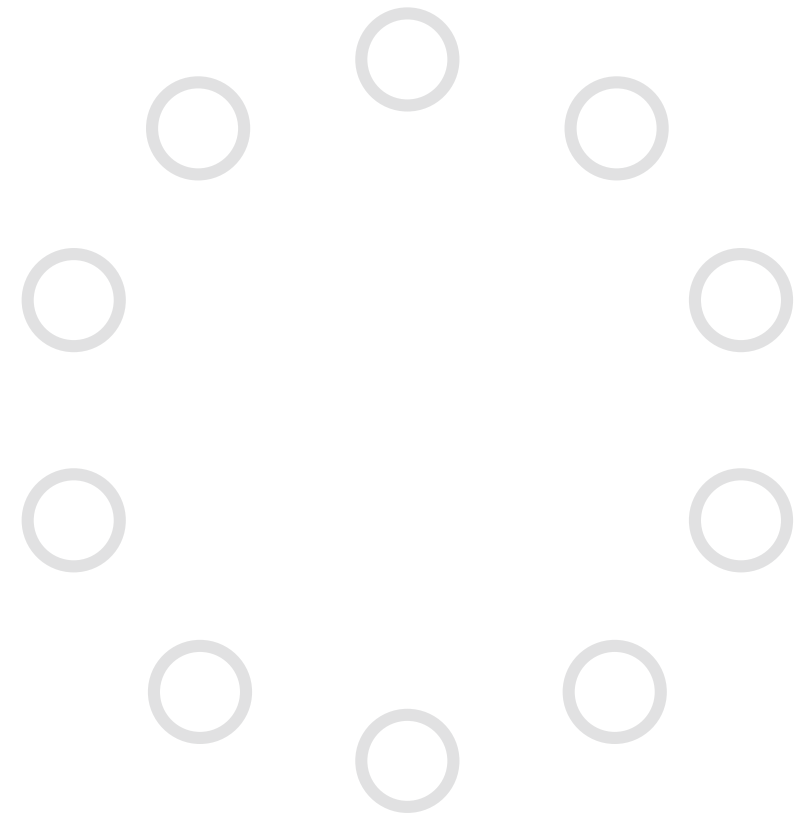
ROLES / During the week, you will take on different roles within the team. If your contribution actively reflects that role, that will make it easier for the team to grow together. There are also different task-related roles that you may distribute, such as: moderator, timekeeper, documenter, photographer, note-taker, mood encourager, etc. Try to rotate regularly and clarify who has which role.

× NOTE

This workbook is designed with plenty of white space for you to make it yours, to take notes and to keep track of what you judge to be important during the week. Some hints for how to fill this page:

- Who is who? Can you remember all the names of your team mates?
- What is your team name?

sunday
15:45
TEAM SPACES



Pick a name

× **NOTE**

Refer back to this page regularly throughout the week. Make sure you remain on track and use it as a guide during your creative process.

THE BRIEF

The curriculum of ETH Week brings together elements from research and design thinking to solve real-world problems. As a team, you will go through a number of steps that urge you to think outside of the boundaries of your discipline. One goal of ETH Week is to provide a safe environment that encourages free-spirited critical thinking, while building on the scientific research tradition as an essential foundation for bringing responsible solutions to problems.

Instead of handing you a problem to solve, we ask you to define your own challenge, to frame a problem that you identify within the topic of 'Manufacturing'. On the next page, you will find 'the brief', your task for the week. Every step of the way will bring you closer to finding answers to its three points.

The focus will not be on finding a compelling solution, but on defining a good problem, as mentioned in point (1). You will start with a first definition on Tuesday and improve it on Wednesday and Thursday. As you move through the week, you will deepen your understanding so that you can formulate a more and more concise 'Problem statement'.

Point (2) is related to learning how to explain something complex in a simple and compelling way, so that your audience can understand why your work is relevant and how the problem you define is actually solvable in the real-world context.

Last, point (3) gives you guiding questions to help you reflect your ideas critically, based on the scientific research tradition of ETH Zürich.

1. Define a problem statement that describes the challenge you want to address. It needs to be linked to a Swiss actor and to one of the three angles of ETH Week.
2. Tell an inspirational story that explains where your ideas come from, why your problem statement is relevant and what a possible solution could look like.
3. Critically reflect your ideas by answering the following questions:

SCIENTIFIC RIGOUR

- What are your underlying assumptions?
- What facts and figures did you rely on?

FEASIBILITY

- How feasible is your solution?
- Are there uncertainties related to your solution that would need further clarification?

SYSTEMS THINKING

- How is the problem embedded in the ecological, societal and economical context?
- What are the implications and tradeoffs of your solution?

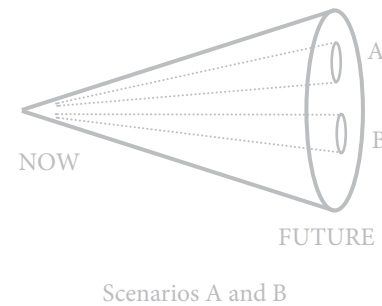
↘ STEEP Analysis.

Enter the topic: Manufacturing. We want you to build on the knowledge and the perspectives available within your team so that you can learn from each other. We do this by going through a small STEEP Analysis, i.e. by looking at the societal, technological, economic, environmental and political dimensions of current trends and drivers that you associate with 'Manufacturing the Future'. In this way, we start to build on the knowledge, motivations and interests of your team.

The future is difficult to predict, especially if we are looking at a time horizon further down the road. Therefore, futurists generally develop different scenarios that depict different possible futures, to widen their perspective. Based on your identified trends, you will create two visual scenarios.

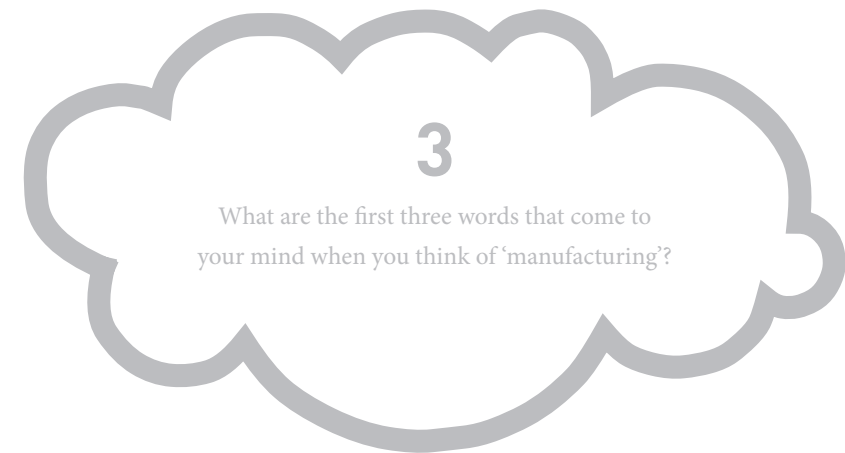
DOCUMENTATION / At the end of every day, you will fill in a daily template. We call this last step of the day 'Template check out'. Start by tidying up your workspace. Make sure that the results of your discussions and your ideas are clearly documented on the pin boards for the next day. Add structure and remove everything unnecessary. Also, make sure there are no documents lying on the floor, as this is related to respecting your work.

Your daily template is basically the essence of your day. It reflects what is pinned up in your workspace, documents your process, and contains the main results. We give you instructions for how to fill each template at the end of the day. When it is complete, you will hang it on your process wall in the ETH Week Hall. It will remain there until the end of the week. The process walls are public so that ideas can flow and build on each other, and to foster informal discussions between you and students from other teams, experts and guests of ETH Week.



× HEADS UP

Sign up before 20.00 at the Info Desk for tomorrow's yoga class or the morning run.



↘ Template check out.

Your first template will contain the two scenarios of the STEEP Analysis exercise. It highlights the team-building goals of the day: to familiarise yourself with the interdisciplinary group setting and to build on and discuss your own experiences, values, and perspectives.

THE ROLE OF MANUFACTURING IN SWITZERLAND AND A DISCUSSION ABOUT FAILING FORWARD

This evening is setting a pioneering and forward-looking spirit at the beginning of ETH Week. The protagonists of the evening share a common interest in a culture of innovation and seizing opportunities to bring ideas and technologies from science to market.

In an introductory dialogue, Detlef Günther and Hans Hess discuss the role of 'Manufacturing' in Switzerland, its citizens and their economy. With micro, small and medium enterprises being the backbone of the Swiss economy, specific opportunities and challenges in comparison to the 'Big Players' are spotlighted and linked to the start-up environment at ETH Zürich and in the greater Zurich area.

In the following discussion with founders of six Spin-offs of ETH Zürich, the panellists will share their personal 'Failing Forward' story and how they managed to turn mistakes into stepping stones. Later on, during the Spin-off Fair, the entrepreneurs are presenting their products and services that are linked to 'Manufacturing' as a whole.



HANS HESS is President of Swissmem, the leading association for companies in Switzerland's mechanical and electrical engineering industries. He studied Materials Engineering at ETH Zürich and holds an MBA degree. Before joining Swissmem, he worked in various management and executive positions in leading Swiss manufacturing companies.



DETLEF GÜNTHER is Professor for Trace Element and Micro Analysis, and since 2015, Vice President for Research and Corporate Relations of ETH Zürich. He is a chemist and did his PhD in Analytical Chemistry at the Martin-Luther-University Halle-Wittenberg. In his research, he developed a portable laser ablation system, a key tool for trace element analysis in field research such as archaeology.

AVANTAMA AG
founded in 2008, Nanomaterials

Avantama is the worldwide leader in the development and production of nanomaterials for electronics. Avantama's materials enable the fabrication of high quality optical and electronic coatings by established printing and coating techniques. Avantama's materials lay ground for innovations in LCD displays, OLED lighting devices or organic solar cells. Avantama's vision is to create materials for a bright and efficient future.

GREENTEG AG
founded in 2009, Sensors

greenTEG develops, manufactures, and markets sensors for heat flux measurements in OEM and R&D applications. The sensors are used in a wide range of applications such as laser power measurements, building physics (U-Value), thermal characterisation of materials and processes, and wearable/medical applications.



SAMUEL HALIM earned his doctorate in Chemical Engineering from ETH Zürich. He was educated in Materials Engineering in Zurich, Lausanne and Stockholm. He is co-inventor of technology that was acquired by a Fortune 100 company and also winner of the Venture Leader 2009 Award.



WULF GLATZ received his doctoral degree from ETH Zürich in 2008. He has studied at the Universidad Politecnica de Valencia, Spain, the University of Oklahoma, USA and the Technical University of Braunschweig, Germany. Wulf has gathered industry experience at the R&D departments of Volkswagen, Bosch and IBM.

NOONEE AG

founded in 2014, Exoskeletons

noonee is the first company to commercialise an exoskeleton and the world's first supplier of wearable ergonomic mechatronic devices that are focused on improving ergonomics in the manufacturing industry. 'The Chairless Chair' enables ergonomic workplace design by providing a sitting support for standing work.



KEITH GUNURA, grew up in Zimbabwe and has always liked robots and exoskeletons. He has a Bachelor's degree in Mechatronic Engineering and a Master's in Nuclear Engineering from the University of Lancaster. He moved ETH Zürich to pursue a doctorate in Bio-Inspired Robotics. His passion for solving real-world problems, led him to found noonee AG.

PERIPAL AG

founded in 2015, Medical Devices

The company develops and commercialises medical devices to facilitate home dialysis. Peripal's product addresses a key step in home dialysis therapy: the manual connection of dialysis tubings to patients' catheters. This handling step carries the risk of infection, thereby posing a critical hurdle to home dialysis. The Peripal system supports such a connection. Patients can connect themselves in an easier and safer way and the system allows more dialysis patients to be treated at home.



SANDRA NEUMANN is CEO and Co-Founder of Peripal AG. In her previous role, she was General Manager Renal for Baxter AG in Switzerland. She is a trained biochemist and received her doctorate from ETH Zürich. She has worked for McKinsey & Company Inc and Geistlich Biomaterials AG before joining Baxter Healthcare Inc in its EU headquarter to work in the Renal business.

SUSOS AG

founded in 2004, Surfaces

SuSoS is a leading company in the field of surface science. One of the most challenging aspects of modern manufacturing is to produce adequate product surfaces. At SuSoS we spray-coat, dip-coat, spin-coat or vapour deposit nanometer-thin polymer layers onto our clients' products to enable optimal surface properties. This is especially relevant for products in Next-Generation Sequencing, Nanofluidics, Diagnostics and Regenerative Medicine. Some of our client's products are truly 'Manufacturing the Future', as these are about to enter the market.



SAMUELE TOSATTI studied Materials Science at ETH Zürich, earning the ETH Silver Medal for his doctoral thesis in 2003. After working as leader of the Biomedical Team in the Biointerfaces Group he founded SuSoS AG together with Stefan Zürcher to bring the technologies developed in the group to market.

SWISS WOOD SOLUTIONS AG

founded in 2016, Manufactured Ebony

We develop and manufacture new wood-based materials, such as 'Swiss Ebony' to provide an alternative for tropical wood species, such as black ebony, that are rapidly declining. Swiss Ebony is based on sustainably grown maple wood and undergoes a modification process to present the same properties and qualities. In this way, we are able to provide a sustainable and legal alternative. Our first application is in musical instruments, with first prototypes already in use. We believe that the market asks for nature-based materials which can satisfy the modern customers' desires!



OLIVER KLÄUSLER worked as R&D engineer in the field of design-driven engineered wood products after his studies in Wood Science and Technology. He was the main developer of two entirely new wood products for Audi, he then returned to ETH Zürich for his doctorate. Today he's CEO of the Swiss Wood Solutions AG and leader of the research group for Applied Wood Science and Technology.



Your projects start tomorrow. Stay tuned.



The goal for Monday is to dive into the topic of manufacturing, and to get an overview of its complexities and opportunities. You will build empathy for a range of actors you meet during the field trips, and discuss stories that include your personal interpretations. In the evening, we will build a foundation for your critical approach to the topic.

7.05 — Yoga and morning run at the HPS Sports Centre.

8.30 — Kick-off at ETH Week Hall.

↘ Check in.

9.00 ◆ **OVERVIEW INPUT**
'Manufacturing the Future' by Larissa Schefer.

↘ Field trips!

15.30 — Return to ETH Week Hall.

↘ Unpack.

↘ Draw stories.

↘ Template check out.

18.30 — Dinner

19.45 ▲ **CRITICAL THINKING NIGHT**
Keynote by Philipp Blom,
Discussion followed by an Interactive Dinner at ETH
Week Hall.

monday
sep 11

↘ Check in.

We have structured the week so that each day has a specific focus and that at the end of each day, you will document your results. The results of Sunday are visualised on the Sunday template on your process wall in the ETH Week Hall. The templates will also function as a roadmap for the whole week. Every morning you will meet there, look back at the previous days and plan the day ahead together with your tutor.

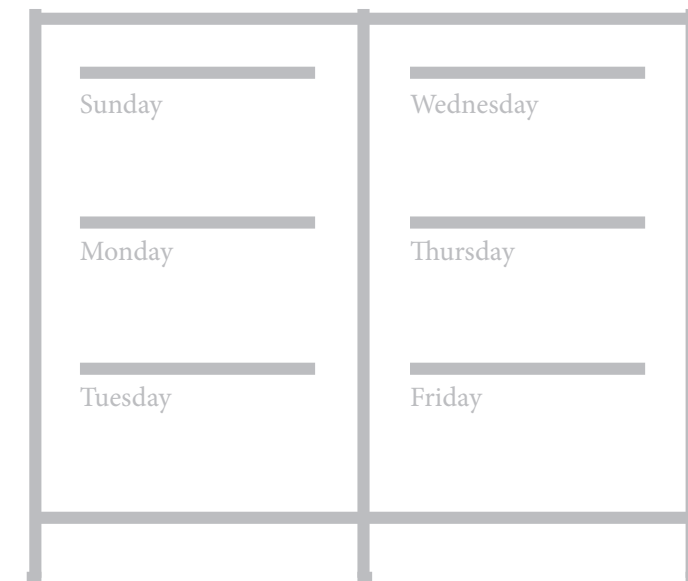
SELF-REFLECTION / The notion of self-reflection is linked to critical thinking. It covers the ability and willingness to understand how your own values influence your communication. This enables empathy, which is the willingness (and capability) of understanding other people's viewpoints. When you understand where you come from, and you are able to critically reflect on how your judgement is affected by your background, your mind should also be flexible to accept the different perspectives of other individuals. While you do not have to agree with the standpoint of the other individual, at least you should be able to see where they are coming from (or be willing to do so), and thus support a fair and rational communication, laying the groundwork for a positive and productive working process.

THE THREE ANGLES / we structure 'Manufacturing' along three inter-connected, overlapping angles, to foster disruptive thinking for all participants involved, each angle is shaped as a dialogue focusing on the synergies that emerge from the combination of different disciplines. With such a transdisciplinary approach, we aim to allow key challenges and opportunities to be identified thereby empowering us, as a community of responsible citizens, to proactively shape the 'Future of Manufacturing'

× NOTE

This slot repeats every day. Walk to your process wall after the kick-off, where you will meet your tutor.

monday
8.40
ETH WEEK HALL



Process walls

◆ OVERVIEW INPUT

MANUFACTURING THE FUTURE

Manufacturing is key to realising products that satisfy human needs ranging from health to communication, mobility and construction. To multiply the societal and economic benefits of manufactured goods, manufacturing needs to yield products that are accessible, affordable and sustainable.

Throughout history, manufacturing has changed dramatically. Starting from products made by hand, advancements in the mechanisation of tools and the targeted use of water and steam power allowed to produce goods in less time and at larger scale. The mastering of the moving assembly line thereafter gave rise to the age of mass production. The broad implementation of computers has automated whole manufacturing processes, and we are currently at the dawn of digital technologies fusing with traditional production processes thereby paving the way for cyber-physical systems to steer how things are manufactured in the future. In addition, the question of 'how we make things' relates to each and every one of us at the most personal level, and represents a defining feature of us as humans. How can we design future products and manufacturing processes that solve environmental problems, rather than exacerbating them? How will our working conditions change, and our relationship to smart machines evolve, as technology advances further?

Historically, Switzerland has maintained a strong, global presence across manufacturing industries. Hence, the disruptive potential of emerging technologies triggers exciting as well as contentious societal questions. Systemic transformations on the global scale bear consequences on Switzerland. At the same time, Switzerland – with its strong scientific and technological base – is in a unique position today to frame this discussion in novel ways by engaging the next generation of scientists and engineers in shaping the global economy for decades to come.

× HEADS UP

Please make sure to pick up your lunch bag in the catering area before heading to the meeting point for the excursions. If you visit InnoRecycling AG or Subitex/Empa, you do not need a lunch bag, as lunch will be provided. All buses leave at 10:15.

monday
9.00

ETH WEEK HALL

Materials and Resources

Factories and Products

Human-Machine Partnerships



LARISSA SCHEFER is managing the ETH Competence Center for Materials and Processes (MaP), combining her interest to advance complex scientific and technological grand challenges and the passion to engage people following a transdisciplinary approach. She studied Food Process Engineering and holds a doctorate in Soft Materials from ETH Zürich, and gained experience in applied R&D projects during time spent in industry.

↘ Field trips!

During ETH Week, the problems you will try to solve are most probably not your own. They are also set in a real-world situation. You will define a problem within a complex system of actors and an existing environment of ideas and mindsets.

Today, you will join students from other teams to go on a field trip. This is a chance to link the overview talk of this morning to a specific context. Keep an open and critical mind and pick another student so that you can work in pairs.

On the field trips, we ask you to engage with real-world partners by formulating your own questions, from the electricians who work on site to the CEOs who take high-level decisions. We want you to put yourself into their shoes and understand what is important to them, the way they think, and the values they hold. A deep understanding of people will help you find better problems to solve. This is called empathy, and it will give you a fresh perspective on the world around you. Without empathy, your mind will automatically filter out information without you realizing it.

On your way back, you will translate your experience into a story that others can relate to.

× HEADS UP

You might want to contact these experts on Wednesday to get feedback on your ideas. Ask for their business card and if they have 15 min on Wednesday afternoon for a brief telephone call.

monday
10.15

DEPARTURE

Build rapport.

Shift the focus to the actor and offer something of yourself.

Seek stories.

Learn about what he or she does, and more importantly thinks and feels.

Ask why?

What opinion made them take a decision, why it is it important to them?

× NOTE

Use this scaffolding to move beyond facts and observations to inferences and interpretations.

HOW TO INTERVIEW

You will start by directly observing what people say and do, what challenge they are trying to solve, and how are they solving it. Then you will move on to infer what they think and feel. We offer a simple scaffolding as guidance: what? how? why?

It is a tool that helps you advance to deeper levels of observation, moving from the concrete and obvious to the more complex and inferred. Start by documenting the facts and descriptions and ask: 'what?' 'how?' Then move on to the inferences. Ask 'why?'. You will need to evaluate the answers and use your own judgement. We want you to become comfortable with taking your own decisions. Be critical and put things into relation with the bigger picture discussed during the first talk in the morning.

Some tips on interviewing:

- When interviewing people, don't suggest answers to your questions. Even if they pause before answering, don't help them by suggesting an answer. This can inadvertently get people to say things that agree with your expectations. Ask questions neutrally.
- Don't be afraid of silence. Often, if you allow there to be silence, a person will reflect on what they've just said and say something deeper.
- Look for inconsistencies. Sometimes, there will be discrepancies between what people say and what they do (or say later). Probe these contradictions, but do so gracefully.
- Stay on the same path of a question. Respond to what your interviewee offers and follow up to go deeper. Use simple queries to get him to say more. Ask 'why?'.

what

is the expert trying to solve?
the facts

how

are they solving it?
the emotions and the techniques

why

are they doing it in this way?
your inferences

◆ **FIELD TRIPS**

ABB SCHWEIZ AG, SEMICONDUCTORS DIVISION, LENZBURG

Use of Robots and Automated Guided Vehicles (AGV's)
in the Manufacturing of High Power Semiconductors

ABB is a pioneering technology leader in robotics and motion and industrial automation, serving customers in industry, transport and infrastructure globally. ABB today is writing the future of industrial digitalization and driving the Fourth Industrial Revolution.

During this excursion, you will be introduced to an industry 4.0 factory automation project. You will see how robots and automated guided vehicles (AGV's) are used in the manufacturing of high power semiconductors. You will also learn how such a project is initiated and implemented and what are the opportunities, as well as the challenges in an automated factory.



DAVID HAJAS has worked at ABB Semiconductors for eight years and initiated as well as set up the industry 4.0 factory automation project, which he now leads. David holds a PhD in Materials Science from RWTH Aachen.



YAN VOLFSON is an automation and robotics engineer who has been working on the project for two years. He is responsible for the pilot line, which has been used to gain experience in the highly integrated systems. Yan has gained his automation experience in the steel industry.



CARLOS PUERTAS is working at ABB Semiconductors as a project manager and automation expert. He is responsible for the automation concept and additionally manages external suppliers for the automation project. Carlos has gained his automation experience in the watch industry at ETA SA.

BLUMER-LEHMANN AG, GOSSAU

Timber Industry, Value Chain from the Log to the House

Closing the circle. We're driven to close the life cycle of wood and are therefore involved in all areas of the economic and ecological supply chain of timber. Today, we are the pioneers of innovative and sustainable timber construction.

This excursion will be in German and English.



KATHARINA LEHMANN is the owner and president of the board of Lehmann Group. Since 1996 she is the person responsible for Blumer-Lehmannn.

◆ FIELD TRIPS

BOTANICAL GARDEN, UZH, ZURICH

Principles of Biomimetics

Botanic Gardens are hot spots of biodiversity and a rich source for researchers working in the field of biomimetics and biomechanics. With this excursion, we invite you to take a look on plants from a biomimetic and biomechanical perspective. We will show several plant species, which have been a source of inspiration for innovative, biomimetic solutions in engineering and construction.



MARKUS RÜGGERBERG is senior assistant and group leader at the chair of Wood Materials Science at ETH Zürich. He has received his PhD in Biology and has settled his work at the interface of Biology and Engineering Science in the field of Plant Biomechanics, Wood Actuation, and Biomimetics.



EVELIN PFEIFER holds a diploma in Botany from UZH and works as garden educator at the Botanical Garden of University of Zurich.

NCCR DIGITAL FABRICATION AND NEST, EMPA DÜBENDORF

DFAB HOUSE–Designing, Planning and Building with Digital Processes

In 2016 the modular research and innovation building NEST was opened at the Empa Campus in Dübendorf where new technologies, materials and systems are tested, researched, honed and validated in realistic conditions. NEST consists of a central “backbone” and three open platforms, where individual research and innovation modules can be installed based on the “plug-and-play” principle. People live and work in these units, which double up as bustling experimental laboratories. More than 100 partners from research, industry and the public sector join together at NEST to explore the future of buildings.

Initiated in 2014, the National Centre of Competence in Research (NCCR) Digital Fabrication strives to radically revolutionize architecture through the seamless combination of digital technologies with physical construction processes. Over 70 researchers from five different academic disciplines collaborate to develop groundbreaking technological solutions.

Eight ETH Zurich professors are collaborating with business partners to build the three-storey DFAB HOUSE. It is the first house in the world to be designed, planned and built using predominantly digital processes.



KONRAD GRASER is the project manager and lead architect of the DFAB HOUSE. He holds a master’s degree in Architecture at ETH Zürich. His focus is on digital technology in architectural design and planning. He has worked in architecture, façade engineering and interdisciplinary projects in Switzerland, Germany and the USA, where he has taught design at Yale School of Architecture and California College of the Arts.



RETO LARGO studied computer science at ETH Zürich and completed a postgraduate degree in Executive MBA at the University of St. Gallen. He has broad experience in technology development and sales. He has successfully set up and led start-ups, business units and large-scale projects in the national and international environment. Since June 2014, Reto Largo is the managing director of the research and innovation platform NEST at Empa.

◆ **FIELD TRIPS**

GENERAL ELECTRIC (SWITZERLAND) GMBH, BIRR

Advanced Manufacturing of Turbomachine Components

GE's Birr Manufacturing and R&D site combines many facets of modern turbomachinery production. You will get insights in some processes that enhance performance and optimise the total lifecycle costs of heavily loaded turbomachine parts. Examples are the automated welding of rotors, milling of large steam turbine blades, but also additive manufacturing and advanced reconditioning of complex turbine components.



MATTHIAS HOEBEL has a PhD and is a Consulting Engineer in GE's Advanced Manufacturing Works with more than 15 years of experience in laser technology development. He has led several R&D teams with focus on additive and subtractive laser manufacturing processes.



KATHARINA BRETTSCHEIDER is working at General Electric (Switzerland) GmbH and is responsible for Employer Branding and University Relations. She holds an MBA with a focus on Human Resources, Finance and Communication.

IBM RESEARCH - ZURICH, RÜSCHLIKON

The Cognitive Era

At IBM Research, most promising and disruptive technologies that will transform industries and society, including Artificial Intelligence (AI), Blockchain and Quantum Computing are pioneered. These technologies are developed with the aim to manage the huge increase in both structured and unstructured data, whether from internal or external sources. With Cognitive Computing and Watson, IBM strives to leverage a huge potential to accessing data, identifying patterns and developing business and industry insights that benefit clients and IBMers alike.



HENRIQUE SÄUBERLI is Executive Briefing Consultant at the IBM Client Centre Research. He joined IBM in 2010, bringing a range of experience in banking, insurance and financial markets. Henrique holds a Master's in Computer Science from ETH Zürich.



MARIA SOIMU is Research Content Advisor and is in constant exchange with Content Advisors from IBMs research labs around the world. Her job is to identify the most relevant and mature projects, curating the information and material for client meetings and presenting the research prototypes during events.



KARIN VEY is an Innovation and Trend Expert at the Industry Solutions Lab (ISL) at IBM Research. Vey's work reflects her multidisciplinary academic background in physics, communications and psychology. She is also a professor at the Zeppelin University in Friedrichshafen (Germany), where she teaches Innovation and Knowledge Management.

◆ **FIELD TRIPS**

INNO RECYCLING AG AND INNOPLASTICS AG

Recycling of Plastics

While the InnoRecycling AG specialises in the disposal and sorting of plastics, InnoPlastics AG processes them into high-grade regranulates. We will show you the whole process of this value chain on site. In the past it was common to only feed plastics from commerce and industry to the recycling process, and it is only now that the future potential of plastic household waste is being seen. Future challenges will revolve around the topic of plastic waste as a resource, as both waste incineration plants as well as the plastics-processing industry rely on its availability. A 'Fight for Plastic'?!

This excursion will be in German.



MARKUS TONNER is managing co-owner of InnoRecycling AG. As president he represents the interests of 'VKRS Verein Kunststoffrecycling Schweiz' and he teaches in the Department of Plastics Recycling at Berufsschule BZZ in Horgen. His motto: There is no rubbish, except in our minds!

SUBITEX RESEARCH INITIATIVE, EMPA ST. GALLEN

Materials meet Life

With the Internet of Things, consumer goods become 'intelligent' and interconnected. In the future, textiles and clothing will contain sensors for body monitoring or will be carriers for controlled drug release. During the visit at Empa, the materials research institute of the ETH domain, you will see how smart textiles are developed and how they can be implemented into innovative products thanks to the industrial partners' network 'Subitex'.



ALEX DOMMANN is Head of the Department 'Materials meet Life' and member of the Board of Directors at Empa.



DIRK HEGEMANN is Team Leader of the Plasma and Coating Group at Empa.



RENÉ ROSSI is Head of the Laboratory for Biomimetic Membranes and Textiles at Empa in St.Gallen and lecturer at ETH Zürich. He is a physicist and holds a doctorate in physiology from ETH Zürich.



LUCIANO BOESEL is Team Leader of the Medical Textiles Research Group within the Laboratory for Biomimetic Membranes and Textiles at Empa.

SWISS STEEL AG, EMMENBRÜCKE
R&D in the Swiss Heavy Industry

Swiss Steel AG is one of the leading suppliers of steels in the European long steel market, especially in the free cutting steel market. Our products are mainly used in the automotive industry. As an important recycling company, Swiss Steel AG is also committed to continuing its resource conservation activities.

During the excursion we will discuss the R&D-approach of Swiss Steel, answer the question 'How R&D Works in Practice in the Industry', and finally we will visit the steel mill and the rolling mill.



HEIKO HAUPT-PETER is Head of Business Development and R&D at Swiss Steel AG in Emmenbrücke. He holds a PhD in natural science and an MBA. He is listed as an international steel expert at CEN (European Committee for Standardization) and member in Standardization Committees.



HANS ROELOFS is Senior Researcher at Swiss Steel AG. He is alumnus of ETH Zürich with a Dr. sc. degree in natural science. As expert he represents Swiss Steel in various committees of the German steel association. As sponsor, tutor or referee he accompanies PhD students at various European universities.

PERLEN PAPIER AG, PERLEN
Recycled Paper Products

Perlen Papier AG is part of the CPH Chemie + Papier Holding (CPH), a mid-cap listed company with a history of innovation. It is the largest manufacturer of newsprint and the only producer of magazine paper in Switzerland and produces 580,000 tonnes per year on state-of-the-art production machines.

Roughly 80% of the revenues are primarily made within the Eurozone (excluding Switzerland). Paper is a recycled product, consisting of 90% waste paper and woodchips, which are recycled from sawmills. The company has a strict environmental code of conduct, runs an own hydroelectric power station and has a biomass plant, which uses waste materials of the production process.



KLEMENS GOTTSTEIN is CEO of the Paper division. In his career he has worked for multiple companies in the paper manufacturing industry in leading positions. Before joining Perlen Papier, he worked for Myllykoski as global COO. Today, he is leading one of the newest paper plants in Europe, with 350 FTE, a production capacity of 580kt per year and a daily wastepaper demand of 1500t.



MARKUS THOMALA is Head of R&D. Before that, he was Head of Production at PM7, the latest paper machine at Perlen Papier, which produces enough paper in 14 days to circumnavigate the globe. Today one of his duties is to utilize fibers in a more efficient way.

↘ Unpack.

After the field trip, you will go back to your team and share your new knowledge with the others. To make it easier, you have prepared a story on four post-it notes. This is a simple way to condense a vast amount of information into a standardised sentence. Use the template for the story on the opposite page.

The story you bring back will help you externalise data and structure the conversation. Think of it as a hook to the experiences you have made. During the discussion, your teammates will use it as a starting point to dig deeper, probing your assertion. Stories can uncover knowledge, reinforce discussions, and stimulate creative thoughts, actions, and alternatives. Unpack and identify tensions, contradictions, and surprises.

× NOTE

Make sure to use the following color coding: Someone (yellow), Wanted (green), But (pink), So (orange).

monday
16.00

TEAM SPACES

Someone ... (a person, a group)

wanted ... (sought, desired, had a goal)

but ... (complications, obstacle, conflict)

SO ... (climax, outcome, learning, resolution)

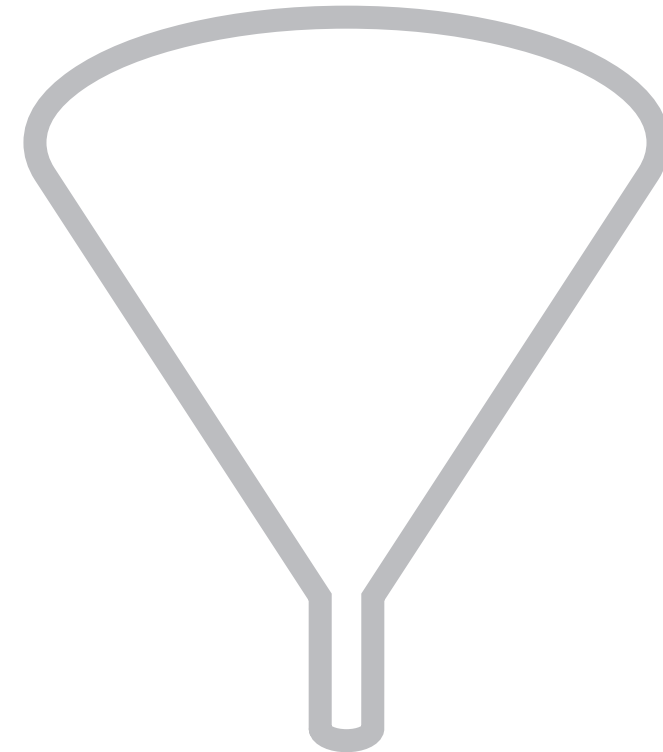
↘ Draw stories.

Learning how to take decisions together will be crucial in order to become a well-functioning team during the week. Only by creating room for exchange, you will be able to build on the thoughts of others. This will also help you to bring different ideas, opinions, and values together. Time pressure actually helps you in this process: it keeps you away from postponing important decisions.

Consider this slot a dry-run for the more important decisions that will need to be taken later in the week. Become comfortable with this work mode and learn how to establish a team culture that works for you. It needs to enable you to take decisions efficiently, representing the opinions of the team. Find out what rules could help you to stay focused and move ahead one decision at a time.

× HEADS UP

Sign up before 20.00 at the Info Desk for tomorrow's Body Combat class, or the morning run.



↘ Template check out.

Despite the fact that all teams have visited the same excursions, we are almost certain that the results of your discussions in the afternoon will be very different from one team to the next. To visualise this, we ask you to draw three comics, representing the three most significant stories from the excursions onto the Monday template.

WHAT IS AT STAKE

In his latest book 'Was auf dem Spiel steht', Philipp Blom describes our society as one that is not interested in a better future. We seem to be living in a never-ending present, prefer as little change as possible and dream about a past that never really existed. What happened to our appetite for bold, ideological visions?

In his clear and critical analysis, Blom draws a number of vivid mental images and identifies connections that give us the tools to better understand our time. Informed by history, he connects two trends that are looming at the horizon: climate change and digitalisation. While the first one can at best be mitigated, the second one bears an opportunity for new paths off the beaten track.

While his serious tone underscores that he is pessimistic about a fundamental system change, he hopes to be proven wrong. Both trends he depicts are products of the industrial revolution, just as mass production and our dependency on oil. But ideas live and die with the generations that invented them and, after decades of delegating the problems to the market, ideas are back. Also, for the first time, we have enough information about the consequences of our actions. And most importantly: the tools and technologies exist to change course!

In his talk, Philipp Blom will elaborate on the opportunities that lie ahead, e.g. how a revival of craftsmanship in 'how we make things' bears an opportunity not only to create new solutions but also to find new problems that can fire up our imagination for a new individual and societal learning process. In an interactive discussion, he will try to stress how the imagination of new paths for technology and scientific thinking, new models for society, and digital and physical interaction represents the largest common project of our time.

Why?



PHILIPP BLOM studied in Vienna and obtained his D.Phil in Modern History in Oxford, where he also started writing. After university, he worked in London as an editor and journalist before moving to Paris working as translator, writer and freelance journalist, contributing to newspapers, magazines and radio programmes in Great Britain, the US, Germany, Switzerland, Austria, the Netherlands, and France. He now lives in Vienna.



Tomorrow will be about framing the problem.



On Tuesday, we will introduce the three angles to create some structure that is supposed to help you think about manufacturing along additional dimensions. You will get to meet 30 experts so that you can start defining the problem you will be working on for the rest of the week. Learn to take decisions quickly and act as a team.

7.05 — Body Combat and morning run at the HPS Sports Centre.

8.30 — Kick-off at ETH Week Hall.

↘ Check in.

9.00 ◆ DEEP DIVE DIALOGUES
Introduction to the three angles.

11.45 — Lunch break.

↘ Prepare for knowledge fair.

13.30 ◆ KNOWLEDGE FAIR
30 representatives from industry, research, and society.

↘ Unpack.

↘ Problem statement 1.0.

↘ Template check out.

18.30 — Dinner

19.45 ▲ TECHNICAL PANEL
'The Future of Production' in the manufacturing context with Torbjørn Netland.

tuesday
sep 12

◆ DEEP DIVE DIALOGUES

MATERIALS AND RESOURCES

In the materials and resources angle, we compare the synthetic and the biological realm to find strategies to advance human-made materials regarding sustainability, biocompatibility, and energy-efficiency. We look at design principles of nature-made materials that have evolved through a natural selection process, thereby recognising the interplay of material composition and hierarchical structuring, optimised to achieve certain functionalities.

From a manufacturing perspective, we are facing a demand for advanced materials for new product applications that fulfil novel functions, such as being smart, adaptive and self-healing. As a solution to cope with this need, we explore 'how to use natural design principles to make functional materials that are sustainable'. Following nature's assembly approach from the bottom-up, we aim to grow materials from scratch. But how can we solve the challenge of up-scaling to the level required in manufacturing?

By having a look at wood, a biomaterial and renewable resource, widely used in the construction field, we identify a sophisticated hierarchical structure grown in a natural 3D-printing fashion. This opens the opportunity to utilize wood as an already grown hierarchical material that can be functionalised to fulfil application-specific requirements. To tailor the functionality of wood as an engineering material in manufacturing, we are facing the challenge of a top-down functionalisation based on an already grown structure.

Taking these two challenges of up-scaling when building materials from scratch and functionalisation of grown structures from the top-down, we identify 'manufacturing across scales' as a key opportunity. Would it not be nice, if we tried to merge the best from both sides, combining bottom-up assembly in a 3D printing fashion and top-down functionalization in conjunction?

× HEADS UP

You will meet researchers of the six chairs on Thursday during the feedback round.

tuesday
9.00

ETH WEEK HALL



ANDRÉ STUDART heads the Complex Materials group at D-MATL. He obtained his PhD under the supervision of Victor C. Pandolfelli at the Federal University of São Carlos, Brazil, investigating novel methods for processing of refractory castables and near-net-shape advanced ceramics. His main research interests are on bio-inspired complex materials with potential applications as medical implants, energy conversion systems and smart structures.



INGO BURGERT is Professor for Wood Materials Science at the Institute for Building Materials at D-BAUG. His research focus is on the nanostructural and micromechanical characterisation of wood and fibre composites and their modification in order to optimise material properties. For this purpose Ingo Burgert and his group analyse and transfer principles and mechanisms that can be found in nature to technical applications.

FACTORIES AND PRODUCTS

Within the angle of factories and products, we address the rise of digital fabrication technologies, thereby focusing on 'how we move from something that is technically feasible to applications with industrial and societal impact'.

Digital fabrication technologies, such as robotics and additive manufacturing have entered the collective imagery through fiction and art long before their actual technological development has occurred and applications have found their way into real factories. We aim to put technology into context by introducing basic concepts in digital fabrication focusing on the 'why' and 'how' these technologies evolve.

Right now, digital technologies have reached a level of pervasiveness that cuts across production technologies, process and value chains, organisational and geographical boundaries, products and business models. We look at this evolution and aim to identify opportunities along digital value chains to create benefits for society.

By comparing manufacturing at the scale of an object vs the scale of architecture, we discuss implications such as possibilities for customisation, application-specific cost structures, and issues of resolution. And even in the era of a new digital production logic, where machines take over the part of building, the role of the designer will remain important, leading to a resurrection of craftsmanship.

Technical change follows an unstable path between technocratic thinking and scepticism. To make an impact, we realise that mass deployment is required, however, the value of demonstrators is key and change often only starts with premium applications such as monumental buildings, aircrafts and satellites.



MIRKO MEBOLD is Professor of Product Development and Engineering Design at D-MAVT. His main research focuses on the development of new products in the field of mechanical engineering industries, biomedical applications and associated technologies. He regards the impact on the education of young engineers and its relevance for industry as a key motivation and benchmark for his research. He currently is working in user-oriented product innovations, new production technologies and challenging applications.



FABIO GRAMAZIO is an architect with multi-disciplinary interests ranging from computational design and robotic fabrication to material innovation. In 2000, he founded the architecture practice Gramazio & Kohler in conjunction with his partner Matthias Kohler, where numerous award-winning designs have been realised. Current projects include the design of the Empa NEST research platform, a future living and working laboratory for sustainable building construction. Since 2017, Fabio Gramazio is Director of Studies at D-ARCH.

HUMAN-MACHINE PARTNERSHIPS

The human-machine partnerships dialogue explores how machines and people might be able to accomplish something that neither of them can do alone. A particular focus will be given to the technologies of machine learning (ML) and artificial intelligence (AI) and how such systems may find a way into human decision making. Grounded in specific applications like automatic image capturing and recognition as key enabling technologies for autonomous driving, we will speculate on what this could mean for the field of manufacturing.

We start with a general learning discussion, moving into interactive ML and learning from demonstrations, thereby exploring ‘how people and machines can learn to solve complex tasks collaboratively’. By focusing on concrete modalities of interactive learning, we identify and discuss challenges such as the trade-off between interpretability and accuracy.

In the context of more automated systems and learning systems, we recognise multidimensional effects of technology on society, also on an ethical level. The boundary between technical and social systems is getting more and more blurry, in particular when it comes to decisions made jointly, driven by data as well as people. At the core of the design challenge for emerging joint learning systems, we ask ‘what are the trade-offs of exploration and exploitation?’ and ‘how can we address the issue of allocation of control and accountability?’.



ANDREAS KRAUSE is Professor of Computer Science at ETH Zürich, where he leads the Learning & Adaptive Systems Group. He also serves as Academic Co-Director of the Swiss Data Science Centre. Before that he was an Assistant Professor of Computer Science at Caltech. His research on machine learning and adaptive systems has received awards at several premier conferences and journals.



GUDELA GROTE is Professor of Work and Organizational Psychology at D-MTEC. The main objective of her research is to provide psychologically based concepts and methods for integrative job and organizational design, taking into consideration the changing technological, economic and societal demands and opportunities. Application fields for Grote’s research are e.g. effects of new technologies on work processes, and collaborative planning within and between organizations.

↘ Prepare for knowledge fair.

Between the input talks of this morning and the knowledge fair this afternoon, you will get the chance to reflect and build on the information gathered so far. We want you to identify links between the key topics and the actors you will get to meet at the knowledge fair.

The knowledge fair is organised into 5 sectors. Each sector includes 5 different expert booths. You will again work in pairs, each pair in your team covering a different sector. The knowledge fair has four rounds of 15 minutes each. For every round, you will switch to a different expert, which means you will get to see 4 of the 5 experts of the chosen sector. You will not be able to predict whom you will get to meet exactly or in which order, as the fair follows a free-market approach within the sector. Therefore, prepare at least five questions per expert for the chosen sector, and do this for all experts. Also, in each round, students from different teams will be present in one booth. Use the 'what—how—why' questions on the opposite page, but try to be more specific. You will also find short abstracts, guiding questions, and portraits of the experts you will meet.

× NOTE

Use this scaffolding to move beyond facts and observations to inferences and interpretations. Also, refer back to the pages on the field trips.

tuesday
12.30

TEAM SPACES

what

is the expert trying to solve?
the facts

how

are they solving it?
the emotions and the techniques

why

are they doing it in this way?
your inferences

◆ **KNOWLEDGE FAIR**

Area 1

DEPARTMENT OF ECONOMICS, UZH

Ethics for Business. Why It Is Not Enough to Appeal to Moral
Conscience

Suzann-Viola Renninger is a philosopher in the departments of Economics and Biology at the University of Zürich. In our rapidly changing society, we are constantly confronted with new and unfamiliar moral challenges. We need interdisciplinary collaboration to address these challenges effectively and comprehensively. One of her research topics is thus to establish a dialogue between applied ethics and behavioural science.

FRITZ STUDER AG

Tailored Integrated Solutions for Every Grinding Task

Fritz Studer AG, headquartered in Steffisburg, was founded in 1912. STUDER is worldwide known for high-precision circular grinding technology. With 800 employees, sales in 2015 were 210 million swiss francs. The circular grinding machines are used in: automotive industry, electronics, hydraulics, aerospace, precision industry, as well as the tool industry. Development at STUDER is strongly related to topics like machine communication, process data analytics and predictive maintenance.

BCOMP AG

Lightweight Natural Fibre Composites for the Future Mobility

Bcomp focuses on the manufacturing and designing of natural fibre based semi-finished composite structures for the sports & leisure industry. Their products aim to offer the best possible compromise between the structure's performance and its environmental impact.

× **HEADS UP**

You might want to contact these experts on Wednesday to get feedback on your ideas. Ask for their business card and if they have 15 min on Wednesday afternoon for a brief telephone call.

How can society as a whole contribute to future manufacturing systems that are sustainable?

How will advanced manufacturing and new digital technologies impact the future of production in the field of hard fine machining?

How can one manage to use a natural, historical resource for advanced technologies?

**tuesday
13.30**

ETH WEEK HALL



SUZANN-VIOLA RENNINGER has a Master's degree in biology and a PhD in philosophy. She teaches ethics and philosophy of science at the University of Zurich, and is interested in the relevance of behavioural economics for concepts in applied ethics.



MICHAEL KLOTZ studied mechanical engineering at TU Chemnitz and then started to work at Fraunhofer IWU as a scientific assistant. Since 9 years he is project manager for machine and grinding technology development.



JULIEN RION is Technical Director and Co-Founder at Bcomp Ltd. As such he is responsible for the technical developments of Bcomp.

SBB CFF FFS AG

Integrated Planning and Control

The Infrastructure Division of the SBB is responsible for Network Planning, Life Cycle Management, Production Planning, Production Execution, Network Operations, and Control and Monitoring. A critical factor in production planning and execution of all construction and maintenance activities within the Swiss network is the determination of how maintenance and construction activities can be performed in such a way that the four key resources of finance, heavy construction machinery, manpower and, most importantly, line closure, are available within the operational network.

ENGINEERING DESIGN AND COMPUTING LABORATORY, ETH ZÜRICH
Digital Design Methods for Sustainable Manufacturing

The Engineering Design and Computing Laboratory focuses on developing cutting-edge computational models, methods and tools that enable the design of innovative and sustainable engineered systems and products, as well as the automation of design and fabrication processes. They focus on novel methods for automatically generating, simulating and optimising structural and mechanical systems that can be directly fabricated with single and multi-material 3D printing.

What factors determine how maintenance is performed to maximise resource efficiency?



JAMES O'NEIL is the Regional Head of Strategic Portfolio Management for Rail Infrastructure Construction and Maintenance with a demonstrated history of change management in heavy industrial sectors.



TINO STANKOVIĆ is a senior assistant at the Engineering Design and Computing Laboratory at ETH Zürich and teaches Engineering Design Optimization. In his research, he focuses on advanced computational methods for engineering design synthesis and optimisation.

How may digital design and advanced manufacturing technologies such as 3D printing pave the way towards more sustainable manufacturing systems?



ALEXANDRA BLÖSCH has been a doctoral student at EDAC since 2015, focusing on Design for Additive Manufacturing. She has a general interest in design tools and methods, and enjoys introducing these methods to students through supervising design projects and courses.

● KNOWLEDGE FAIR

Area 2

SOCIAL FABRIC GMBH Sustainability and Textiles

Social Fabric is a sustainable textile centre based in Zurich. At Social Fabric, we imagine a future of distributed garment manufacturing using sustainable materials produced through circular methods.

INSTITUTE OF VIRTUAL MANUFACTURING, ETH ZÜRICH Virtual Planning of Future Manufacturing Systems

Nowadays, complex manufacturing systems are virtually planned before their realisation. The Institute of Virtual Manufacturing deals with the engineering of virtual systems, which support these planning processes. The virtual mapping is treated in close dependence on industrial applications. Thus, knowledge of real-life manufacturing processes, material behaviour and control of methods to evaluate process robustness pose important components of a virtual planning process.

× HEADS UP

You might want to contact these experts on Wednesday to get feedback on your ideas. Ask for their business card and if they have 15 min on Wednesday afternoon for a brief telephone call.

How can a holistic life cycle management of textile products be achieved?



HEATHER KIRK worked in plant ecology and molecular biology research for a number of years, before founding Social Fabric.



PAVEL HORA has been Professor for Virtual Manufacturing and Forming Technology at ETH Zürich since 2004. His research activities focus on virtual process modelling, including mathematical constitutive modelling, failure prediction, numerical optimisation of manufacturing processes, and stochastic methods for robustness control.

How can the virtual planning of manufacturing process chains from the raw material to the final product improve future manufacturing systems?



PASCAL FISCHER is a doctoral student at the Institute of Virtual Manufacturing at ETH Zürich. He studied Mechanical Engineering with a focus on production technology and was part of the Formula Student Electric Team from 2011 until 2014.

SAP (SCHWEIZ) AG

Manufacturing Execution Systems

SAP takes a central role in the current industrial revolution. As market leader in business software solutions, SAP helps companies and organisations to minimise negative effects of complexity, to shape new possibilities for innovation and growth and to be successful in competition.

3A COMPOSITES CORE MATERIALS, AIREX AG

Structural Lightweight Materials – Sandwich Design

3A Composites is a global organization with operations in Europe, the Americas, India, China and Papua New Guinea, that has pioneered the sandwich technology for more than 75 years. Its AirexBaltekBanova brand provides sustainable, lightweight and resource-friendly, high-quality core materials to enable the production of lighter and thus more energy efficient end products for the wind, marine, aerospace, and automotive industries.

CHAIR OF ENTREPRENEURSHIP, ETH ZÜRICH

Enabling Entrepreneurship – From Science to Startup

The chair of Entrepreneurship aims at improving the practice of managing novel ideas and growing aspirations-driven ventures. Their research and teaching focuses on successful strategies and managerial practices that entrepreneurs and entrepreneurial organizations employ in value creation. Anil Sethi's focus is to help technology teams interested in becoming entrepreneurs to address key challenges to successfully commercialise. He helps them to understand steps from science to startup, recognise challenges and how to address them, and to focus on what needs to be done in order to take their technology to market.

How can the reliability and security of ever more connected and complex manufacturing systems be enhanced?



MICHAEL SCHWARZ is working as an Industry Business Developer responsible for Discrete Industry. He joined SAP in 2001 and his interests are focused on working with customers on the basis of 'design thinking' and the topics Innovation and Industry 4.0.

How can advanced composite materials and manufacturing technologies contribute to more sustainable products?



ROMAN GÄTZI obtained his degree in Mechanical Engineering from ETH Zürich, focused on Lightweight Design and Robotics. Since 2006 he works at 3AC Airex AG as Head of Technical Services & Global Product Manager in Solutions Engineering.

What are the challenges in the manufacturing context to bring ideas and technologies from science to the market?



ANIL SETHI is a serial entrepreneur, author and teacher. His book 'From Science to Startup' was recognised as one of the top five books globally for 'Entrepreneurship and Innovation' in 2016.

◆ **KNOWLEDGE FAIR**

Area 3

ROBOTICS AND PHILOSOPHY STUDENT PROJECT, ETH ZÜRICH

Robotics & Philosophy

The Robotics and Philosophy project was initiated by students in the History and Philosophy of Knowledge master program at ETH Zürich. It investigates how philosophers could, instead of post-maturative consideration and assessment of technological advances, be also involved in the initial phases of design and development. The first stage of the project has been to form interdisciplinary dialogues and discussions with masters and doctoral students, postdocs and professors working in the field of robotics, this then translated into several workshops and seminars.

× **HEADS UP**

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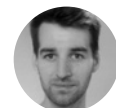
How can the symbiosis of future human-machine partnerships be proactively improved?



STEPHAN GRAF is currently in his Masters' degree in History and Philosophy of Knowledge at ETH Zürich and is a Member of the Robotics & Philosophy group. He is interested in questions regarding anthropology in context of artificial intelligence.



MARIN AESCHBACH is interested in the relationship between societal perception and the self-perception of contemporary science as well as the principles of knowledge in general.



KAJ SPÄTH is one of the co-initiators of the Robotics & Philosophy group. His focus lies mainly in moral philosophy and philosophy of law as well as democratic theory.

SWISSCOM AG

Artificial Intelligence and Machine Learning

The Swisscom Artificial Intelligence and Machine Learning Group helps Swiss companies to use artificial intelligence easily and quickly. The Swisscom competence centre for applied artificial intelligence offers companies everything they need for quick, successful implementation of artificial intelligence solutions: we can assist you at every stage, from advising you about the right technology to the actual integration process.

SNV SWISS ASSOCIATION FOR STANDARDIZATION

Rules, Norms and Standards

The Swiss Association for Standardization (SNV) is Switzerland's umbrella organisation for standardization. It promotes the drafting and international harmonisation of standards and it directly represents the European Committee for Standardization (CEN) based in Brussels and ISO, the global standards organisation headquartered in Geneva.

What are the challenges and opportunities for Swiss manufacturing companies to use AI and ML?



CLAUDIU MUSAT is in charge of the research in the Artificial Intelligence and Machine Learning Group at Swisscom. He has a technical background, with a PhD in Opinion Mining

How can the harmonisation of standards – in Switzerland and internationally – contribute to current and future manufacturing systems that are sustainable and inclusive?



FELIX VON REISCHACH leads the Artificial Intelligence and Machine Learning Group at Swisscom. His strength is in bridging the technical and business worlds for designing digital products that customers love.



BARBARA MULLIS has been a Standards Manager at the Swiss Association for Standardization (SNV) since 2012. She holds a degree in Chemistry from ZHAW and a MAS in Work and Health from ETH Zürich and University of Lausanne.

METOXIT AG

From Refractories and Insulation Materials to Medical Technology

Metoxit is preparing for wider use of ceramic dental implants around the world, caused not only by very good results in clinical trials but also by growing understanding of the interaction of the human body with metal implants. Preparing for these future challenges, Metoxit is not only adopting new manufacturing techniques but also adjusting to the increasing demands of the regulatory bodies.

BÜHLER AG

Retrofit – A New Lease of Life for Machinery

Bühler is a Swiss-based specialist for plant, equipment and related services for processing foods and manufacturing of advanced materials. Within the Die Casting business unit, cutting-edge technologies, machines and systems are developed for application in OEM industries. However, buying a new machine is not always the unique available solution, for which reason the Remanufacturing Centre as an innovative customer service product, offers machinery upgrades ranging from basic service to full reconditioning to latest specifications

What are the challenges in developing and processing high tech ceramics with desired properties and functionalities?



BENEDIKT SEEBER acquired his Dr.sc. in 2012 on the topic of highly porous ceramics at ETH Zürich. After working for Alstom in the Thermal Services unit he joined Metoxit AG in 2016 as Head of Research & Development.

How does the retrofitting of old machines makes a positive impact on current and future manufacturing systems?



PAOLO ZANONE is General Manager of Bühler Brescia S.R.L. and Head of the European Remanufacturing Centre, committed to innovative new die casting technologies and customer service by full machine upgrades. He studied Engineering and Management at Politecnico di Torino and holds a certificate in Leadership from HSG.

◆ **KNOWLEDGE FAIR**

Group 4

KOF SWISS ECONOMIC INSTITUTE, ETH ZÜRICH

Economic Surveys and Forecast

KOF delivers profound insight into the field of Economic Research. Next to conducting surveys in all branches of the Swiss economy, it also creates forecasts and indicators for business cycle analysis. KOF's data pool of business surveys is unique in Switzerland. KOF uses these data sets to mirror the economic situations and moods of Swiss companies through the generation of indicators. The KOF Economic Barometer, KOF Employment Indicator, KOF Business Situation, etc., are crucial for assessing economic developments in Switzerland.

UNIA

Improving and Securing Working Conditions

Unia is the largest trade union in Switzerland. It organises employees in the following sectors of the Swiss private economy: industrial, craft, construction and services. As a member of the Swiss Federation of Trade Unions it collectively represents the interests of all employees and offers its members individual advice, legal protection and further services. It also operates the largest unemployment fund in Switzerland.

× **HEADS UP**

You might want to contact these experts on Wednesday to get feedback on your ideas. Ask for their business card and if they have 15min on Wednesday afternoon for a brief telephone call.

What can be learned from current forecasts and indicators with regards to the economic situation and mood in the Swiss manufacturing sector?



MARTIN WÖRTER is Head of Section Innovation Economics at the ETH Zürich, KOF Swiss Economic Institute. His research activities focus on the empirical analysis of innovation activities of firms.

How does the role of trade unions in the manufacturing sector evolve when more and more human employees are replaced by robots?



LORENZ KELLER is responsible for communication and politics for the Zurich-Schaffhausen regional unit of Unia, which is the largest trade union in Switzerland.

ERNE AG HOLZBAU

Modular Building Solutions

The Swiss timber construction firm, ERNE AG Holzbau, provides building solutions using system and modular construction methods, windows and facade systems as well as interior solutions. Digital planning, engineering, an extensive knowledge of materials and hybrid construction, traditional craftsmanship, and the expertise of a General Contractor are combined with industrial production to enable the realization of complex construction projects at a high level of quality and with cost certainty. They were involved as an industry partner in the construction of the dfab House and the roof of Arch_Tec_Lab.

ECOPARTS AG

Additively Manufactured Metal Solutions

Ecoparts is a 3D printing and additive manufacturing pioneer of the first hour. With more than 10 years of experience (founded in 2006) in the additive production of metal parts, Ecoparts provides the basis for new and innovative products in the Swiss industry. Layer for layer (> 20 µm) arise components from various metallic powder materials. The material properties of additively manufactured components correspond to the physical and chemical properties of conventionally produced materials. Additive manufacturing allows for the development and manufacturing of products like components with complex geometries for lightweight construction, or applications with cavities and bionic structures. The additively manufactured components can be machined mechanically like 'normal' components.

What are the opportunities and challenges of digital fabrication technologies for a Swiss timber construction firm?



THOMAS WEHRLE is an expert in timber construction, researcher in the field of digital fabrication, and vice director of ERNE AG Holzbau. He regularly gives lectures on the topic of Building Information Modeling and is a visiting lecturer at different universities.

What are the opportunities and challenges in the design and series production of additively manufactured parts in comparison to traditional subtractive processes?



DANIEL KÜNDIG is co-founder and Managing Director of Ecoparts AG and worked in the tooling and moulding industries for over 15 years. As a pioneer of the first hour Mr. Kündig is a proven specialist with experience in the practical manufacturing and the various applications of the AM technology.

PANALPINA LTD

Logistics Manufacturing Services

The Panalpina Group is one of the world's leading providers of supply chain solutions. The company combines its core products of Air Freight, Ocean Freight, and Logistics to deliver globally integrated, tailor-made end-to-end solutions for eleven core industries. Having a global network of 150 Distribution Centres, which perform the last touch to the customer's goods before final delivery, the company is in a unique position to provide such 'distributed manufacturing' solutions.

How can the management of globally integrated supply chains enhance local value creation?



CARLO QUIRICI is responsible for the financial performance of the Logistics Division of Panalpina. He is a strategy and finance expert with education in engineering and twelve years of experience in the service, industrial, and humanitarian sector.

◆ **KNOWLEDGE FAIR**

Area 5

CTI COMMISSION FOR TECHNOLOGY AND INNOVATION

Promoting science-based innovation in Switzerland

CTI is the innovation promotion agency of the Federal Administration. It supports numerous research and development projects jointly pursued by companies and research institutes. CTI also offers courses and coaching sessions for start-up companies and potential entrepreneurs and stimulates knowledge transfer between researchers and companies.

TECHNOLOGY AND SOCIETY LABORATORY, EMPA ST. GALLEN

Assessing material life cycles for a more sustainable society

The Technology and Society Laboratory (TSL) at Empa aims at creating and transferring knowledge to support the transition to a more sustainable society. It does so by analysing novel materials and emerging technology applications with a focus on associated material and energy stocks and flows, evaluating them with regard to both natural environment and societal constraints, and providing guidance for the implementation of more sustainable materials, technologies and sociotechnical systems.

× **HEADS UP**

You might want to contact these experts on Wednesday to get feedback on your ideas. Ask for their business card and if they have 15min on Wednesday afternoon for a brief telephone call.

How can governance structures and federal regulations enable innovations in future manufacturing systems?



MARTIN RIEDIKER holds a Dr.sc. in chemistry from ETH Zürich. He has 35 years experience in the Chemical & Pharmaceutical Industry and is a member of several boards and commissions such as CTI, economiesuisse and INOFEA.

How can advanced Life Cycle Assessment (LCA) methodologies support addressing environmental and societal implications of novel materials and emerging technology applications?



ROLAND HISCHIER is Head of the Advancing Life Cycle Assessment (ALCA) Group within TSL at EMPA. He obtained his Dr.sc. from ETH Zürich with a thesis in the area of LCA and Nanotechnology.

OERLIKON SURFACE SOLUTIONS AG

Passion for Coating Materials

Oerlikon Balzers is one of the world's leading suppliers of surface technologies that significantly improve the performance and durability of precision components as well as tools for the metal and plastics processing industries. Oerlikon Balzers operates a dynamically growing network of more than 100 coating centres in 35 countries in Europe, the Americas and Asia.

TISSUE ENGINEERING AND BIOFABRICATION GROUP, ETH ZÜRICH

Innovative Biomaterials

The Laboratory for Tissue Engineering and Biofabrication works towards a comprehensive understanding of cartilage biology which allows the development of novel, multidisciplinary solutions to treat cartilage injuries. The group is uniquely qualified to translate technologies to the clinic environment due to their interdisciplinary toolbox and close connection to the clinics.

CASSANTEC AG

Prognostic Solutions for Predictive Maintenance

Cassantec goes beyond the early warnings of predictive analytics. Their Prognostic Report provides insight into the future state of assets with an explicit time horizon of typically weeks or months, in special cases years. Significant financial benefits of Cassantec's technology are reached through understanding when in the future a malfunction is likely to occur, lower maintenance cost, higher asset availability through avoidance of unplanned downtime, better planning of maintenance and improved commercial strategies.

What is the most pressing issue in your current research for innovative coating technologies and what are your strategies to develop and distribute new approaches through your network?



MARTIN ROSATZIN is Head of Engineering and Portfolio Management at Oerlikon Surface Solutions AG and is responsible for the development of coating systems. He holds a diploma and a Dr.sc. on Laser Spectroscopy from ETH Zürich.

How can advanced manufacturing technologies such as bioprinting revolutionise future medical products?



MARCY ZENOBI-WONG is a Professor in the Department of Health Sciences & Technology at ETH Zürich. Her group's research is focused around the development of functional biomaterials for cartilage regeneration and biofabrication technologies including electrospinning, two-photon polymerization and bioprinting.

How can predictive analytics contribute to sustainable future manufacturing systems?



FRANK KIRSCHNICK is a Computer Scientist from TU Munich and holds Master's and PhD degrees from Stanford University. He started his career at Siemens Corporate R&D and is co-founder of Cassantec AG.

↘ Unpack.

About half of the time this afternoon is reserved for you to bring the information gathered during the knowledge fair into your teams, discuss it, and structure it into different clusters or frameworks that make sense.

To simplify sharing and understanding, the findings are aggregated into categories: actors—needs—insights. As time is limited and the amount of information gathered is large, you need to synthesise the discussions held at the fair into a few concise findings that you can share with your team. Make sure the other students understand why the finding was meaningful to you. Indeed, this synthesising process is very personal. You have to infer meaning and interpret what has been said. Then you must decide which information is important and filter the data accordingly.

× NOTE

A few hints for writing post-it notes in style:

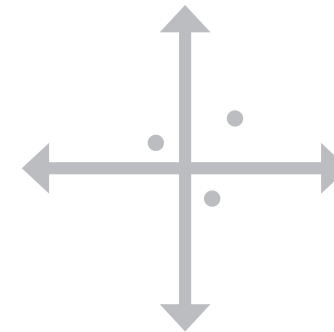
- One aspect per post-it note, to regroup ideas.
- Incorporate drawings to make your ideas more understandable.
- Be concise and adapt to the size of the post-it note.
- Color code! Today: actors (yellow), needs (green), insights (pink).

tuesday
15.45

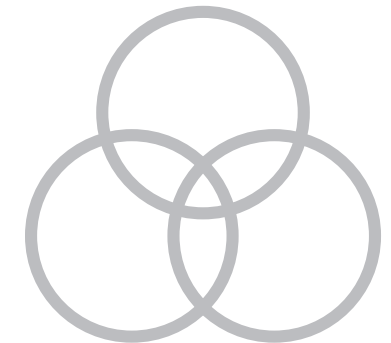
TEAM SPACES

1 → 2 → 3 → 4

journey map



two-by-two



venn diagrams

Use frameworks

HOW TO FORMULATE A PROBLEM STATEMENT

A problem statement is short and has three ingredients: actor, need, and insight. By combining them into a sentence, they are put in relation and reveal initial dependencies. Problem statements are standardised sentences that guide the process of your team, like a slogan. They also provide focus to generate ideas during ideation tomorrow.

Example: Swiss individuals with interests in making their own meals and who are health conscious need convenient ways to maintain their proper micronutrient intake because a lack in these nutrients is correlated with deficiency diseases which lower quality of life and are costly to cure. (Project Micro Meal, ETH Week 2015).

A good problem fulfils the following criteria:

1. Is the problem statement focused enough to have a specific impact?
2. Does the question allow for a variety of solutions?
3. Does the question take into account context and constraints?

You may have to play with the scope of your problem statement. If too broad, you might not know where to start and develop concepts that are unspecific. If too narrow, you might already have a specific solution in mind. In both cases, you need to adjust and dig deeper in order to find at what 'altitude' the real need lies so that you can overcome a precise constraint and innovate.

× NOTE

In pairs, use this scaffolding to formulate a first problem statement. Discuss your answers to each question, then move on to the next.

describe

the problem you have identified in three lines.

version 0.1

Phrase it as a problem statement.

impact

State the ultimate impact you are trying to have.

context and constraints

Finally, write down some of the context and constraints that you're facing.

version 0.2

it as a problem statement.

↘ Problem statement 1.0.

Now it is time to start defining the problem you want to solve. You will do this by formulating a first problem statement that is short and simple and that inspires your team.

The trick is to feel comfortable with taking quick decisions. As this is an iterative process, there will be enough time to make it more precise tomorrow or change it if need be. At the same time, the trick is to iterate in a constructive way, which means to build continuously on every step and include the knowledge gathered. With every iteration, you will gain a better understanding of your problem, which is why your problem statement will become clearer and more precise.

In pairs, you will use the template on the opposite page to phrase a first problem statement. It is the least straightforward task of the week, and it is not easy to get right in a first attempt. The result will be a draft that you will improve again and again.

× HEADS UP

Sign up before 20.00 at the Info Desk for tomorrow's pilates class or the morning run.

(Actor)

needs

(need)

however

(insight)

■

↘ Template check out.

The crucial lesson of today was to take decisions quickly as a team. As you have become familiar with the dynamics, understand that your ideas are not lost, but may return later in the process, when they can be used to build on another thought. Therefore, the template contains more than just the selected problem statement.

THE FUTURE OF PRODUCTION

Our first panel is critically discussing implications of new technologies in the 'Future of Production' for different industry sectors. Torbjørn Netland, together with five experts from the textile, machine, chocolate, sanitary systems, and speciality chemistry industries, will debate on broad themes related to future production across industries. This involves identifying similarities and differences in the assessment of which technologies will be important for a given company and why these will be of enhanced relevance. The panel will provide you with cross-industry insights on the opportunities and added value, as well as challenges and trade-offs coming along with emerging technologies.

The panel takes place towards the end of the 'collecting information' phase of the ETH Week programme and is designed to help you consolidate your understanding of 'manufacturing' and how emerging technologies impact production across industries. Ideally, you will gain a first reality check concerning the relevance of your 'problem definition' that you aim to tackle in the course of the ETH Week programme.

The counterpart of the Technical Panel will take place tomorrow morning when implications of the 'Future of Work' in the manufacturing context will be discussed

DEBATE / Join the debate!
Participate in polls, ask questions
and engage with meetoo.



bit.ly/ethweektechpanel



TORBJØRN NETLAND is Professor at D-MTEC in the field of Production and Operations Management. He is an internationally renowned expert in increasing the productivity of industrial companies by such means as improved production processes and the use of new technologies. He often conducts his research in close cooperation with global companies.



ANDRI FRITZ is Regional Lean Coordinator at Franke Water Systems AG, responsible for the regions Europe, Middle East and Africa. He studied Mechanical Engineering at ETH Zürich and completed his Master thesis on the Risk Mitigation of Large-Scale Engineering Programs through Lean Management at MIT.



JAN ZIMMERMANN is Business Unit Leader at Forster Rohner AG, specialised in the development and production of innovative eTextiles, smart fabrics and intelligent textiles. He studied Interdisciplinary Natural Sciences at ETH Zürich and completed his PhD on Silicone Nanofilaments as Functional Coatings at the University of Zurich.



KATHRIN MICHEL is Head of Supply Chain Management at Rahn AG, focused on the international supply of speciality chemicals. Following her training in Materials Engineering at EPFL and ETH Zürich and an MBA from Strathclyde Business School, she gained SCM experience in multiple industries and cultures, including Asia.



PAOLO ZANONE is General Manager of Bühler Brescia S.R.L. and Head of the European Remanufacturing Centre, committed to innovative new die casting technologies and customer service by full machine upgrades. He studied Engineering and Management at Politecnico di Torino and holds a certificate in Leadership from HSG.



PAUL BECK is Head of Production at Maestrani AG, dedicated to producing about 3'500 tonnes of high-quality Swiss chocolate and confectionery per year. Following his studies in Food Science at ETH Zürich, he completed a MAS MTEC\BWI during his doctorate on Magnetic Field Assisted Biomaterials Processing also at ETH Zürich.



You will redefine the problem statement tomorrow.



The goal for today is to formulate a refined problem statement that reflects the deeper understanding gained during the first iteration. During the morning, you will think of initial solutions to really understand your problem. The afternoon is reserved for integrating feedback and research results.

7.05 — Pilates and morning run at the HPS Sports Centre.

8.30 — Kick-off at ETH Week Hall.

wednesday
sep 13

↘ Check in.

9.00 ◆ **SOCIETAL PANEL**
'The Future of Work' in the manufacturing context with
Sunnie J. Groeneveld.

↘ Ideate.

12.15 — Lunch break.

↘ Research and test.

↘ Problem statement 2.0.

↘ Template check out.

18.45 ▲ **ROBOTICS NIGHT**
Meeting FSR and AMPA
Talks by NCCR Digital Fabrication and Robotics Demos.

THE FUTURE OF WORK

Today's panel is transmitting the spirit of 'moving forward' to make you start thinking about developing solutions that address and consider human needs. In this societal panel, the discussion is centred around the implications of the 'Future of Work' in the manufacturing context.

As a strong voice of the young generation, Sunnie J. Groeneveld and four experts will focus on the fundamental and underdiscussed issue of how technology should be designed to create effective socio-technical systems and optimal human-technology interaction. This discussion is spotlighted from different perspectives, including the historical, sociological, economic and psychological points of view and will shed light on how job-related skills evolve as technology magnifies our leverage and to what extent new forms of human-machine collaborations may inhabit new work-related problem and solutions spaces.

Following the moderated discussion, the panelists are available for 30 more minutes of personal discussions immersing further into matters of the 'Future of Work', before you start prototyping.



SUNNIE J. GROENEVELD is the Co-Founder and Managing Partner of Inspire 925, helping its customers to identify and implement digital solutions to increase employee engagement, collaboration and innovation. She is a member of the Future Work Forum and the Global Shapers Community established by the World Economic Forum (WEF) and holds an Economics degree from Yale University.



TONI WÄFLER is Professor for Applied Psychology at the University of Applied Sciences and Arts Northwestern Switzerland (FHNW). With a background in Psychology, Business Studies, and Computer Science (UZH), his work is focused on work and organisational psychology, understanding of human factors, the design of socio-technical systems, human-machine interactions, industry 4.0 and digitalisation.



JOHANNES SCHUMM is Vice President R&D and Member of the Board of Directors of Sensirion, which is among the 'Best Companies to Work for in Switzerland in 2017'. He studied Electrical Engineering and Information Technology at RWTH-Aachen. During his doctoral studies at ETH Zürich, he addressed the quality appraisal of signals in personal health monitoring obtained by using wearable devices and advanced sensing technologies.



TOBIAS STRAUMANN is Professor for Economic History at UZH and author of the Tagesanzeiger Blog 'Never Mind the Markets'. Following his studies in History, Sociology, Social and Economic History, in his PhD he studied the history of the chemical industries in Basel. His research interests cover the European monetary and financial history, Swiss business history and economic policy.



JAN-EGBERT STURM is Professor of Applied Macroeconomics at D-MTEC and of the KOF Swiss Economic Institute at ETH Zürich. He holds a Masters and PhD degree in Quantitative General Economics from the University of Groningen. His research relies on empirical methods and statistics, concentrating on Monetary Economics, Macroeconomics and Economic Policy, particularly in fields closely related to practical and current problems.

THE DESIGN THINKING FACILITATORS

The design thinking facilitators will accompany you today and tomorrow to provide you with a wide range of methods that will be used to develop solutions and improve your problem statement. They will be the pacemakers of the week and collaborate with your tutors. As experts in creative processes, they will help your team take decisions in the right order.



ALICE REPETTI is a Social Scientist with a background in Economics. As a visiting MBA student at the George Washington University, innovation strategy consultant at Spark Works and TA at ETH Zürich, she has experience in designing research projects and facilitating training programs using collaborative and agile techniques. Her ambition is to explore new ways to integrate Technology, Innovation and Design into effective strategies to create social change and shape new educational approaches.



AXEL ZEIJEN is a doctoral student in the Technology & Innovation Management group at ETH Zürich. He studies how new technologies, such as 3D Printing, can shape the future of manufacturing – and how organizations and we as a society can get there.



GIACOMO CATTANEO holds a Dr.sc. in Innovation Management from ETH Zürich and Aarhus University focused on collaborative innovation processes and their role in the strategic renewal of organisations. He is part of Spark Works, supporting clients in their innovation journey, as well as RethinkResource, consulting companies on circular economy and circular design.



HAZEM AHMED is a doctoral student at the Institute of Pharmaceutical Sciences, ETH Zürich. Hazem obtained his Bachelor's degree in Pharmacy and Biotechnology in Egypt. He oscillated between academia and industry before joining ETH Zürich. He is attracted to negotiations, project management and has a passion for challenges and solving problems.



LINDA ARMBRUSTER holds a Master's degree in Strategic Design from the design akademie berlin. As Project Manager at Spark Works, a strategic human-centered innovation firm, she builds and leads inspiring research and advisory programs with interdisciplinary teams to tackle complex challenges in the private and public sector.



JANNES JEGMINAT'S goal is dying a wise man. Extensive exploration might one day get him there: He studied Astrophysics, spent years in Ecuador, Chile and Texas and is currently doing in his doctoral studies in Computational Neuroscience. He leads community affairs and the AI series at reach, and tutored last year's ETH Week.



SONJA FÖRSTER is a trained mechanical engineer and business school graduate. Not being able to side with one or the other community, she has since been working at the intersection trying to reveal the constructive forces of interdisciplinary team work. She is also very passionate about applying methods (to herself and others) that shake up routinized behavior to expand individuals' creative potential.



JOSE ARRIETA is a Costa Rican, physicist and electrical engineer, turned Innovation Management doctoral student after coming to Zurich. Jose studies the process of how managers and entrepreneurs solve strategic problems, and develop routines in dynamic environments, in the hope of helping in fostering creativity.



WILFRED ELEGBA is a final year doctoral student in Plant Science and Policy at the ETH Zürich. He loves working with interdisciplinary teams to help tackle everyday problems of society. This is the third time he is participating in the ETH Week. He also enjoys working on social intervention projects such as the EquipSent, an initiative which focuses on improving teaching and research in underdeveloped countries by donating unused but functional equipment from ETH Zürich.

After establishing a first draft of the problem statement yesterday evening, it is time to see if it holds and if it is productive. You will start ideating, which means generating solutions in a democratic way. First of all, the goal is not yet to develop good solutions, but to get the obvious solutions out of your heads and advance beyond them. This will result in an improved problem statement and clusters of initial ideas.

Next, you will start sketching. This is a quick way to bring ideas onto paper and figure out the details of different solutions. You will need to take decisions, going from an abstract idea to concrete details. In this way, you can probe and clarify different aspects of an idea. As you are under time pressure, you will automatically have to focus on the essentials, which helps you discard weak ideas in the process. Sketching is also a quick way to make ideas shareable. In fact, you will work in sub-teams all morning, advancing different ideas in parallel.

× NOTE

Make sure that yesterday's problem statement and the actors-needs-insight post-its are visible in the space where you ideate.

wednesday
10:30

TEAM SPACES

1

Go for quantity

2

Be visual

3

Defer judgement

4

Build on the ideas
of others

5

Encourage wild
ideas

6

Stay focused on
the topic

7

One conversation
at a time

Brainstorming rules

↳ Research and test.

After generating first ideas, please set aside some time to evaluate the ideas and remain critical. Reconsider the brief that we introduced on Sunday, and start answering the scientific rigour questions from the opposite page.

This goes hand in hand with preparing for the first round of testing. In order to get feedback from the experts you have met so far (during the field trips or at the knowledge fair), choose who would be relevant to talk to and schedule a phone call or ask for an answer by e-mail.

During the research and test phase in the afternoon, you will deepen your understanding of the problem you are trying to solve. For this, you will split up to work in parallel:

- do research to back up your assumptions;
- get feedback from experts by phone or e-mail;
- test your idea sketches with non-experts.

You will learn to build on other people's knowledge and decide which feedback is useful for advancing your project, and how to integrate it. You will learn to be critical about your own ideas and evaluate them as you move on.

We suggest that during this phase, you should listen as much as possible and talk as little as possible while explaining your ideas. You don't want to convince anybody; rather, you want to observe their reactions and learn from the exchange.

This marks the end of the first iteration. After this, you will jump back to defining, i.e. reframing your problem statement. You will go through a second iteration tomorrow.

× NOTE

Start answering the scientific rigor questions under point (3) of the brief:

- What are your underlying assumptions?
- What facts and figures did you rely on?

Now you may use the feedback capture grid below. Try to include getting answers to the feasibility part of the brief:

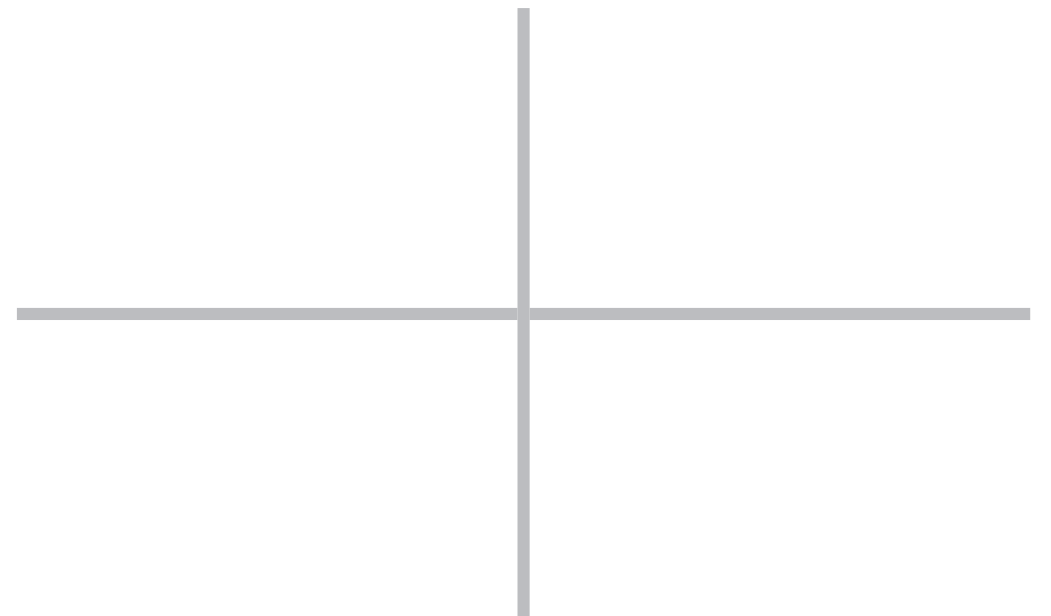
- How feasible is your solution?
- Are there uncertainties related to your solution that would need further clarification?

wednesday
13:00

What worked well?



What did not work?



What questions remain?



New ideas that emerged.

↘ Problem statement 2.0.

Because we want you to fall in love with the problem and not with solutions, the formulation of the problem statement is always the goal of the day. Make sure it reflects the lessons learned from the ideation phase in the morning and the testing phase in the afternoon.

Make sure it fulfils the following criteria:

- Is the problem statement sufficiently focused to have a specific impact?
- Does the question allow for a variety of solutions?
- Does the question take into account context and constraints?

A problem statement has the following goals:

- It phrases a problem as a standardised sentence to guide the process of your team, like a slogan.
- It provides focus to generate ideas during brainstorming.
- It serves as an evaluation tool for competing solutions, so that your team can take decisions when working in parallel.
- It documents the progress of your understanding of the problem, deepening with every iteration.

× HEADS UP

Sign up before 20.00 at the Info Desk for tomorrow's muscle pump class or the morning run, with your rector, Sarah M. Springman.

(Actor)

needs

(need)

however

(insight)

■

↘ Template check out.

The main result of Wednesday is an improved problem statement. The template will contain two solution ideas, the sketches of the morning, and the answers to the first questions of the brief: scientific rigour and feasibility. Additionally, you can talk to members of the two robotics conferences tonight. Consider it another forum to test your ideas.

**DIGITAL FABRICATION –
ROBOTICS AND ADDITIVE MANUFACTURING**

Today's inspiration night is dedicated to a range of emerging technologies, that are widely recognised for their transformative potential in future manufacturing systems. We start the evening by having a closer look at the research at the NCCR Digital Fabrication and it is implemented at the RFL, as a physical embodiment of interdisciplinary collaboration for digital technologies within the field of architecture.

- 18:45 The NCCR Digital Fabrication
Russell Loveridge
- 19:05 The Robotic Fabrication Laboratory
Mike Lyrenmann
- 19:15 Robots Fair
and Informal Networking Barbecue

You might have noticed that, by now, the ETH Week Hall is crowded with field and service robots from different research groups at ETH Zürich (and beyond). To celebrate half-time, the research communities of two conferences that run in parallel to the week are joining you in the hall: the Scientific Conference for Additive Manufacturing in Products and Applications (AMPA), hosted by Mirko Meboldt's group and the 11th Conference on Field and Service Robotics Technology (FSR), hosted by Marco Hutter's group. After a short talk by the National Centre of Competence in Research for Digital Fabrication (NCCR Digital Fabrication), a wide range of field robots developed at ETH Zürich will be on display. At the same time, all participants are invited to an informal networking barbecue to share ideas and discuss potential synergies across the different fields.

ROBOTS / some of the robots involved are:

- MENZI MUCK / D-MAVT, RSL
- IBEX / D-MAVT, RSL
- ANYMAL / D-MAVT, RSL
- HUSKY / D-MAVT, RSL
- WINGTRA / Wingtra AG
- GOLDEN LION / IRIS, V4RL
- EMINEM & SNOOP / RPG, UZH
- PACKDRONE / EPFL
- ENVIROBOT / EPFL
- CLEARPATH / Clearpath Robotics
- YUMI / D-MAVT, ASL
- RIDGEBACK / D-MAVT, ASL
- TRADR / D-MAVT, ASL
- EUROPA / D-MAVT, ASL
- UAV / D-MAVT, ASL
- EBEE / SenseFly
- MESH MOULD / NCCR Digital Fabrication and Gramazio Kohler Research, and many more...



MIKE LYRENMANN is Technical Head of the Robotic Fabrication Laboratory, which is set up as a worldwide unique digital construction environment at ETH Zürich, that follows for internationally leading research in the field of robotic fabrication in architecture and construction.



RUSSELL LOVERIDGE is Managing Director of the NCCR Digital Fabrication. He studied Civil Engineering and Architecture in Toronto and at ETH Zürich, and obtained his doctorate at EPFL. His research investigates advanced fabrication methods, smart materials, and novel construction techniques all with a specific interest on how these emerging technologies affect processes of design.



MARCO HUTTER is Professor for Robotic Systems at ETH Zürich since 2015. His research interests lie in the development of novel machines and actuation concepts together with the underlying control, planning, and optimisation algorithms for locomotion and manipulation. Marco Hutter is the Programme Chair of the FSR 2017.



MIRKO MEBOLDT is Professor of Product Development and Engineering Design at ETH Zürich. His main research focuses on the development of new products in the field of mechanical engineering industries, biomedical applications and associated technologies. His team is responsible for bringing the AMPA conference to life.



Tomorrow, you will get to prototype and test.



It is time to start prototyping. During the morning, you will work on solutions and make your ideas tangible. You will then use your prototypes to get feedback from experts, making a dry run of a first presentation. Afterwards, you will integrate their comments and reconsider the brief.

7.05 — Muscle pump class and morning run with Sarah M. Springman at the HPS Sports Centre.

8.30 — Kick-off at ETH Week Hall.

↳ **Prototype.**

12.15 — Lunch break.

↳ **Expert feedback.**

↳ **Integrate feedback.**

↳ **Template check out.**

18.30 — Dry Run and Dinner

19.45 — Stage test

thursday
sep 14

↳ Prototype.

Prototyping is a chance to bring ideas out of your head into the material world, making them tangible. Your idea is just beginning to come to life. Also, try to forget about precision and perfection for the moment: low-resolution prototypes are quick and cheap to make, but they are still sources of valuable insights as you study, discuss, and test them with your peers. Similar to yesterday morning, you will again work in sub-teams and produce different prototypes in parallel. You will present two prototypes to the experts after lunch.

While prototypes can be very different in format, ranging from a wall of post-it notes to 3D models, and role-play, the general idea is the same: to gain an understanding of how your solution will function in reality and how it will be experienced from the actor's perspective.

In this iterative process, you need to take one decision after another in order to move from intangible ideas to a concrete model. What was unknown when you started off should now become precise. Also, design your prototype according to what you want to learn from it.

By making ideas tangible, they also become shareable. And the more you go into detail, the less chance there is of a misunderstanding. Therefore, prototypes are valuable conversation pieces that can have a rhetorical value of their own.

× NOTE

Some more reasons to prototype, in bullet points:

- To ideate and problem-solve
- Solve disagreements
- Communicate
- Start a conversation
- Fail quickly and cheaply
- Manage the solution-building process
- Test possibilities

thursday
9:00

TEAM SPACES

what

do you want to prototype?

how

do you want to prototype?

why

is it relevant?

Expert feedback.

The feedback round is organised in three rounds. You will first present the two final prototypes of this morning. Once you are done presenting, the experts give you feedback.

Some hints:

- Define beforehand what you want to test.
- Let the experts experience the prototype: Show, don't tell!
- Actively observe.
- Follow up with questions.

Make the most of this time. Keep track of what is being said and think about what this means for your project. What needs to change, what needs to be improved, what needs further research or clarification? Take notes on the feedback capture grid on the opposite page.

Also, make use of the time when experts are giving feedback to other teams. Focus on the third point of the brief: systems thinking. You can find the brief in the next step.

× HEADS UP

The experts will come into your team spaces, so that you lose no time in transit. There are three slots, 13.00, 13.30 and 14.00.

thursday
13:00

TEAM SPACES

What worked well?



What did not work?



What questions remain?



New ideas that emerged.

THE EXPERTS

The following researchers are going to meet you in groups of three to give feedback to your problem statement and the two solutions you have been working on during the morning. They are related to the three angles of 'Manufacturing the Future'. In addition, it is our pleasure to welcome the four professors who will join the final event tomorrow, to listen to your presentations and draw a bigger picture during the concluding panel.



MARTIN BATLINER is a doctoral researcher at Product Development Group Zurich. Before that he worked for a sensor company in the development of complex, highly automated manufacturing and testing processes. In his research he collaborates with a medtech start-up to bring a medical device from idea to market.



HODA HEIDARI is a postdoctoral scholar at the Machine Learning Institute at ETH Zürich. She received her PhD in Computer Science from the University of Pennsylvania. Her main research interests are in algorithmic economics and computational machine learning. Among other applications, she is interested in the study of online labor markets, ad exchanges, social networks, and prediction markets.



INGO BURGERT is Professor for Wood Materials Science at the Institute for Building Materials at D-BAUG. His research focus is on the nanostructural and micromechanical characterisation of wood and fibre composites and their modification in order to optimise material properties. For this purpose Ingo Burgert and his group analyse and transfer principles and mechanisms that can be found in nature to technical applications.



KUNAL MASANIA is a postdoctoral researcher in the Complex Materials Group and develops hierarchical bioinspired materials with contradicting properties (e.g. tough and strong, stiff and dissipative). Using 3D printing, they structure self-assembling natural or carbon-based materials across multiple length scales in order to study the role of anisotropy and porosity in microstructural design.



TORBJØRN NETLAND is Professor at D-MTEC in the field of Production and Operations Management. He is an internationally renowned expert in increasing the productivity of industrial companies by such means as improved production processes and the use of new technologies. He often conducts his research in close cooperation with global companies.



STEFAN BOËS is a doctoral researcher at the Product Development Group Zurich within D-MAVT. He developed guiding principles for the interaction of product development teams and co-founded the Memox Innovations AG. His research in the biomedical field is focused on the design and testing of implantable blood pumps.



ETIENNE CABANE is a group leader and postdoc fellow at the Wood Materials Science chair at ETH Zürich. His current research interests include the preparation and characterization of functional lignocellulosic materials as well as the establishment of sustainable processes for the transformation of biomass into new composite materials.



BENJAMIN DILLENBURGER is Professor for Digital Building Technologies at D-ARCH since 2016, developing new building technologies based on the interplay of computational design, digital fabrication and new materials.



IRINA STOLLER is a doctoral researcher at the Chair of Work and Organisational Psychology at ETH Zürich. Her research interests are influences of technology on work organization, uncertainty creation and resolution of paradoxes. She holds a MSc degree in Applied Mathematics and Physics and MAS in Management, Technology and Economics.



DAVID JENNY is a Research Assistant at the Chair of Architecture and Digital Fabrication and he studied at EPFL, University of Tokyo and ETH Zürich. Currently, he is especially interested in the influence of technological innovation on sociological processes and how this relates to Architecture evolving further as a discipline.



NADINE BIENEFELD is a postdoctoral researcher at the Chair of Work and Organizational Psychology at D-MTEC. Her research interests are AI – human collaborative decision making in medicine and aviation. She holds a PhD in Work and Organizational Psychology and Master's degree in Business Psychology and Human Factors and has over 15 years of practical experience as a safety expert and trainer in aviation and medicine.



LUCIO ISA is Professor for Interfaces, Soft Matter and Assembly at D-MATL since 2013, focusing on the basic understanding of physical mechanisms in complex materials. He is particularly interested in the self-assembly of colloidal particles, and manufacturing strategies across various length scales.



SIMONE SCHÜRLE is Professor of Responsive Biomedical Systems at D-HEST since 2017, researching on micro- and nanosystems for health care applications. She is a Co-Founder of an ETH Spin-Off for magnetic manipulation systems and serves as a Fellow of the WEF Global Future Council on the Future of Human Enhancement.



FABIO GRAMAZIO is an architect with multi-disciplinary interests ranging from computational design and robotic fabrication to material innovation. With his architecture practice Gramazio & Kohler in conjunction with his partner Matthias Kohler, he realised numerous award-winning designs. Since 2017, Fabio Gramazio is Director of Studies at D-ARCH.



RAFAEL LIBANORI is a senior researcher in the Complex Materials Group at ETH Zürich and has been working on the development of novel processing routes for the fabrication of bio-inspired composites since 2009. Currently, his research is focused on the design and synthesis of multifunctional polymers for integration into lightweight platelet-reinforced composites.



ANDREAS KRAUSE is Professor of Computer Science at ETH Zürich, where he leads the Learning & Adaptive Systems Group. He also serves as Academic Co-Director of the Swiss Data Science Centre. His research on machine learning and adaptive systems has received awards at several premier conferences and journals.



PHILIPPE KNÜSEL is a doctoral student at the Optical Materials Engineering Lab, D-MAVT. As MaP Graduate Symposium co-organizer, he helped researchers exchange their ideas and connect with industrial partners. His research focuses on the synthesis of nanocrystals such as quantum dots and nanoplatelets.



STELIAN COROS is Professor for Computational Robotics at D-INFK since 2017 and is also affiliated with the Robotics Institute at Carnegie Mellon University, bridging fields of robotics, computational fabrication and animation. He develops digital design algorithms, works with 3D printers and uses a wide range of materials and approaches, including 'soft robots'.

↘ Integrate feedback.

By now, you have learned to be open to feedback and how to be critical of it. You have almost 24 hours left before you get to present your story on stage. As you are part of a large team, this is a lot of time and the most exciting part of the week. Start by including the feedback and iterate a third and last time. Also, reconsider the brief:

1. Define a problem statement that describes the challenge you want to address. It needs to be linked to a Swiss actor and to one of the three angles of ETH Week.
2. Tell an inspirational story that explains where your ideas come from, why your problem statement is relevant and what a possible solution could look like.
3. Critically reflect your ideas by answering the following questions:

SCIENTIFIC RIGOUR

- What are your underlying assumptions?
- What facts and figures did you rely on?

FEASIBILITY

- How feasible is your solution?
- Are there uncertainties related to your solution that would need further clarification?

SYSTEMS THINKING

- How is the problem embedded in the ecological, societal and economical context?
- What are the implications and tradeoffs of your solution?

DRY RUN

We meet at 18:30 to explain how we will organise the final presentations and make a quick run through.

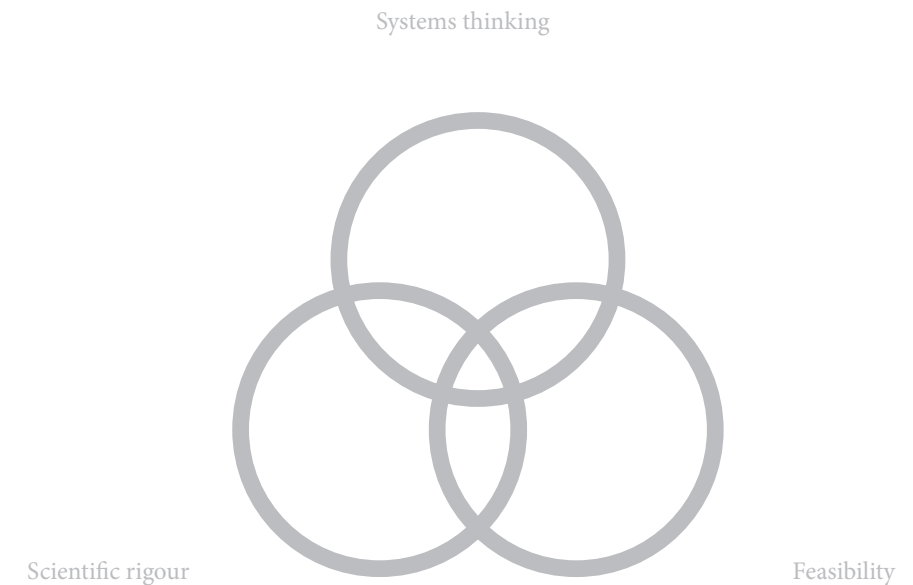
× HEADS UP

Test microphone and technics today between 19.45–21.15. Send some representatives to understand what you need to pay attention to and what technical tools are available when preparing your presentation tomorrow morning. The ETH Week team, trainers and tutors will have a drink afterwards, so stay with us if you like, the InfoBar closes at 22.00.

Sign up before 20.00 at the Info Desk for tomorrow's Tai Chi class or the morning run.

thursday
14:30

TEAM SPACES



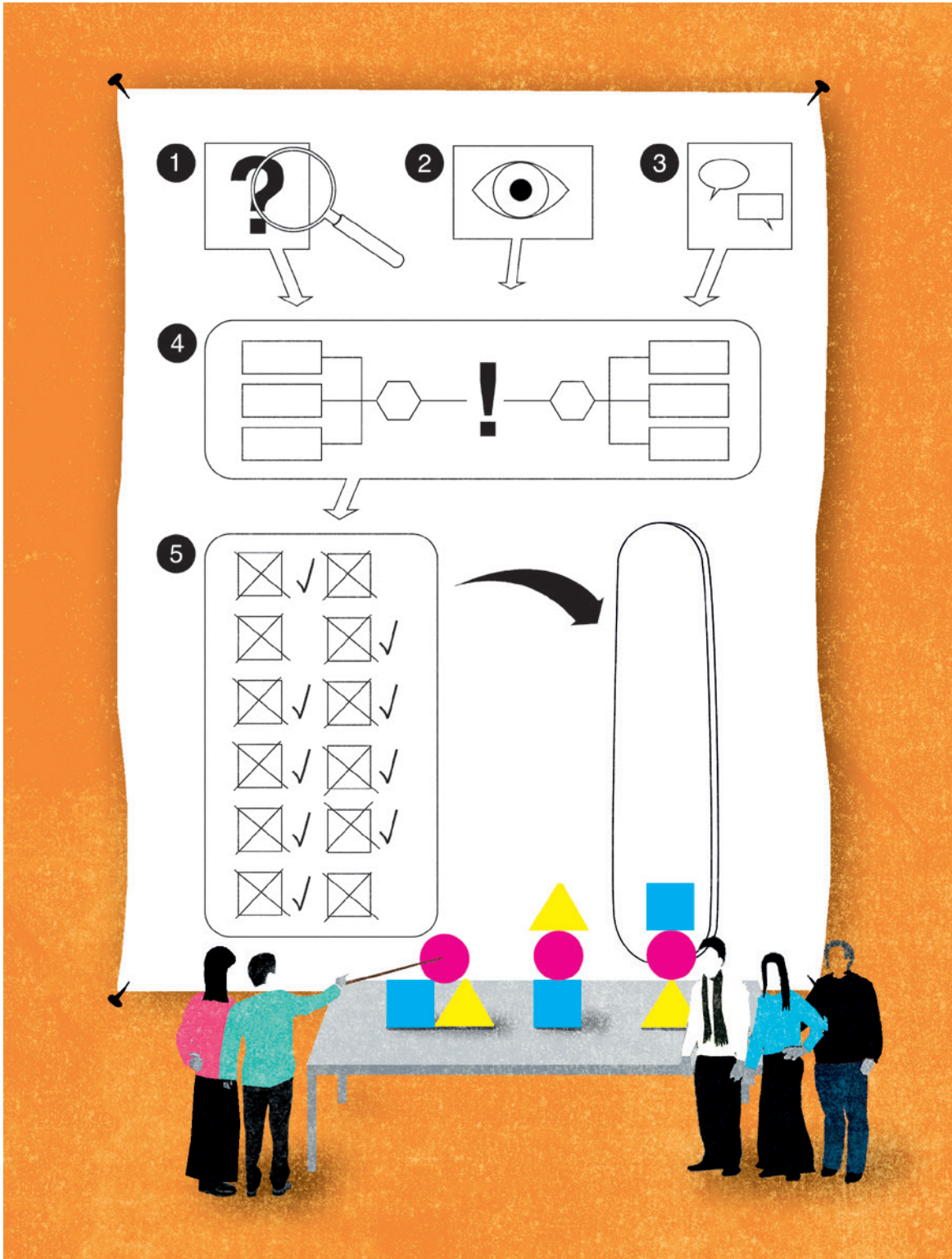
Name your project

↘ Template check out.

You will be amazed to see how much you can achieve in just one day. In order for everyone else to be able to put your advancements into perspective, we ask you to document both the ideas that you presented as well as the feedback you received. Also, answer the last questions of the brief before getting ready for tomorrow.



Good night! Tomorrow's the day.



On this last day of ETH Week, we ask you to focus on telling a balanced story that takes into account all three parts of the brief. Convince the audience of your problem statement and solution. We then conclude with a bigger picture before we all come together to celebrate six days of critical thinking!

7.05 — Tai Chi class and morning run at the HPS Sports Centre.

8.30 — Kick-off at ETH Week Hall.

↘ Check in.

9.00 ▲ **KEYNOTE**
Christiane Leister at the ETH Week Hall.

↘ Polish your presentation.

↘ Last check out.

13.30 — **DEADLINE FOR HAND IN AND LUNCH BREAK**

15.00 ◆ **FINAL PRESENTATIONS**
It is time to get on stage and tell a convincing story at ETH Week Hall.

↘ Wrap up.

19.15 ◆ **PANEL DISCUSSION AND CLOSING CEREMONY**
Stelian Coros, Benjamin Dillenburger
Lucio Isa, and Simone Schürle at ETH Week Hall.

Sarah M. Springman concludes
at ETH Week Hall.

20.30 ▲ **UNTIL NEXT YEAR?**
It is time to celebrate the last six days at ETH Week Hall.

friday
sep 15

◆ KEYNOTE

**SUSTAINABLE GLOBAL LEADERSHIP –
SUCCESS FACTORS OF THE LEISTER GROUP**

We start the last day of ETH Week with an account of Christiane Leister's expertise as the owner of the Leister Group, a Swiss company group with the following business activities: welding equipment for thermoplastic polymers, hot-air modules for industrial process heat applications, micro-optics and gas sensors. After two days of intensive discussions about the future, we pause for a reality check before you get the chance to fine-tune your presentations.

Christiane Leister will share her insights regarding:

- what it is like to exert change management on a family-run company and how to implement it;
- how she deals with the constant need to modernise and innovate;
- how she leads the workforce in times of crisis;
- how important company culture is.

At the end, we have reserved time for questions and for a personal exchange.

friday
9.00

ETH WEEK HALL



CHRISTIANE LEISTER is the Owner of the Leister Group and Chairperson of the Supervisory Board at Leister AG. She holds a degree in Economics and started her career at Jungheinrich (fork lift trucks and warehousing systems). She then headed controlling and finance departments of Vereinigte Papierwerke AG and Milupa AG. She took over strategic and operational duties within the Leister family business in 1989. She has been the owner of the Leister companies since 1993, where she also acted as general manager and CEO until 2014. During that time she diversified them with new technologies and expanded them internationally to create the Leister Group.

↘ Polish your presentation.

Use this last session to finish your project. Decide how to best use the 5 minutes to tell your story. In order to be more time-efficient, you may delegate responsibility for finishing the prototype, polishing specific arguments, and writing the overall narrative. Integrate the final answers to the questions of the brief. You will also need to decide on a name for your project.

Your story can only be 5 minutes long, which is more than sufficient to bring a great idea across. In order to present successfully in such a short time, you need to practise. Rehearse your story to your neighbouring team and vice-versa. You would probably prefer to continue working on your presentation or prototype instead of wasting valuable time on a dry run. However, what matters is not only what you say, but also how you say it, and this is how you control that aspect.

Try to do 2–3 iterations and pretend there are 200 people in the audience. Include the logistics of the event: the time to prepare before getting on stage, the time you need to get on stage, and how to react to the ‘1 minute left’ notice. Also clap when the time is up to find an elegant way to wrap up in case you should run over time.

× HEADS UP

All documents and material needs to be handed in before 13.30 in the ETH Week Hall:

- 1. Your digital files for the screens during the presentation and the 1-pager at the main stage.
- 2. Hang up your process templates and put your prototype to the process wall.
- 3. Your props to the backstage area.

friday
10:15

TEAM SPACES

↘ Last check out.

Your process wall will be part of the final exhibition together with your prototype. In order for your project to be understandable, write a short abstract, document your arguments for the questions in the brief, and write the final version of the problem statement on the last template. Also, answer to the question of why you believe your work is relevant. Fill all of this into your 1-pager digitally as well.

FINAL PRESENTATIONS

1. Define a problem statement that describes the challenge you want to address. It needs to be linked to a Swiss actor and to one of the 3 angles of ETH Week.
2. Tell an inspirational story that explains where your ideas come from, why your problem statement is relevant and how a possible solution could look like.
3. Critically reflect your ideas by answering the following questions:

SCIENTIFIC RIGOUR

- What are your underlying assumptions?
- What facts and figures did you rely on?

FEASIBILITY

- How feasible is your solution?
- Are there uncertainties related to your solution that would need further clarification?

SYSTEMS THINKING

- How is the problem embedded in the ecological, societal and economical context?
- What are the implications and trade-offs of your solution?

DRY RUN

We meet at 18:30 to explain how we will organise the final presentations and make a quick run through.

× HEADS UP

- Keep in mind that each group has 5 minutes for their final presentation.
- There are 2 hand microphones.
- There are only 2 minutes between presentations. Therefore, once finished, each group needs to leave the stage swiftly. Then, bring your prototype to the process wall.
- In order to guarantee a smooth change between two groups we ask you to take seats according to the sequence of the final presentation. Seats will be labeled.

friday
15.00

ETH WEEK HALL

Without Powerpoint

We are no fans of powerpoint and believe that you will find more inspiring ways to tell us a convincing story.

↘ Wrap up.

After all the time dedicated to your tasks, we have now reserved some time to reflect. Between the final presentations and the closing ceremony, you will have the opportunity to meet one last time in your teams and wrap up. Your tutor has designed this slot to help you reflect your team process. It is a chance to think about how your group worked together. Discuss what was good and what could have been improved. Also, sit together with your tutor and teammates and reflect on what you have learned during the last 6 days. As it will be your last formal meeting during ETH Week, use it as an opportunity to find a common understanding of the experience you have gone through together.

× HEADS UP

— Cast your votes before heading to the debriefing.

friday
18.15

Your take home message

Anything that you would like to share with your team before closing the week?

CONCLUDING PANEL

Our concluding panel discussion gives us – students, professors, and staff – one last chance to critically reflect our work and the topic of ‘manufacturing the future’ as a whole. We have invited four representatives of a younger generation of ETH Professors – Stelian Coros, Benjamin Dillenburger, Lucio Isa, and Simone Schürle – and hope to find themes that have crystallised, identify how projects build on each other and draw a bigger picture that we can take home. Together, we will try to formulate a joint understanding of what we have learned throughout ETH Week. We will envision opportunities that await us so that we can make a positive impact towards ‘manufacturing’ which is innovative, viable, inclusive, sustainable and circular. Larissa Schefer, who you have met on Monday, will moderate the discussion, to close the loop.



LARISSA SCHEFER is managing the ETH Competence Center for Materials and Processes (MaP), combining her interest to advance complex scientific and technological grand challenges and the passion to engage people following a transdisciplinary approach. She studied Food Process Engineering and holds a Dr.sc. in Soft Materials from ETH Zürich, and gained experience in applied R&D projects during time spent in industry.



BENJAMIN DILLENBURGER is Professor for Digital Building Technologies at D-ARCH since 2016, developing new building technologies based on the interplay of computational design, digital fabrication and new materials. In this context, he searches for ways to exploit the potential of additive manufacturing for building construction, thereby linking to our ‘Materials and Resources’ and ‘Factories and Products’ angles.



STELIAN COROS is Professor for Computational Robotics at D-INFK and is also affiliated with the Robotics Institute at Carnegie Mellon University, bridging fields of robotics, computational fabrication and animation. He develops digital design algorithms, works with 3D printers and uses a wide range of materials and approaches – including ‘soft robots’ – thereby reaching out to all angles of this year’s ETH week.



LUCIO ISA is Professor for Interfaces, Soft Matter and Assembly at D-MATL since 2013, focusing on the basic understanding of physical mechanisms in complex materials. His particular interest in the self-assembly of colloidal particles and in manufacturing strategies across various length scales link to the discussion of natural vs. artificial materials along the ‘Materials and Resources’ angle.



SIMONE SCHÜRLE is Professor of Responsive Biomedical Systems at D-HEST since 2017, researching on micro- and nanosystems for health care applications. She is a Co-Founder of an ETH Spin-Off for magnetic manipulation systems and serves as a Fellow of the WEF Global Future Council on the Future of Human Enhancement, thereby widening the context and implications of future ‘Human-Machine Partnerships’.

◆ FINAL EVENT

CLOSING CEREMONY

By the time we get to this point, André Sandmann will add his last touches to **THE BIGGER PICTURE** of ETH Week 2017. He accompanies us throughout the day and will have the difficult job to document the essence of what has been said, thought and discussed during ‘Manufacturing the Future’. He will produce two drawings: The first one, called **THE SATELLITES** documents your projects as you present them. The second one, **THE BIGGER PICTURE** evolves during the concluding panel. They will be exhibited, together with your prototypes throughout the evening.

We are excited that our Rector, Sarah M. Springman, is present during the last moments of the week, to listen to your presentations, and to close the week. But before we all fall into bed, a few more surprises await. Stay tuned! We hope you stay to celebrate, David Suivez is in charge of the music on our final night in the ETH Week Hall. See you all under the disco ball!



SARAH SPRINGMAN is the Rector of ETH Zürich and Professor of Geotechnical Engineering. She studied soil mechanics at Cambridge University, then embarked on a career in industry before returning to Cambridge, where she earned her PhD and established an academic career. She also represented Great Britain as an athlete from 1983 to 1993, winning 20 elite European Triathlon Union (ETU) Championship medals in triathlon and duathlon.



ANDRÉ SANDMANN is a graphic artist and illustrator, living in Zurich. He understands design as a term derived from disegno, Italian for idea or draft. He believes in the potential of hand-drawn sketches because they leave room for interpretation in the viewer. As a graphic recording artist, he uses them to document discussions and ideas.



DAVID SUIVEZ is a DJ, Yoga Teacher and producer of the Swiss band “Liricas Analas”. He also founded the ‘Movement Masterclass’, a platform where transdisciplinary approaches of movement based forms are being researched and investigated in a non-dogmatic way. He is as excited as we are about the last evening of ETH Week 2017.

**friday
20.30**

ETH WEEK HALL



Thank you!