BuildDigiCraft

New Mindset for High-quality Baukultur in Europe:

Bridging Craft and Digital

Annette Bögle, Emiliya Popova (eds.)

Imprint

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2.1 Training program
Intellectual Output 6

Interdisciplinary Doctoral Training Course

Authors
Emiliya Popova, Annette Bögle

Contents

1.0 Structure

1.1 Formal structure

The **BuildDigiCraft** training program consists of four consecutive five-day long Intensive Study Programs, referred to as ISPs in short. They can be taken within one calendar year, within an interval of three or four months. For instance, the pilot issue of the **BuildDigiCraft** training program started in October 2020 and ended in December 2021, with ISP1 taking place in October 2020, ISP2 in February 2021, ISP3 in June and ISP4 in December 2021. This training course is open to advanced Master's-level students and PhD students who are working on their individual projects where the role and impact of the digital technologies on issues related to the shaping of the built environment is being explored. **The program is interdisciplinary and open to young professionals from the field of studies of design and architecture, structural and civil engineering, urban planning but also to any field of studies with a certain focus on spatial planning and the transformation of the built environment**.

1.1.1 Application for the ISPs

The general organizational structure of the ISPs is the same for each ISP. The programs are launched with an **application phase** and an open call for participation that is distributed throughout the teaching and doctoral networks of the teaching and expert staff involved. The call describes the focus, scope and contents of the program, the higher educational institutions involved, the work formats during the intensive course as well as the selection criteria for the participants. The formal selection criteria focus on the academic and disciplinary background (PhD/Master's level, field of studies), whereas the thematic criteria help to find participants who are interested in research projects related to one of the following topics:

- Digital transformation in the planning and building industry
- Cultural transformation of the professions of the built environment
- Future of craftsmanship, digital craftsmanship
- Formation of new cultural and aesthetic values in the built environment of the digital age

1.1.2 Preparation for the ISPs

Selected candidates receive prior to the start of the training program a set of preparatory task assignments, which are related to the content of the specific ISP. The preparatory tasks help participants present themselves at the beginning of the course, and at the same time they offer guidelines for setting the individual research work within the scope of the **BuildDigiCraft** training program. The number of the preparatory task varies for each ISP, in the first two ISPs the number of preparatory tasks is aligned with the number of training days – there is a preparatory task for each day. In the last two ISPs the number of tasks is reduced to one or two, but then the task assignment requires a more focused and in-depth reflection on the individual research project.

1.1.3 Input during the ISPs

There are **three major sources of input** during the training program: **individual input by the participants, input from the scientific team organizing the training program** (in the form of supervision of the group work as well as contribution to the joint discussion rounds after each group work presentations) and **external input** coming from invited experts and renowned keynote speakers. The invited experts bring in the latest know-how and cutting-edge ideas regarding the selected thematic focus of the specific ISP. There is an invited expert for each day of the training program, in some cases even two speakers per day. Each ISP day ideally starts with the input of the invited expert offering a major intellectual impulse for the following group work tasks and discussions.

1.1.4 Work formats during the ISPs

The work format during an ISP consists of **individual presentations, supervised group work formats and intermediate and final group presentations**. The individual presentation is usually based on a preparatory task, it can take place either in the larger round or in smaller breakout groups of four to six people, depending

on the total number of participants. The **individual task or presentation**, respectively, allows each participant to introduce to the rest of the group their current research context as well as individual and research background. After the "presentation round," the actual ISP group work starts. **Group work tasks** are introduced as "mapping guidelines for group work" and are mainly based on the preparatory task assignments. Within the group work, in small breakout sessions of four to six members, participants present their individual findings to each other, discuss them and follow the mapping guidelines to try to find a common way to organize and classify information, so that they can later transfer the results to the joint discussion rounds or to the group task assignments of the next days. The assignments of the group work tasks during the ISP is carefully prepared by the supervising scientific staff. The selected exercises help participants and the scientific supervising team to gain a shared understanding of the dimensions and impact of the ongoing cultural change in the building and planning sector. They also build up the foundation for the **joint discussion rounds** during and after the final group work presentations.

During the group work, each group is fully or partially supervised by at least one member of the teaching staff. Ideally, group work is always supervised by two teaching members. In some cases, groups can be given first some unsupervised group work time, while supervisors' input is collected only in the final stage of the daily group work period. The character of the group work during the four ISPs changes gradually, allowing for the testing of different group work formats.

ISP1: Group work task assignments and group members change every day

ISP2: Group work task assignments and group members change every day

ISP3: Group work is arranged around certain topics (two to four in total), group members remain the same throughout the ISP, ideally four participants per group

ISP4: Group work is arranged only around one topic, participants are separated in groups of five to six people, group members remain the same throughout the ISP

The gradually changing character of the group work reflects the depth of the concepts explored within the **BuildDigiCraft** project. In order to cover as many aspects as possible at the beginning during ISP1 and ISP2, it is recommendable to create as many explorative group tasks as possible, ideally one per day, so that all participants can get a better overview of the thematic scope, the concepts and ideas introduced by the different participants and members of the scientific team. At the same time, in terms of interdisciplinarity, it is important at the beginning of the training program to give participants the opportunity to interact with as many participants as possible. Therefore, the **BuildDigiCraft** team recommends a regular change of group work assignments and group members within the first two stages of the training program. In the second stage of the program, ISP3 and ISP4, it becomes necessary to create a more focused and concentrated work environment in order to achieve a higher level of scientific reflection among the participants. While in ISP3 the organization team can choose to have two to four main topics to organize the group work around, in the last ISP the topic can remain the same for all group members. Thus, group members have the opportunity for a more intensive exchange by interacting with the same group members throughout the whole ISP. In the last stage of the training program all group members work on the same topic, trying to address it from their individual perspective but at the same time to reach a new level of shared understanding about the cultural change within the built environment of the digital age. An interdisciplinary work language is created at this level, in which Baukultur, Craftsmanship and Digital are used synergetically.

1.1.5 Digital tools for the group work during the ISP

The training program can be carried out both in physical and digital format. Whereas there was enough experience and knowledge accumulated for the organization and implementation of training workshops in physical presence, there had not been much experience in carrying through

a training program in an entirely digital mode until the beginning of the coronavirus crisis. The **BuildDigiCraft** program was therefore the first training program of the organizing scientific team that took place in a completely digital format. The new digital tools that are available allow for new modes of collaboration. The experience made within the **BuildDigiCraft** training program shows that there are **two major communication tools absolutely necessary for the realization of group work and discussions in the digital format**. The first one refers to the digital conference tools used for enabling real-time communication mainly via camera and microphone, and in a highly extended version within a game-engines reality allowing for an avatar embodiment of the participants. The second major worktool is the interactive whiteboard, allowing for an immediate and simultaneous visualization of ideas and thoughts within a team. The latter enables an immediate and machine-readable visual documentation of group work and discussions.

1.1.6 Documentation

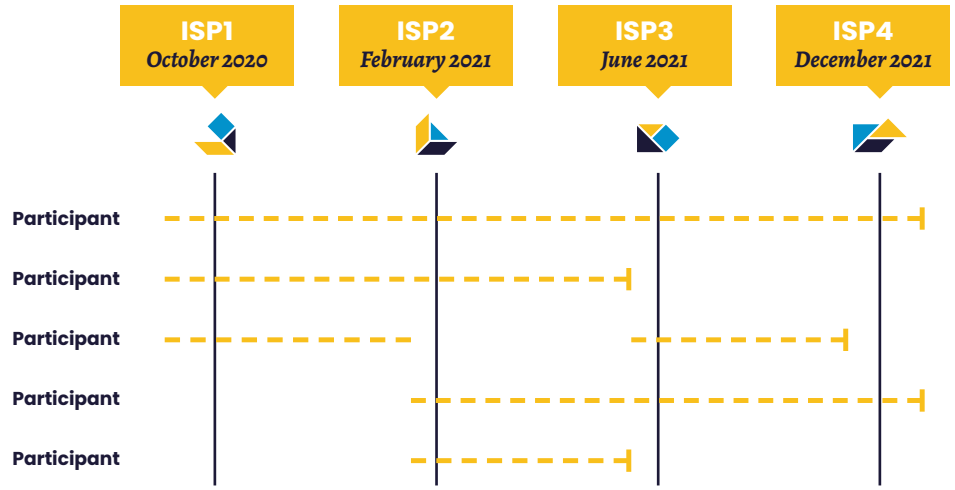
All input and outcome of the training program needs to be carefully documented. Thus, the collected material during the ISPs remains available in a well-structured manner for later evaluation and post-processing. All external input is video-recorded and uploaded on a popular and widely accessible video platform such as the YouTube[1] channel of the project. The input of the individual participants in the form of submitted pre-tasks and visual outcomes from the group work assignment (saved on an interactive white board) is organized in a digital documentation format. The closing discussion rounds during the training program can be recorded and used in a follow-up evaluation. In a next phase, the fully documented insights of the training program are processed through the prism of the **BuildDigiCraft** model (see [Chapter1.0 | "Introduction" | Fig[●2]]), allowing for the creation of well-structured guidelines and strategies for the Process, Knowledge, and Material necessary for achieving high-quality Baukultur in the digital age.

1 https://www.youtube.com/channel/UC8bIdsOCxTQCwF2Xu1H3_rA/videos

1.1.7 Participation in the ISPs: number and consecutiveness

An ISP from the **BuildDigiCraft** training program can be open to a different number of participants. However, it is recommended to have no less than ten participants and a maximum of 25. A smaller number of participants would mean a significant narrowing of the spectrum of explored topics, a larger number would lead to a lower quality of interaction between the participants, thus depriving some of them of the opportunity to actively engage in discussions in a bigger round.

Fig[●1] Participation form.
Option 1: consecutive
Option 2: non-consecutive



The **BuildDigiCraft** program with its four ISPs is planned as a consecutive study program. However, it allows for non-consecutive participation and integration of new participants at any stage of the program. At the same time, it is highly recommended to ensure that there is a small number of "regular participants," who have attended at least two of the ISPs. This allows for a continuous transfer of knowledge between the "old" and "new" participants. It is the members of the scientific team, organizers of the training, who remain constant throughout the training program. They supervise the PhD and Master's students throughout the group work and joint discussions as well as make sure that the workshop outcomes flow in the project outputs (Fig[●1]).

1.1.8 Scientific supervision during the ISPs

The **BuildDigiCraft** scientific team is responsible for both the concept of the **BuildDigiCraft** training program and the supervision of the participants' work during the ISPs. Group work and group discussions foresee the involvement of experienced researchers to guide the participants, the early-stage researchers, through the conceptual framework of the **BuildDigiCraft** project as well as to equip them with the necessary skills and competences for a future career in research and academia. Group supervisors during the group work exercises have two main tasks. First, they make sure that the group follows the assigned mapping guidelines for the group work. Secondly, they supervise the quality of the discussion rounds within the group, while at the same time actively contributing to it by bringing in disciplinary insights from their own field of expertise. In the final discussion rounds after the group presentations, usually at the end of each working day, all group supervisors come together and take part in a bigger joint discussion round with all participants (see Fig[● 2] as an example of the program).

Fig[● 2] Example of an ISP program.

TOPIC (DAY)	15.02.2021 Monday — Day 1: Introduction	16.02.2021 Tuesday — Day 2: Process	17.02.2021 Wednesday — Day 3: Material	18.02.2021 Thursday — Day 4: Knowledge	19.02.2021 Friday — Day 5: Roundup
9:00—9:15	KEYNOTE **Mette Ramsgaard Thomsen** Centre for IT and Architecture Research Group (CITA) *Assoc. Prof., Royal Danish Academy*	KEYNOTE **Mark Burry, AO** Founder of Swinburne University of Technology's Smart Cities Research Institute *former Prof. of Urban Futures, University of Melbourne*	KEYNOTE 1 **Vicki Thake** Material and Spatial Design _ *Assoc. Prof., Royal Danish Academy*	KEYNOTE **Helle Rootzen** Professor in Learning Technology and Digitalization LearnT DTU - Center for Digital Learning Technology *CEO Andhero*	KEYNOTE **Lars Botin** Values and social responsibility in technology development *Assoc. Prof., Aalborg University.*
9:15—9:30	*Coffee Break (15 min)*	*Coffee Break (15 min)*	*Coffee Break (15 min)*	*Coffee Break (15 min)*	*Coffee Break (15 min)*
9:30—9:45	OFFICIAL WELCOMING	GROUP WORK 1 *(Pre-Task 2)*	KEYNOTE 2 **Anton Kuzyk** Professor in DNA Nanotechnology – Department of Neuroscience and Biomedical Engineering *Aalto University*	GROUP WORK 1+ PANEL DISCUSSION KEYNOTE SPEAKER *(Pre-Task 4)*	INPUT TALK **Vincent Kuo,** *VXT Research*
9:45—10:00	GROUP WORK 1 *(Pre-Task 1)*		*Break (15 min)*		GROUP WORK 1 *(Pre-Tasks 5)*
10:00—10:15	*Break (15 min)*	*Break (15 min)*	GROUP WORK 1 + 2 *(Pre-Task 3)*	*Break (15 min)*	*Break (15 min)*
10:15—10:30	GROUP WORK 2	GROUP WORK 2		GROUP WORK 2	GROUP WORK 2 + PANEL DISCUSSION WITH LARS BOTIN
10:30—10:45					OFFICIAL CLOSING
10:45—11:00				*Break (90 min)*	
11:00—11:15		*Break (120 min)*	*Break (120 min)*		
11:15—11:30		OPTIONAL WORKSHOP PARAMETRIC DESIGN WITH RHINO/GRASSHOPPER Part 1 *Kacper Radziszewski* 15:30—18:00	OPTIONAL WORKSHOP PARAMETRIC DESIGN WITH RHINO/GRASSHOPPER Part 2 *Kacper Radziszewski* 15:30—17:30	OPTIONAL WORKSHOP PARAMETRIC STRUCTURAL DESIGN WITH KARAMBA3D *Clemens Preisinger* 15:00—17:00	
11:30—11:45					
11:45—12:00					
12:00—12:15					
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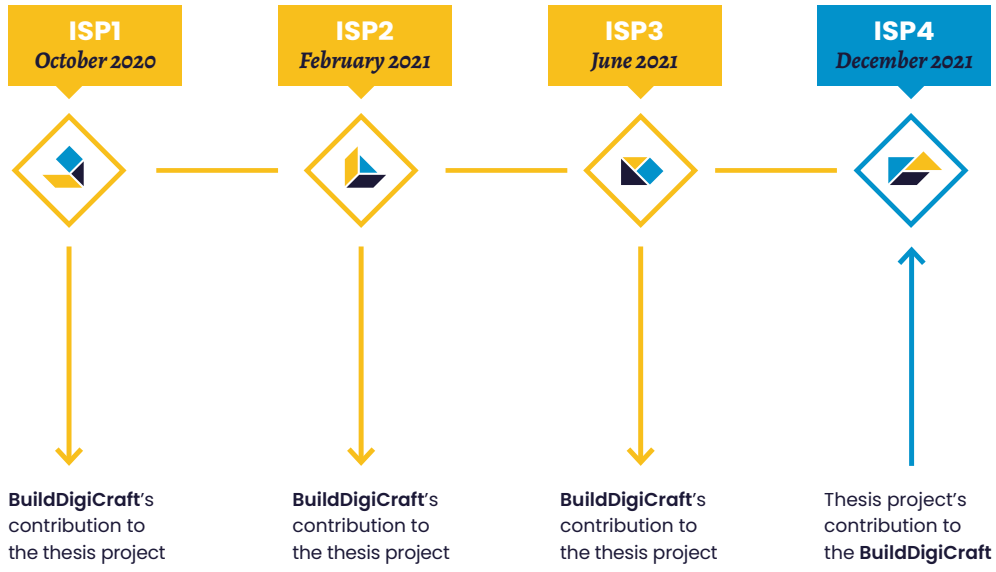
1.1.9 Relation between the training program and the individual project

The training program brings together an interdisciplinary team of researchers at different levels of their research careers to offer them a holistic framework and exchange platform for their research projects. During the first three ISPs the scientific team behind the program provides the input and guidelines for the intensive group work, helping participating researchers to set their research projects in the holistic framework of the **BuildDigiCraft** project. In the last ISP it is the participants who are asked in their group work projects to deliver a joint outcome, their own Group Manifesto, which can then be used for the further development of the project's final Manifesto. Thus, the project framework is developed within an active exchange of ideas between the participants, the scientific team and the invited experts (see Fig[● 3]).

Fig[● 3] Relation between the training program and the individual project.



1.1.10 Formal recognition of participation

The participation at the **BuildDigiCraft** training program can be formally awarded with credit points for the transfer of knowledge in higher education. The participation at each ISP, including the fulfillment of the preparatory tasks, allows for the acquisition of 2 to 2.5 ECTS[2] which corresponds to 60 to 75 working hours. The exact number of the credit points depends on the academic award system at each university. The **BuildDigiCraft** training program can be basically integrated as an official doctoral study course in the doctoral education program of European higher education institutions.

2 **ECTS** = European Credit Transfer and Accumulation System: the European Credit Transfer and Accumulation System (ECTS) is a tool of the European Higher Education Area for making studies and courses more transparent.

1.2 Contents structure

The **BuildDigiCraft** training program was implemented as a one-year online training program which consisted of four consecutive five-day long[3] intensive training courses – called "Intensive Study Programs" (ISPs). Each of these four ISPs was dedicated to a specific topic, which in turn reflected a certain aspect to be explored within the **BuildDigiCraft** project.

3 Exception ISP1 "Concepts and Fundamentals" – duration was only four days instead of five. A minimum of five consecutive days for an intensive study program is required according to the Erasmus+ Strategic Partnerships program requirements.

To follow, the detailed day-by-day content program of each of the four ISP is presented. First, the thematic focus of the training with the leading discussion questions is outlined, then the input lectures are listed (a detailed description is available in the Catalog [Chapter 4.0 | "Catalog of Video Lectures"] of the **BuildDigiCraft** Input Lectures) and finally, the format of the group work during the training with a full description of the specific task and project assignments is looked at.

ISP1 Concepts and Fundamentals

Thematic scope

ISP1 is the first of four consecutive training events organized between 2020 and 2021 within the thematic framework of the **BuildDigiCraft** project. ISP1 is dedicated to setting out the common ground for the joint work within the doctoral teaching program. It builds up the fundamentals and introduces the main concepts of the **BuildDigiCraft** project: future projections, Baukultur in Europe, craft and craftsmanship and digital explorations.

Leading discussion questions:

- *What is Baukultur in the digital age?*
- *What is craft and craftsmanship?*
- *How can crafting techniques and materiality be transferred to the digital world?*
- *What is the essence of the digital revolution in respect to shaping the built environment?*

Fig[● 4] Full program ISP1 "Concepts and Fundamentals."

	19.10.2020	20.10.2020	21.10.2020	22.10.2020
DAY COORDINATOR	Day 1: **Introduction** HCU, RTU	Day 2: **Baukultur** GUT, HCU	Day 3: **Craft** KADK, Aalto, Chalmers	Day 4: **Digital** DTU, Chalmers
9:00—9:15	INTRO PROJECT "**Build Digi Craft**" *(in Zoom Meeting)*	INTRO GLOSSARY *(in Zoom Meeting)*	DRAWING EXERCISE Helle Mie Helleson (Royal Danish Academy) *(in Zoom Meeting)*	KEYNOTE *Digital Craftsmanship (title TBC)* **Kristoffer Negendahl** (Denmark University of Technology) *(in Zoom Webinar)*
9:15—9:30				
9:30—9:45	KEYNOTE *How are you imagining [y]our future?* **Chris Luebkeman** (ETH Zürich, Strategic Foresight Hub) *(in Zoom Webinar)*	KEYNOTE *What is Baukultur and Baukultur in the Digital Age?* **Inga Glander** (German Federal Foundation Baukultur) *(in Zoom Webinar)*	KEYNOTE *Craft in a Digital era. A Search for Earthly Paradise?* **Claes Caldenby** (Chalmers University of Technology) *(in Zoom Webinar)*	Coffee Break (15 min)
9:45—10:00				
10:00—10:15	Coffee Break (15 min)	Coffee Break (15 min)	Coffee Break (15 min)	GROUP WORK Pre-Task: Digital (Built) Environment *(in Zoom Meeting)*
10:15—10:30	INTRODUCTION: 3D-AVATAR EXPERIENCE *(Zoom M)*	GROUP WORK Pre-Task: Case Study Baukultur *(in Zoom Meeting)*	GROUP WORK Pre-Task: (1) Semantics of Craft Pre-Task: (2) Why Material Matters *(in Zoom Meeting)*	
10:30—10:45	EXPLORATION 3D-CONGRESS SPACE *(TriCAT Spaces)*			
10:45—11:00	GET-TO-KNOW THE GROUP 1			Lunch Break (30 min)
11:00—11:15	Avatar Coffee Break (15 min)			REFLECTION *(individually)*
11:15—11:30	GET TO KNOW THE GROUP 2 Individual Presentations, Pre-Task 1 *(sub-groups)*	Lunch Break (30 min)		GLOSSARY Group Presentations + Discussion
11:30—11:45		REFLECTION *(individually)*	Lunch Break (30 min)	
11:45—12:00	Avatar Coffee Break (15 min)	GLOSSARY Group Presentations + Discussion	REFLECTION *(individually)*	MANIFESTO Group Presentations + Discussion *(all in Zoom M)*
12:00—12:15	GET BACK TO STAGE "What comes next?" & Feedback		GLOSSARY Group Presentations + Discussion	Coffee Break (15 min)
12:15—12:30		MANIFESTO Group Presentations + Discussion *(all in Zoom Meeting)*	MANIFESTO Group Presentations + Discussion *(all in Zoom M)*	OFFICIAL CLOSING
12:30—12:45	FACE-TO-FACE *(in Zoom Meeting)*			
12:45—13:00				
13:00—13:15				
13:15—13:30				
13:30—13:45				
13:45—14:00				
14:00—14:15				
14:15—14:30				
DIGITAL TOOL OF THE DAY	Avatar Conference Tool	Interactive White Board	Interactive White Board	Interactive White Board

Day 1: Introduction

Initial input

- Introduction to the project and the teaching program
- Dr. Chris Luebkemann, *ETH Zurich*, Strategic Foresight Hub
  Lecture title: ***How are you imagining [y]our future?***

Group work

- **Get-to-know-the-group activity:** carried out first as an avatar meeting in a 3D conference space. Participants enter the training program directly in a 3D game-engine environment, without having the opportunity for a face-to-face exchange based on their real-faced, selves. Within this environment they first have no opportunity for a one-to-one voice exchange. Instead, they can test different options to transform the digital space by adding new forms and furniture, can move around freely and look at the other avatars. Next, in order for them to get first impressions of the group and the team constellation, they are asked to group according to various indicators (i.e., student status, home university, discipline, etc.). After this explorative phase, half of the participants are asked to present their Preparatory task 1 to the rest of the group. For this activity they meet in four separate breakout sessions called "private zones" in the avatar environment. The experience within the 3D meeting environment ends with a plenary session in a classic stage-audience setting, where the participants are officially welcomed and the **BuildDigiCraft** project and the training program are presented (Fig[● 5]). After that everybody leaves the avatar meeting and the ISP participants meet again in a camera-based 2D standard online conference environment, where the other half of the participants who have not yet presented their preparatory task can introduce themselves in an environment they now know.
- Preparatory task 1: ***"Personal presentation and relevance to the BuildDigiCraft project including five keywords"***
  (both in the 2D and 3D conference space)

Fig[● 5] Screenshots from the avatar meeting ISP1, Day 1.

Pre-task 1: Assignment

Reflect on your individual project (PhD project / Master's thesis or any project of personal interest) in respect to the following three concepts: Baukultur, Craft(smanship) and Digital(ization).

Prepare a presentation with four to six slides, addressing the following issues:

1. Personal profile/introduction – who you are?
2. Baukultur – does the term Baukultur play any role in your work?
3. Craft & Craftsmanship – how do you see these in your work?
4. Digital & Digitalization – what dimensions and representations does the Digital have in your work?
5. Share with the audience your personal statement/choice/interest (Joker slide).
6. Suggest your own five keywords in relation to Baukultur, Digital, and Craft, and please add/share (your own) short definition of these words.

Fig[● 6] Collected keywords in Pre-task 1, ISP1.

- 3D-SCANNING
- ADAPTABILITY
- AESTHETIC
- AGILE
- ALGORITHMIC
- DESIGN
- ALIVE
- ARCHITECTURE
- BAUKULTUR
- BUILDING NDUSTRY
- BUILT and UNBUILT
- BUILT ENVIRONMENT
- CARE
- CHANGE
- CIRCULAR
- CIRCULAR ECONOMY
- COLLABORATION
- COMMUNICATION TOOLS
- CONNECTION
- CRAFT
- CRAFT TECHNOLOGY
- CRAFTSMANSHIP
- DATA-AVAILABILITY
- DATA-INTEGRATION
- DETAIL
- DEVELOPMENT
- DIGITAL
- DIGITAL FABRICATION
- DIGITAL TOOLS
- DIGITALISATION
- EMOTIONAL
- ENVIRONMENT
- FUTURE-ORIENTED
- GENERATIVE DESIGN
- HERITAGE
- IDENTITY
- INFORMED PROCESS
- INTEGRATION
- INTEGRITY
- INTERACTIVE DESIGN
- INVOLVEMENT
- LEARN
- LIFE-CYCLE
- LIFESTYLE
- MACHINE LEARNING
- MANAGEMENT/ ECONOMIC SYSTEMS
- MATERIAL
- MATERIAL COMPUTATION
- MATERIAL REUSE/ RECYCLE/UPCYCLING
- MATERIALITY
- MATERIALITY & DIGITAL
- MEGASCANS
- OPEN BUILDINGS
- OPTIMISATION
- OWNERSHIP
- PARTICIPATORY
- PEOPLE
- PHOTOGRAMMETRY
- POLICIES
- PRESERVE
- PROJECT
- REFLECTION
- RESILIENCE
- RESISTANCE
- RESPONSIBILITY
- REUSE
- REVITALISATION
- SAVE
- SCALE
- SHAPE
- SOCIAL
- SOCIAL ISSUES
- SOCIAL PARTICIPATION
- STRUCTURAL ART
- STRUCTURES and ARCHITECTURE
- SUSTAINABILITY
- SYSTEM
- TACIT KNOWLEDGE
- TACTILE
- THINK OUTSIDE THE BOX
- TIMBER-ONLY STRUCTURES
- TIME
- TRANSFORM
- UNIQUE
- UNREAL ENGINE
- URBAN PLANNING
- VR HDM MODELING
- WELL-BEING

Day 2: Baukultur

Initial input

- Glossary introduction (Glossary Matrix) see [Chapter 2.2 | IO1 "Glossary"]
- Inga Glander, German Federal Foundation Baukultur
  Lecture title: ***What is Baukultur in general and Baukultur in the digital age?***

Group work

- Presentation Preparatory task 2 ***"Case Study Baukultur"*** in supervised breakout groups of four to seven people
- Group presentations and joint discussion in the larger round

Pre-task 2: Assignment

Think of a concrete case of practiced Baukultur that you would like to present and justify your choice by answering the question: *Why is this case a good or bad example of practiced Baukultur (in your opinion)?*
There are no thematic or format restrictions. You can use the suggested literature references.

Literature references:

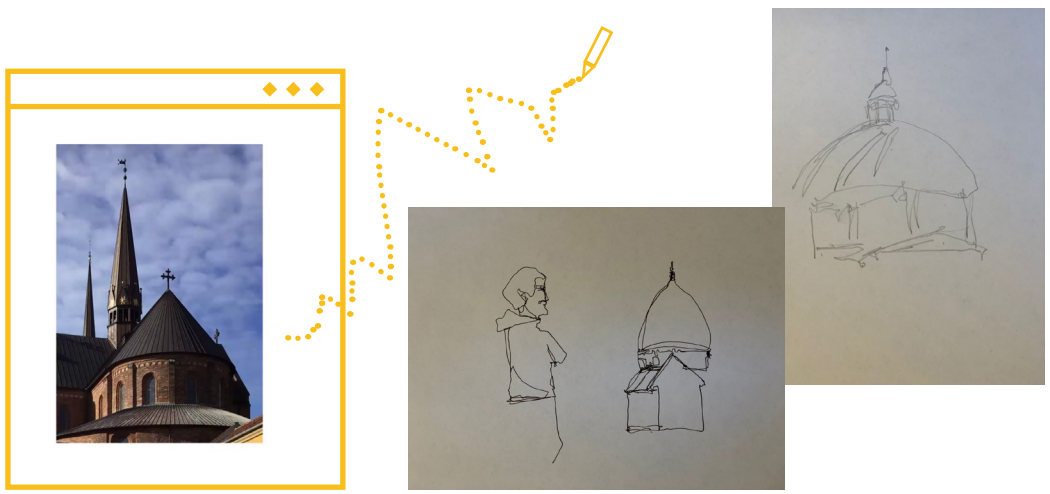
1. **ECAP Vienna 2018 – Documentation**
   European Conference for Architectural Policies "*High Quality Building for Everyone. Baukultur and the Common Good in Europe*"
   https://www.ace-cae.eu/uploads/tx_jidocumentsview/ECAP_Vienna_2018.pdf
2. **Davos Declaration 2018** https://davosdeclaration2018.ch
   + Conference "*Getting the measure of Baukultur*" 2019
   https://davosdeclaration2018.ch/conference-2019-geneva/
   Context document:
   https://davosdeclaration2018.ch/media/Context-document-en.pdf
3. **German Federal Foundation Baukultur** (English version)
   https://www.bundesstiftung-baukultur.de/en

Day 3: Craft and Craftsmanship

Initial input

- Real-time online "**Drawing exercise**" by
  Helle Mie Helleson (Assoc. Prof.), *Royal Danish Academy*
  Aim of the exercise: activation of the connection between the mind and the hand at an online meeting
- Claes Caldenby, Prof. em., *Chalmers University of Technology*
  Lecture title: ***Craft in a digital era. A search for earthly paradise?***

Fig[● 7] Drawing sketches by Faezeh Sadeghi, drawing exercise, ISP3, Day 3.



Group work

- Presentation Preparatory task 3 ***"Craft & Craftsmanship: Semantics of Craft(smanship) and Material Matters"***
  in supervised groups of four to seven people
- Group presentations and joint discussion in the larger round (see Fig[● 8–11]).

Pre-task 3: Assignment

a) Semantics and Etymology of Craft & Craftsmanship
Present and discuss the semantics and etymology of the words "*Craft*" / "*Craftsmanship*" in your native language or any language of personal choice.

b) Why does material matter? How to digitize material and skill?
Find and present examples (one or two) on how materials or skills can be (re)presented in a digital environment, how we can approach Craft/Craftsmanship and the material dimension in the digital environment.

There are no thematic or format restrictions. You can use the suggested literature references.

1. ***The Craftsman***, Richard Sennett, 2008
2. **Richard Sennett: *Craftsmanship*** at MAK, Museum für Angewandte Kunst, Vienna, October 9, 2016, https://www.youtube.com/watch?v=nIq4w9brxTk
3. ***The Good Craftsman***, Richard Sennett, ACT Cube, Nov. 13, 2018, Part of the Fall 2018 Lecture Series: Vibrant Signs and Indeterminant Matter(s), MIT program in art, culture and technology, https://vimeo.com/320539053
4. ***Richard Sennett on Art and Craft***, Getty Museum, December 3, 2009, https://www.youtube.com/watch?v=LH1aX_6-xkY
5. **Richard Sennett: *The Decline of the Skills Society***, UC Berkeley Events, Oct.25, 2011
   1) reality of the prospect – high-skilled society; **2)** what do we mean by skills (capacities for symbolic interpretation)? **3)** how we deal with skills that involve new technologies, https://www.youtube.com/watch?v=mjd5iM42APA
6. **Richard Sennett: *Und wo bleibt der Mensch?***,
   SRF Sternstunde Philosophie (English version), December 7, 2018.
   https://www.youtube.com/watch?v=rNzX4Ou3FvQ
7. **Bauhaus-Archiv: *Museum für Gestaltung***, Berlin,
   https://www.bauhaus.de/en/ (Arts & Crafts)

Fig[● 8] Outcomes of the Pre-task 3 group work – Group 1.

Group 1

Country	Craft definition in ~ 6 words please. Long one in the yellow box :)	Craftsmanship definition in ~ 6 words please. Long one in the yellow box :)
Matijs Babris **Latvia 1**	2 words **Position** (post office) **+ Nonsense** (futility, vanity)	The same
Illirjana Haxhiaj- **Albania**	**Daily Skill** The skill that one exercises daily, usually working by hand or with simple tools, having special habits and skills, gained from experience; -Profession	; the **totality of crafts**; ex:Blacksmith craftsmanship
Szymon Kowalski - **Poland**	craft/craftsmanship (same translation) **1. «small scale manufacturing including making and repairing utility items by hand or with simple tools»** 2. "ability to do such subjects" 3. "with reference to the fields of art: mastery of technique, creative workshop" *4. formerly: "Profession, occupation"*	craft/craftsmanship (same translation) 1. «small scale manufacturing including making and repairing utility items by hand or with simple tools» **2. "ability to do such subjects"** **3. "with reference to the fields of art: mastery of technique, creative workshop"** *4. formerly: "Profession, occupation"*
Asad Fallah-**Iran**	**industry**, Crafts, Profession,Art **Skill: Something fulfilled by practice**	Handmade, Handwork
Egils Markus - **Latvia 2**	**Activity/Skill** that one possess/does in **creation of something by hand**	Similar

craftsmanship
= Two Parts
1-industry, Crafts, Profession,Art
2- Handmade, Handwork

Craftsmanship *Rzemiosło* (Polish)	General	Specific	Related to (PhD) thesis
Past	Small-scale manufacturing including making and repairing utility items by hand or with simple tools	Carpentry works (show of skills and abilities)	Object with its **orginal function** (in this particular church)
Present	With reference to the fields of art: mastery of technique, creative workshop (in retreat)	Object of preservation (a great carrier of skills and abilities from past)	**Object** of interest as a great **specimen** of knowledge
Future	Automatization, Digitalization of crafts (algorithms, computer-aided crafts: 3D prints)	Hopefully still existing object (still as a great carrier of skills and abilities from past)	**Digital reconstruction** of piece of architecture (with possibility to share the knowledge and show former ways of constructing buildings)

Craftsmanship Matijs	General	Specific	
Past	Necessity	Part of trade. One of main providers of income	Technique
Present	Relic?	**Conservation** of existing buildings mostly?	**3D scanning**
Future	Luxury	**Informational bandwidth extension** – digitalization drawing, hand-eye coordination	**Virtual planning?**

Craftsmanship Egils	General	Specific	Related to (PhD) thesis
Past	Everything is handmade	Scale models, architectural details, construction work	Manually doing things, data gathering, a lot of labor needed
Present	High-quality work involves manual labor in combination with technologies	Scale models, architectural details, prefab, digital data, CNC, laser cutters	Looking into solution on how to work smarter and more efficiently while not losing quality
Future	Technologies take over manual labor, fully automatized solutions with some human supervision	Robotized solutions, higher educated people needed with know-how	Working smart, data-based solution not professional guessing

Craftsmanship Illirjana Haxhiaj	General	Specific	Related to (PhD) thesis
Past	The activity/profession that one performed daily by hand	Limited materials/ constructions	DIY buildings/ application of material found in vicinity
Present	The skills/knowledge required to perform and manipulate materials	To offer a qualitative space and adaptable one through the application of special structures, etc	New building structures/ more morphological shapes/ replace easily and fix any damage through minimal intervention
Future	Preserving traditional skills	To offer a qualitative space and adaptable one through the application of special structures, etc	Sustainable buildings/ spaces/ reducing carbon footprint of building materials

Asad Craftsmanship	General	Specific	Related to (PhD) thesis
Past	It was a collective act within society	Craftsmen working habitually, internalized skill, open source	**Evolution of skills and construction**
Present	There is an artisan's perspective of the issue	Closed system, lack of narrative	Possibility of integration of skills and construction as one entity
Future	**Bringing back the quality to objectification**	**Work is the extension of identity in society**	Skilled confidence + skilled cooperation + quality

Fig[● 9] Outcomes of the Pre-task 3 group work – Group 2.

Group 2

What are the most important group statements for you in the discussion?

Digital can be a new form of Craftsmanship by the integration of the material system based on material characteristics, constructional principles, and the development of new construction methods.

Integration of the knowledge/experience from past and the innovative application at the present

Digital technology can also be a tool for promoting democratic participation.If we make the technology and the skill open-source, the popularization of design tools & processes can lower the entry barriers to the world of making things.

biometric investigation	General	Specific	Related to Phd. Ms.
Past	Traditional experimental	Structures and products were designed and created through materiality strength and behavioural principles which was mostly gained experimentally	
Present	Analysing, scanning, and testing	Designing and construction development is based on material principles and differentiation	Material Programming
Future	DNA Testing		

Craftsmanship	General	Specific	Related to Phd. Ms.
Past	Objectification creating accompanied by quality		
Present	Handmade, Digital, and visual fabricating	Use of robotic, 3D printing, and all digital tools in fabrication and assembly	
Future			

Craft	General	Specific	Related to Phd. Ms.
Past	Manual/hand work	Drawing, sculpturing, modeling by physical product	**Skills Knowledge Experience**
Present	Integration of manual and automated process	3D representation with inputs from manual experiences	Integration of knowledge and experiences
Future	Precise and accureate design with automated process	Understanding product behaviour with technical analysis applying the different algorithms and the AI technology	Development of digital craft

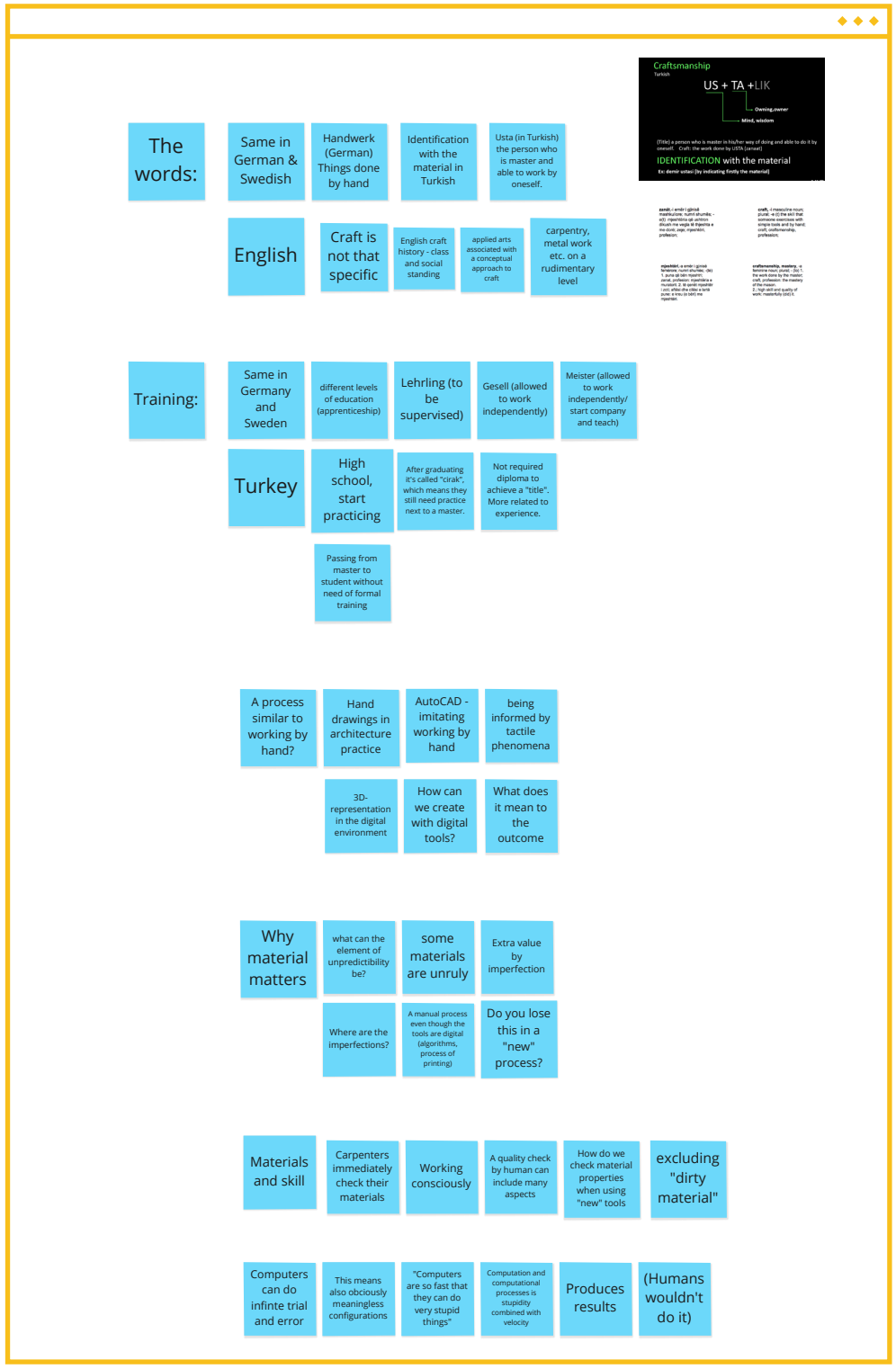
Material Resistance	General	Specific	Related to Phd. Ms.
Past	Intuitive understanding of material behavior.	How to process the material using the proper tools. Reading/Scanning, choosing the proper specimen. Choosing the proper tool.	How did they read, evaluate materials in the past
Present	"Material resistance is something one should avoid"	Material properties from tables ,Mechanical stresses, Test data from few experiments. Theoretical understanding of material resistance.	How to work with the resistance rather than against it?
Future	Choose the right material for the proper purpose	Incorporating the physical behavior and properties in digital tools. Combine theory and intuition.	

Digital Involvement	General	Specific	Related to Phd. Ms.
Past		Public participation	Participatory methods
Present	Use digital technology to involve more people in design process	3D printing photogrammetry	translation in the representation of an object
Future	Involvement in both physical and virtual world.	open-source digital democracy	

Hantverk	General	Specific	Related to Phd. Ms.
Past	People working the knowledge and skills of their hand.	Profession related to guilds. Knowledge about the material and tools, depending on guild. Working with your hands. Brunelleschi was a goldsmith. Such as mason, brickmaker, carpenter, smith.	Understanding of old building techniques, how did they work. Transfer skills and knowledge to a contemporary context in a format that could be understood today. What sources of knowledge and tools did they have?
Present	Beginning of automation of hand and machine integration. New digital technologies.	Automation or replacement of manual labour. At the present, ,or the near history, things automation have made things less advanced, prefabricated concrete elements. Still it is mechanical process that are designed by people. Programming as a new craft/craftmanship. Going from hand-drawings to BIM and parametric design. We still not use these technologies to the full potential.	Transfer the knowledge into available contemporary technologies, theory and methods. Could be digital design tools as well as digital fabrication.
Future	Incorporating the different separate technologies through more developed interfaces. Full integration between man and machine. Homo Deus - Yuval Noah Harari?	Figure out how utilize the computer and digital tools to the fullest. Incorporating the different separate technologies or production techniques into an interface where a person can interact and be in control of the outcome. Two possible tracks: 1. Assisting of people in- such as work(such as fologram). Cheap technologies that everyone can use(democratic aspect). 2. Digital fabrication - Going from mass produced elements to a more unique process for each project within budget. Utilizing the material to the fullest(function), aesthetics	How to democratize digital tools and digital fabrication?

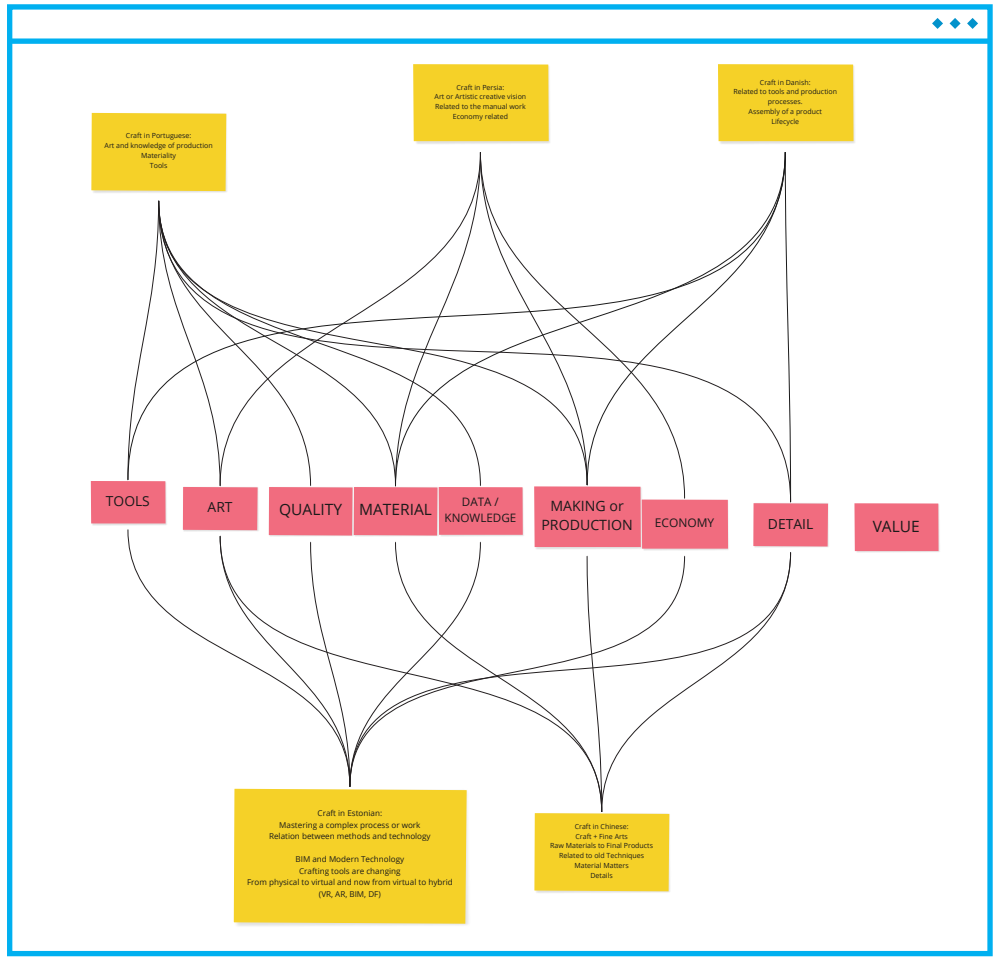
Fig[● 10] Outcomes of the Pre-task 3 group work – Group 3.

Group 3



Fig[● 11] Outcomes of the Pre-task 3 group work – Group 4.

Group 4



Day 4: Digital (Built) Environment

Initial input

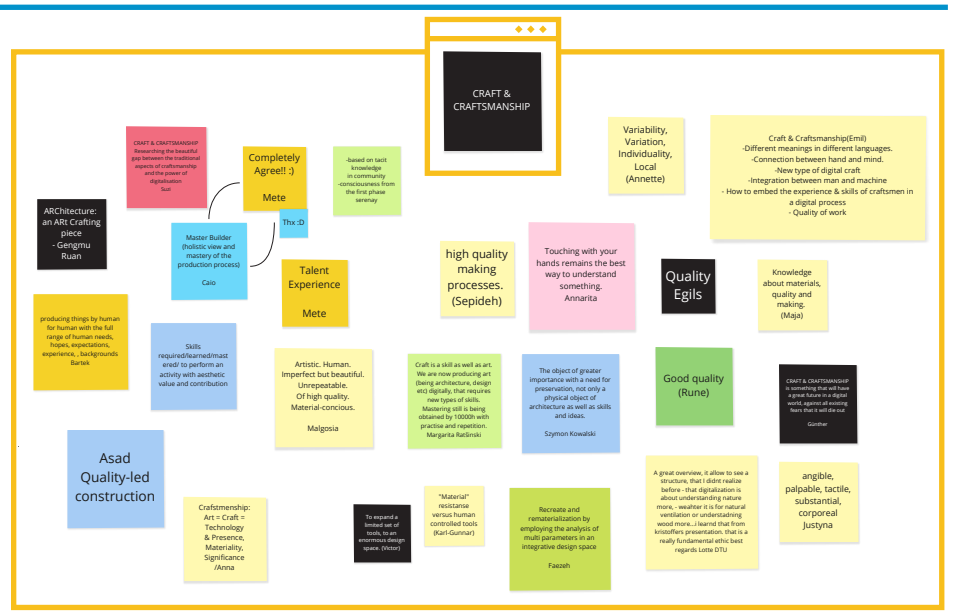
- Kristoffer Negendahl, Assoc. Prof., *Denmark University of Technology*
  Lecture title: ***Engineering architectural arguments – systematic and practical approaches for multivariate optimization***

Group work

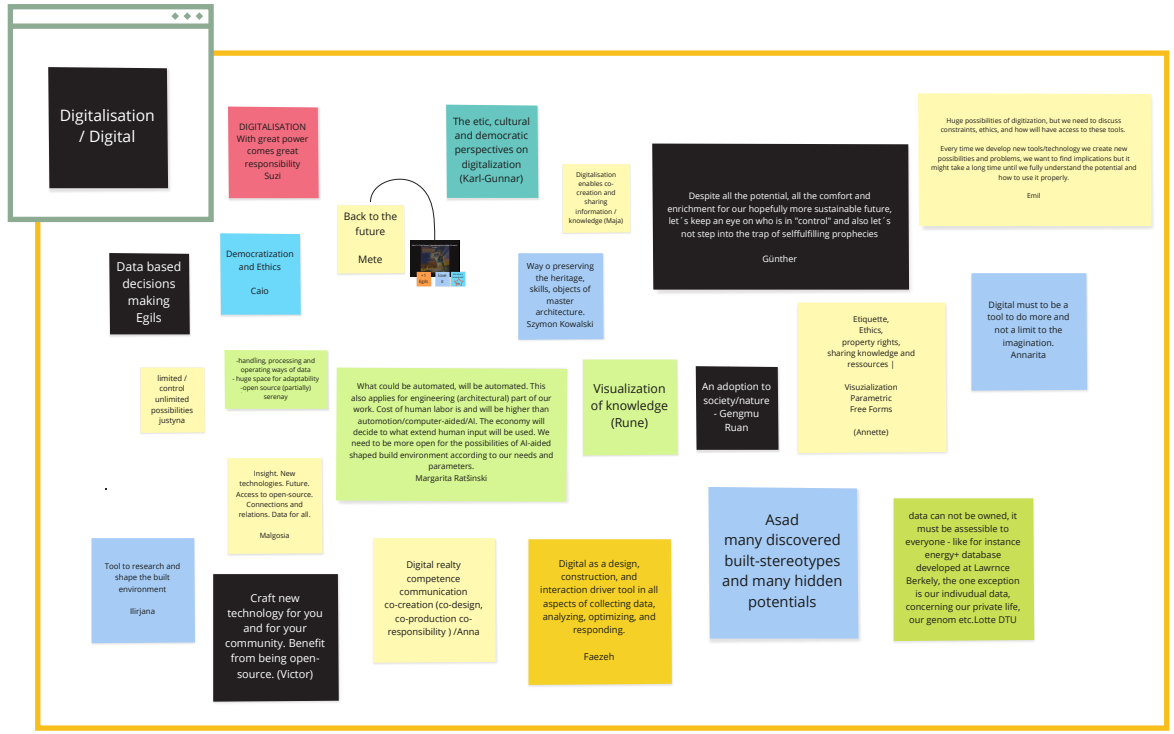
- Presentation Preparatory task 4 ***"Digital (Built) Environment"*** in supervised groups of four to seven people
- Group presentations (see Fig[●13–15])
- Final discussion and closing of the ISP1
  - Joint reflection on the ISP1
  - Observations and statements from the teaching staff
  - Question to participants: Findings for the future work?
  - Free space for a final word by the participants on the three main topics: "*Baukultur*," "*Craft and Craftsmanship*" and "*Digital(ization)*", Fig[●12]

Pre-task 4: Assignment

Think of and present case examples (1 or 2) where the "digital" had and will have impact on the processes of design, the making and society (not necessarily only in the context of the built environment, any context of interest is welcome). Present the ones which have impressed you the most (positively or negatively)!

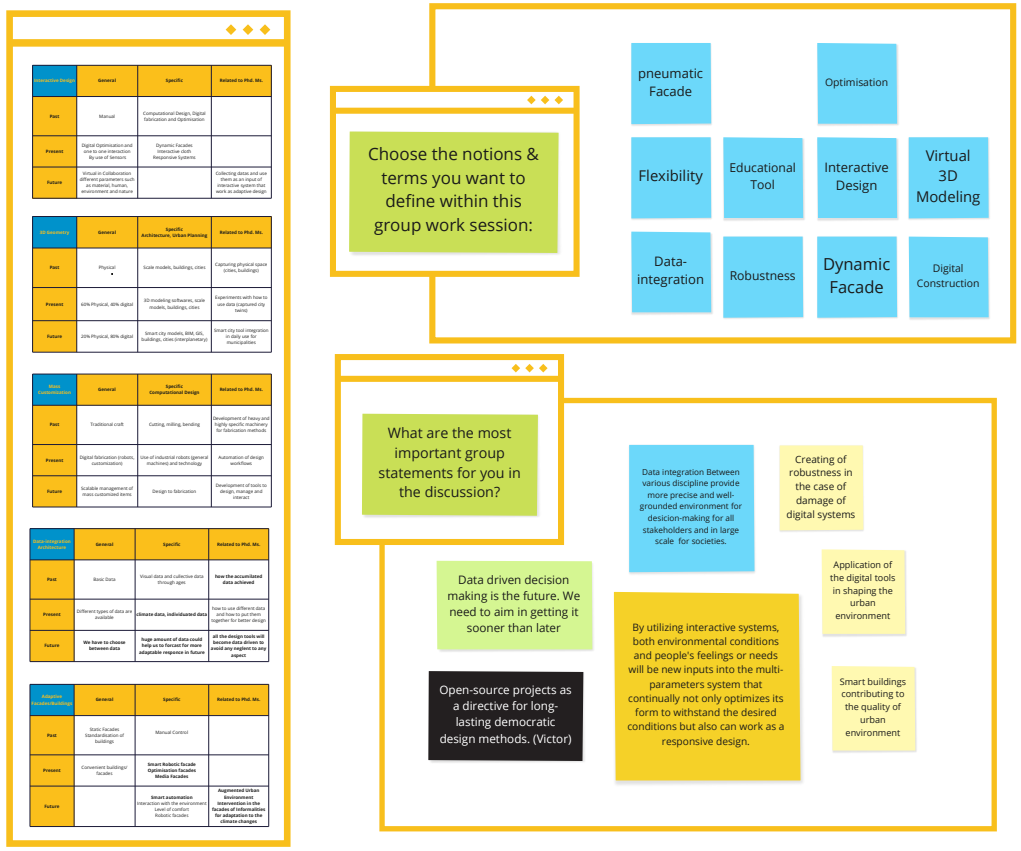


Fig[●12] Outcomes ISP1, Day 4,
Closing – Final words by the ISP participants.



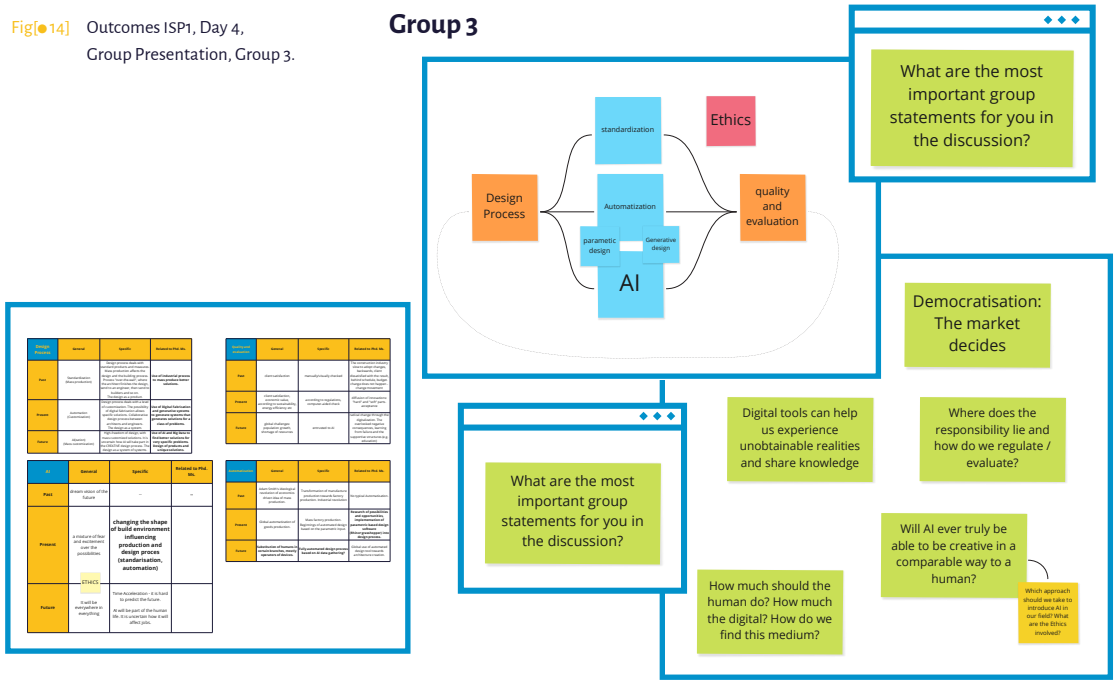
Fig[● 13] Outcomes ISP1, Day 4, Group Presentation, Group 1.

Group 1



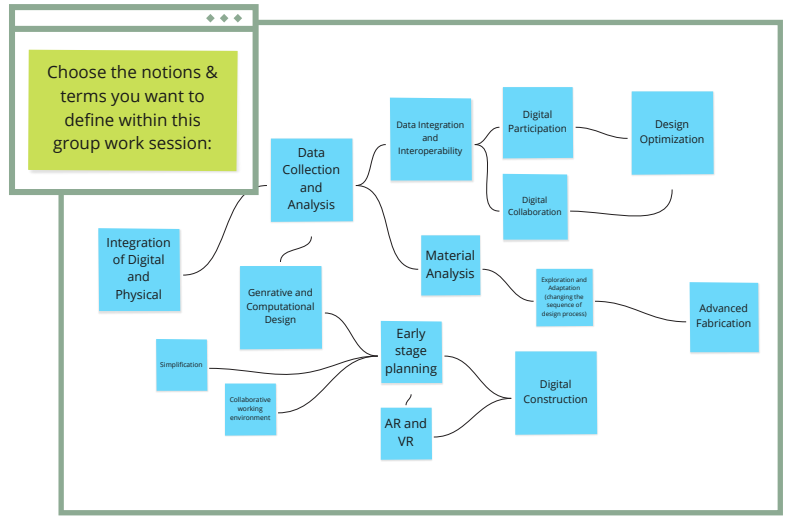
Fig[● 14] Outcomes ISP1, Day 4, Group Presentation, Group 3.

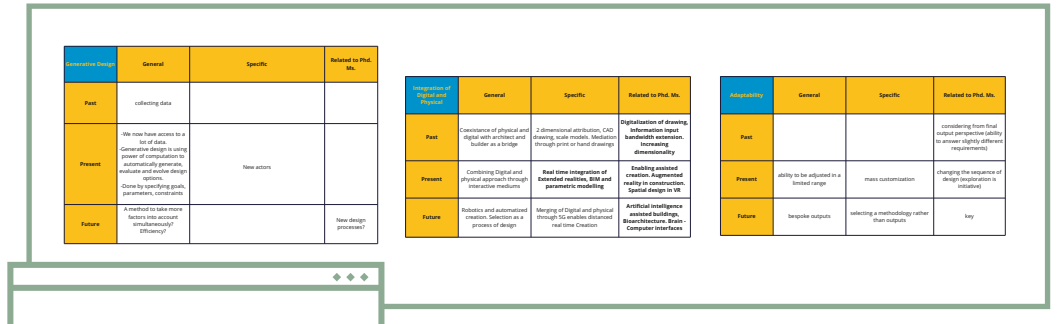
Group 3



Fig[● 15] Outcomes ISP1, Day 4, Group Presentation, Group 4.

Group 4

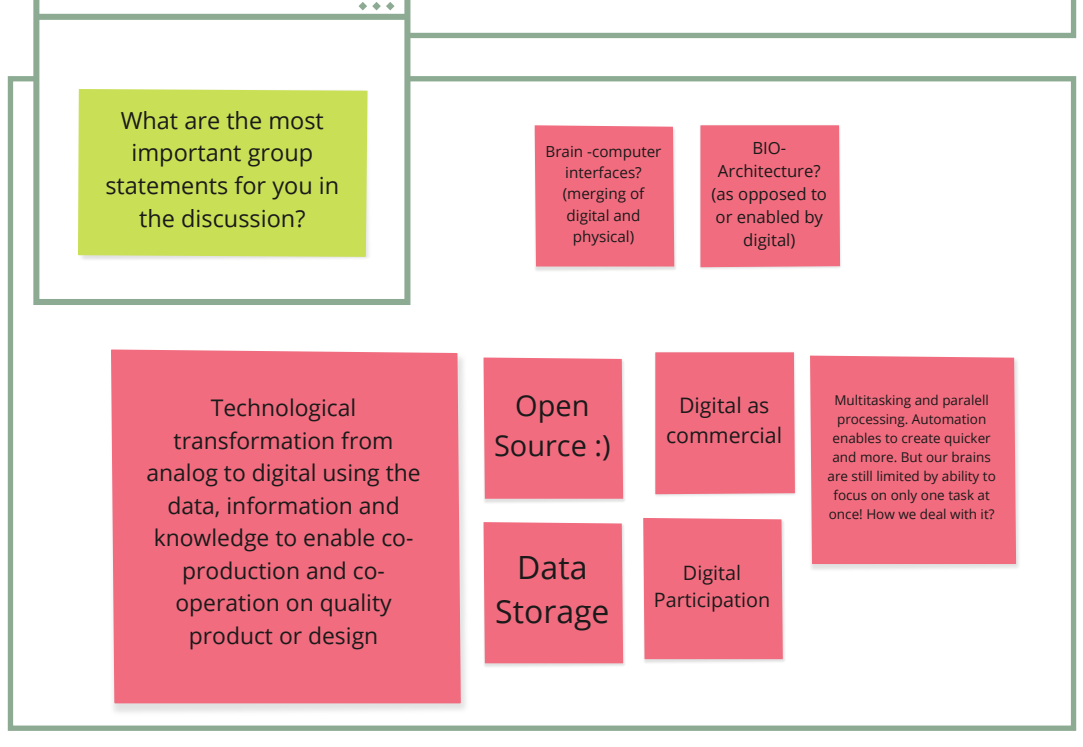




Generative Design	General	Specific	Related to Phd. Ms.
Past	collecting data		
Present	-We now have access to a lot of data. -Generative design is using power of computation to automatically generate, evaluate and evolve design options. -Done by specifying goals, parameters, constraints	New actors	
Future	A method to take more factors into account simultaneously? Efficiency?		New design processes?

Integration of Digital and Physical	General	Specific	Related to Phd. Ms.
Past	Coexistance of physical and digital with architect and builder as a bridge	2 dimensional attribution, CAD drawing, scale models. Mediation through print or hand drawings	**Digitalization of drawing, information input bandwidth extension. Increasing dimensionality**
Present	Combining Digital and physical approach through interactive mediums	**Real time integration of Extended realities, BIM and parametric modelling**	**Enabling assisted creation. Augmented reality in construction. Spatial design in VR**
Future	Robotics and automatized creation. Selection as a process of design	Merging of Digital and physical through 5G enables distanced real time Creation	**Artificial intelligence assisted buildings, Bioarchitecture. Brain - Computer interfaces**

Adaptability	General	Specific	Related to Phd. Ms.
Past			considering from final output perspective (ability to answer slightly different requirements)
Present	ability to be adjusted in a limited range	mass customization	changing the sequence of design (exploration is initiative)
Future	bespoke outputs	selecting a methodology rather than outputs	key



ISP2 Digital Futures

Thematic scope

ISP2 "Digital Futures" is the second of four consecutive training events that was organized between 2020 and 2021 within the thematic framework of the **BuildDigiCraft** project. In ISP2 participants are asked to reflect on the role of advanced digital technologies and the available digital tools on their research work as well as to think together of possible digital future projections of and for the built environment. The thematic focus is set on the following topics: digital urban futures and data-driven decisions, parametric and generative design, artificial intelligence, digital fabrication and digital material transformation. Structurally, the focus of each of the three middle days of the training is set on one of the three main Baukultur elements of the **BuildDigiCraft** project: Process, Knowledge, and Material. The ISP2 is rounded up with a reflection on the intrinsic relationship between humans and technology, as well as on the question of whether "*humans are exclusive carriers of moral and political values*" in a joint discussion with the invited speaker of the day (in this case, Lars Botin).

Leading discussion questions

- *What is Baukultur in the digital age?*
- *What is the essence of the digital revolution in respect to the shaping of the built environment?*
- *How do we design, build and maintain the built environment based on craftsmanship, data and algorithms?*

In addition, further skill training in parametric design is offered in three afternoon sessions. Participants of the ISP2 could optionally join **a workshop on "*Parametric design with Rhino/Grasshopper*" and "*Parametric Structural Design with Karamba3D.*"** (for full description of the workshops see [Chapter 4.0 | "Catalog of Video Lectures"])

Fig[●16] Full program ISP2 "Digital Futures."

TOPIC (DAY)	15.02.2021 Monday — Day 1: Introduction	16.02.2021 Tuesday — Day 2: Process	17.02.2021 Wednesday — Day 3: Material	18.02.2021 Thursday — Day 4: Knowledge	19.02.2021 Friday — Day 5: Roundup
9:00—9:15	KEYNOTE **Mette Ramsgaard Thomsen** Centre for IT and Architecture Research Group (CITA) *Assoc. Prof., Royal Danish Academy*	KEYNOTE **Mark Burry, AO** Founder of Swinburne University of Technology's Smart Cities Research Institute *former Prof. of Urban Futures, University of Melbourne*	KEYNOTE 1 **Vicki Thake** Material and Spatial Design ... *Assoc. Prof., Royal Danish Academy*	KEYNOTE **Helle Rootzen** Professor in Learning Technology and Digitalization Learnlf DTU - Center for Digital Learning Technology. *CEO Andhero*	KEYNOTE **Lars Botin** Values and social responsibility in technology development *Assoc. Prof., Aalborg University.*
9:15—9:30	*Coffee Break (15 min)*	*Coffee Break (15 min)*	*Coffee Break (15 min)*	*Coffee Break (15 min)*	*Coffee Break (15 min)*
9:30—9:45	OFFICIAL WELCOMING	GROUP WORK 1 *(Pre-Task 2)*	KEYNOTE 2: **Anton Kuzyk** Professor in DNA Nanotechnology – Department of Neuroscience and Biomedical Engineering *Aalto University*	GROUP WORK 1+ PANEL DISCUSSION KEYNOTE SPEAKER *(Pre-Task 4)*	INPUT TALK **Vincent Kuo,** *VKT Research*
9:45—10:00	GROUP WORK 1 *(Pre-Task 1)*		*Break (15 min)*		GROUP WORK 1 *(Pre-Task 5)*
10:00—10:15	*Break (15 min)*	*Break (15 min)*	GROUP WORK 1 + 2 *(Pre-Task 3)*	*Break (15 min)*	*Break (15 min)*
10:15—10:30	GROUP WORK 2	GROUP WORK 2		GROUP WORK 2	GROUP WORK 2 + PANEL DISCUSSION WITH LARS BOTIN
10:30—10:45					
10:45—11:00				*Break (90 min)*	OFFICIAL CLOSING
11:00—11:15		*Break (120 min)*	*Break (120 min)*		
11:15—11:30		OPTIONAL WORKSHOP PARAMETRIC DESIGN WITH RHINO/GRASSHOPPER Part 1 *Kacper Radziszewski* 15:30—18:00	OPTIONAL WORKSHOP PARAMETRIC DESIGN WITH RHINO/GRASSHOPPER Part 2 *Kacper Radziszewski* 15:30—17:30	OPTIONAL WORKSHOP PARAMETRIC STRUCTURAL DESIGN WITH KARAMBA3D *Clemens Preisinger* 15:00—17:00	
11:30—11:45					
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General rules of the group work during ISP2

- Every day new composition of the working groups
- Please choose one speaker every day for each working group
- Present to each other the preparatory tasks
- Compare your individual outcomes with the input in the morning (input lecture)
- Collect your vision(s) for the topic of the day (input for the **BuildDigiCraft** Manifesto)
- Add your contribution to the Glossary

Day 1: Introduction

Initial input

- Prof. Mette Ramsgaard Thomsen,
  Centre for IT and Architecture Research Group (CITA)
  Lecture Title: ***Digital Craft in a Bio-based Material Paradigm***
- Welcome and introduction to the project and the teaching program
- Updated presentation **"Glossary introduction (Glossary Matrix)"** – instructions for further use during the ISP2 (see Intellectual Output [Chapter 2.2 | IO1 "Glossary"]

Group work

- Presentation Preparatory task 1 ***"Personal presentation and relevance to the BuildDigiCraft project including five keywords"*** in supervised groups of four to five (same Task as in ISP1, Day 1)

  Mapping guidelines for the group work during Day 1 (ISP2):

  1. Present to each other your Preparatory task 1
  2. Get to know your group better
  3. New joint group work task assignment:
     Map [y]our digital tools
     - What are the digital tools that you are using in your project/for your work?
     - Make a collection and cluster them so that you can present them to the rest of the audience in the next session.

     Think also of the following issues while clustering:
     Why and what do you use them for?
     What are the challenges in using them?
     What do we gain/lose by applying them: pros and cons

- Group presentations and joint discussion in the larger round

Day 2: Process

Initial input

- Prof. Marc Burry, AO, *Founder of Swinburne University of technology's Smart Cities Research Institute*
  Lecture Title: ***Urban futures and designing the digitalized city: from parametric design to parametric urbanism***

Group work

- Presentation Preparatory task 2 ***"Digital Process Modeling"*** in supervised groups of four to five

Pre-task 2: Assignment

Identify a question related to your (PhD) project that you would like to find the answer to/a solution for by applying a conceptual digital workflow or process model. Try to make a preliminary outline of such an imaginary workflow/process. Think digitally and visually, sketch your thoughts. The selected question does not necessarily have to be the main research question of your (PhD) project – it can also be a sub-question related to a specific issue of interest.

This pre-task will be the basis for the group work during the training session.

Mapping guidelines for the group work during Day 2 (ISP2):

1. Present to each other your Preparatory task 2 on Digital Process Modeling
2. Glossary task: according to step-by-step instructions in the Glossary presentation (see Intellectual Output 1)
3. New joint group work task assignment: Digital Process Modeling
   Find a way to map your imaginary workflows by relating them to the:
   a) Glossary Matrix
   b) Digital tools you gathered on Day 1
4. Identify the new and important questions/processes that we need for our future work as professionals responsible for the built environment

- Group presentations and joint discussion in the larger round (for results see [Chapter 2.2 | IO1 "Glossary"] and [Chapter 2.3 | IO2 "Process"])

Day 3: Material

Initial input

- Vicky Thake, PhD, Assistant Prof., *Royal Danish Academy*
  Lecture Title: ***Fiber-reinforced Polymer Composites in an Architectural Context***
- Anton Kuzyk, Assoc. Prof., *Aalto University*, Department of Neuroscience and Biomedical Engineering
  Lecture title: ***DNA-based nanoscale architectures***

Group work

- Presentation Preparatory task 3 ***"Living vs. Non-living Material"*** in supervised groups of four to five

Pre-task 3: Assignment

1. What is the material/materiality in the context of your (PhD) project?
   How do you approach/interpret it through the digital? Can you influence the material/materiality in your project by applying digital processes?
2. Look at the "living world" for further inspiration(s).
   Look for good examples of material/materiality in the living world, which potentially could be transferred back to the context of your own PhD/project, especially in terms of design and construction.
   - *What kind of new materiality can we create in the future?*
   - *What is the role of responsive materials/responsiveness for the future built environment?*
   - *How can we apply the concept of self-organization/self-organizing processes, inspired by the living world in our professional future?*

Mapping guidelines for the group work during Day 3 (ISP2):

1. Present to each other your Preparatory task "*Material: living vs. non-living*."
2. Group work: summarize the variety of material/materiality within your projects in order to present it in the next session to the other groups.
3. Contribution to the Glossary: focus on the concepts of *Material*, *Materiality*, and *Digital Material*.
4. The group speakers present the outcomes of the group work task to the audience.

- Group presentations and joint discussion in the larger round (for results see [Chapter 2.2 | IO1 "Glossary"] and [Chapter 2.5 | IO4 "Material"])

Day 4: Knowledge

Initial input

- Helle Rootzen, *LearnT DTU – Center for Digital Learning Tech*, CEO of andhero
  Lecture Title: ***Big or small data for big and small problems?***

Group work

- Presentation Preparatory task 4 ***"Knowledge Transfer and Data Analysis"*** in supervised groups of four to five

Pre-task 4: Assignment

The task assignment is related to the keynote lecture of the day: Big or small data for big and small problems? (Helle Rootzen, andhero)

1. Think on a situation where you were aware of how data analysis made a project better. Why was it better? Please look at different sources like papers, books, and the Internet to find a good example.
2. In the context of your own projects: what is the data you use? How do you identify and acquire this data? How do you use it? How do you (plan to) interpret/evaluate it?
3. During Helle Rootzen's keynote lecture, keep in mind the following question:
   How can you see that the principles and ideas that Helle talks about can be used in your own project and what would be the benefits?

Mapping guidelines for the group work during Day 4 (ISP2):

1. Present to each other your Preparatory task "*Knowledge Transfer and Data Analysis.*"
2. Group work: collect and categorize together as a group the advantages and disadvantages identified by your examples on how data analysis made a project better.
3. Contribution to the Glossary: focus on the concepts of *Knowledge*, *Data*, and *Data Analysis*.
4. The group speakers present the outcomes of the group work task to the audience.

- Group presentations and joint discussion in the larger round (for results see [Chapter 2.2 | IO1 "Glossary"] and [Chapter 2.5 | IO4 "Material"])

Day 5: Roundup – Social Context

Initial input

- Lars Botin, Assoc. Prof., *Aalborg University*
  Lecture Title: ***Do Digits Have Morality?***
- Vincent Kuo, *CEO VXT Research*
  Lecture Title: ***"Baukultur"– actionable insights with natural language processing*** (input for the development of IO1 Glossary)

Group work

- Discussion and work in breakout sessions
  Mapping guidelines for the group work during Day 5 (ISP2):

  1. Present to each other your Preparatory task 5 ***"Individual SWOT Analysis."***
  2. Group work: try to sum up as a group the outcomes of your individual presentations and the group discussion. Discussion topic: intrinsic relationship between human–technology–physical world (built environment) Provocative question: ***Are humans the exclusive carriers of moral, political, and ethical values?***
  3. Contribution to the Glossary: focus on the concepts of *Values* and *Ethics* in relation to the built environment and your research specifically.
  4. The group speakers present the outcomes of the group work task to the audience.

- Group presentations and joint discussion in the larger round (for results see Intellectual Outputs [Chapter 2.2 | IO1 "Glossary"], [Chapter 2.3 | IO2 "Proess"], and [Chapter 2.4 | IO3 "Knowledge"])

Task V: Individual SWOT-Analysis

Perform an individual SWOT-Analysis of your thesis project seen from the perspective of the prior four training days of the ISP2. Sum up what you have learned during the ISP2.

Take in consideration the aspects of ethics and morality within the „digital world" of your own project/thesis. Present the outcome of the reflection in statements:

E.g., "Engineers will not be able to evaluate the output of the software I am using for data processing in my PhD."
"The data I need is currently not available as open source. If we make it open source, then _____ problem/solution/opportunity/threat."

ISP3 Craft and craftsmanship

Thematic scope

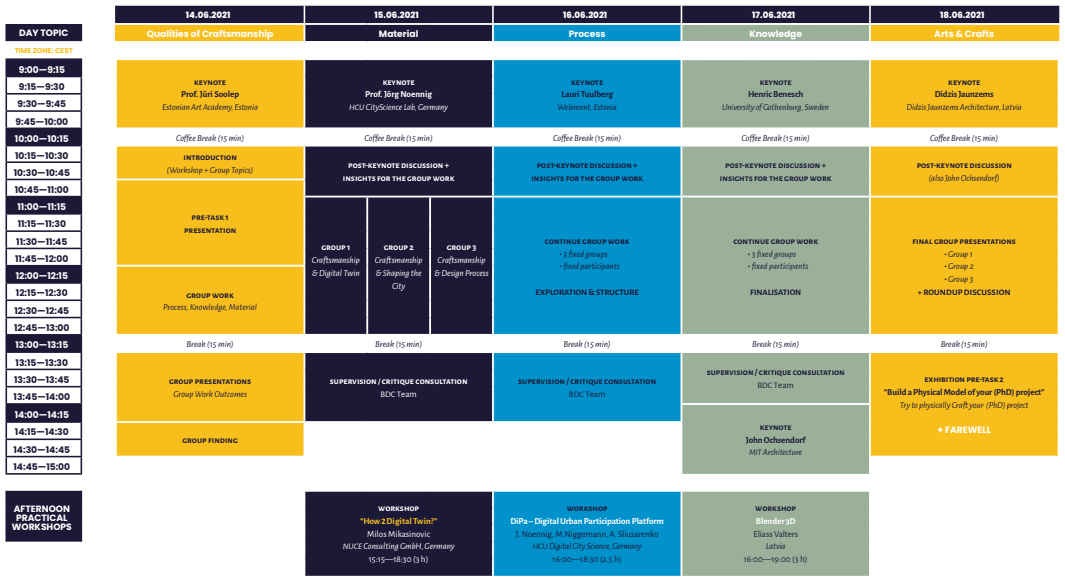
ISP3 "Craft and Craftsmanship" is the third of four consecutive training events organized between 2020 and 2021 within the thematic framework of the **BuildDigiCraft** project. This ISP is dedicated to the exploration of the role of craft and craftsmanship in the current and future professional digital practice of the experts of the built environment such as designers, structural and environmental engineers and urban planners. Input on a wide range of topics in relation to the concept of craftsmanship in the digital age is introduced throughout the training, covering topics from digital disruption and the digital twin, through construction value chains and masonry mechanics, to the right to design, the link to heritage, and the fine fusion of art and crafts. Structurally, the focus of each of the three middle days of the training is based on one of the three main Baukultur elements of the **BuildDigiCraft** project: Process, Knowledge, and Material. Within these, ISP group work is fixed and focused on three pre-selected areas of exploration where craftsmanship interacts with the digital twin, the processes behind shaping the city and the design process. The ISP3 is rounded up with the final project presentations of the three working groups as well as with a presentation of participants' attempt to "physically craft their own PhD."

Leading discussion questions

- *What is Baukultur in the digital age?*
- *How do we design, build and maintain the built environment based on craftsmanship, data and algorithms?*
- *What are the qualities of craftsmanship, what is the essence of craft and craft-based production that we would like to transfer to the future digital shaping of the built environment?*

In the afternoon, additional training through practical workshops is offered to gain knowledge and skills in the three topics of the group work: **digital twin**, **digital urban participation platforms**, and **design process via 3D modeling with "3D Blender."**

Fig[●17] Full program ISP3 "Craft and Craftsmanship."



Day 1: Introduction

Initial input

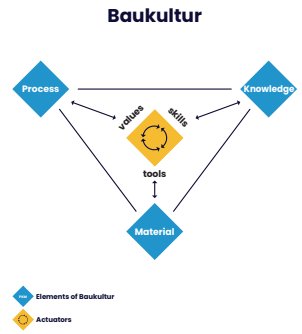
- Prof. Jüri Soolep, *Estonian Academy of Arts*
  Lecture Title: ***Digital Disturbing Delight***
- Welcoming and introduction to the project and the teaching program. Presentation of the three fixed topics for group work: "*Craftsmanship and the digital twin*," "*Craftsmanship and shaping the city*" and "*Craftsmanship and design process*"
- Brief input on craft and craftsmanship: values, principles and qualities, Prof. Annette Bögle, HafenCity University Hamburg

Group work

- Presentation Preparatory task 1
  "Process–Knowledge–Material–Reflection" in supervised randomly selected groups of four to five

Pre-task 1: Assignment

Reflect on your individual project (PhD project/Master's thesis/project of personal interest) in respect to the **BuildDigiCraft** graph model (Fig[●18]).
Analyze and reflect on your individual project by answering the following questions:



Fig[●18] **BuildDigiCraft** graph model.

1. What is the Process, what is the Material and what is the Knowledge that you are addressing and using in your (PhD) project, and what is the Process, Knowledge, and Material that you would like to derive from it?
2. How do you see the relation between the Process, Knowledge, and Material in the context of your work?
3. What are the values you are following/addressing in your project?
4. Which skills are you applying and which are the new skills that you are developing within your project?
5. What tools do you use and plan to use?
6. Try to define the term Baukultur in your own words and in respect to your individual project.

Submission format: prepare a five-minute slide presentation (no specific layout requirements. Please add an initial slide to shortly present yourself: professional experience, background, interests, and expectations.

Mapping guidelines for the group work during Day 1 (ISP3):
As a group try to derive the "*Qualities of Craftsmanship*" within the context of the "*Process–Knowledge–Material*" graph.
For the "*Qualities of Craftsmanship*" use the input below:

Qualities of Craftsmanship:
Some keywords
... Identity
... Quality
... Material
... Tool
... Profession
... Art
... Skills
... Talent
... Experience
...

Values of Craftsmanship

... pride in achieving a level of mastery and highest quality

... skill level developed through implicit and tacit knowledge

... passed on within the craftsman community

... deeply sustainable

Values of Digital Craftsmanship

... **Re-interpretation** of the relationship between the work of the mind and the work of the hand

... new-age **digital craftsman** works within the continuously changing environment of the rapidly developing tools and new materiality

... Challenges are **multi-dimensional** and encompassing, relating huge number of inter-related values and relationships

... **Digital tools** offer an unseen level of handling of complexity

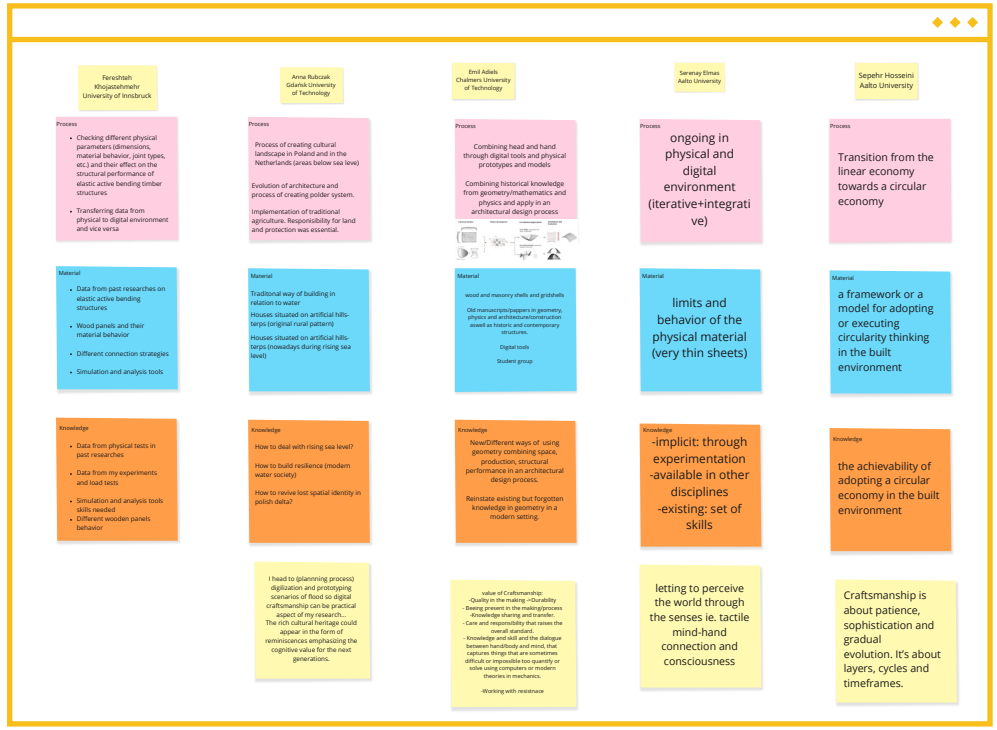
- Group findings for the three fixed topics:
  - Craftsmanship and the digital twin
  - Craftsmanship and shaping the city
  - Craftsmanship and design process
- Group-based supervision and feedback session offered by the expert team of the **BuildDigiCraft** project

Fig[● 19] Outcomes of the group work during Day 1, ISP3 – Group 1.

Group 1

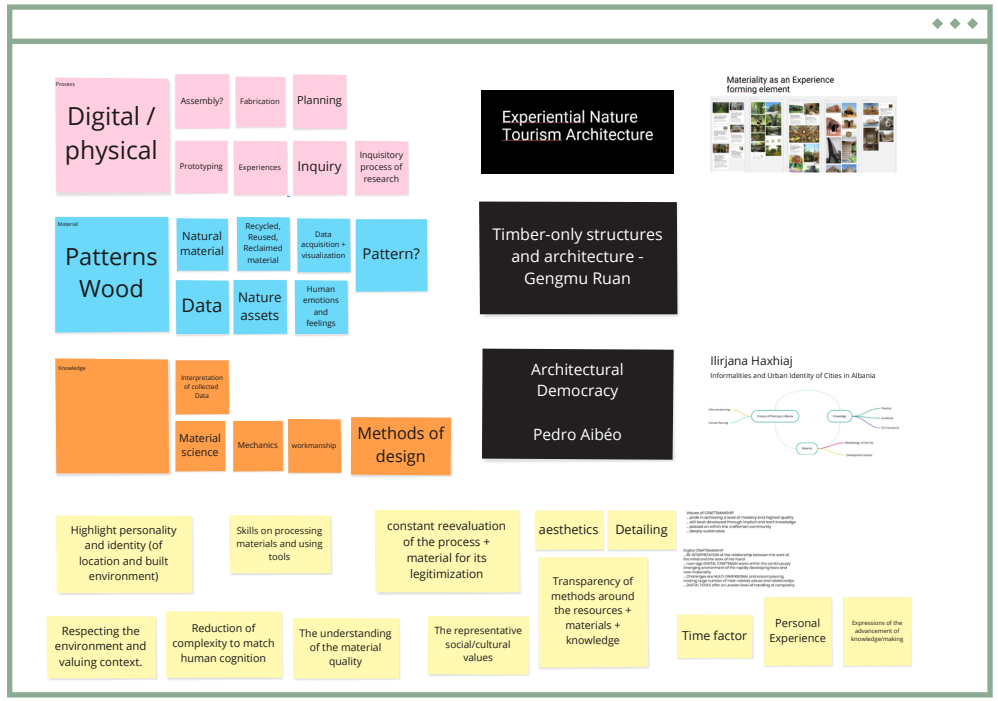
Fig[● 20] Outcomes of the group work during Day 1, ISP3 – Group 2.

Group 2



Fig[● 21] Outcomes of the group work during Day 1, ISP3 – Group 3.

Group 3



Day 2: Material

Initial input

- Prof. Jörg Noennig, *HafenCity University Hamburg*
  Lecture Title: ***Digital City Twins: Urban Analysis and Anticipation***

Joint discussion and group work

- Joint post-keynote discussion in the larger round (participants and **BuildDigiCraft** team)
- Unsupervised project-based group work (three topics)

Project assignment for the group work

1. Which qualities of craftsmanship can be transferred to your group project topic (digital twin, shaping the city, design process), and why are they important?
2. [and vice versa] What part of your (PhD) projects can be related to the qualities of craftsmanship and to the group project assignment?
3. As a group find a way to address the topic in a digital format or even in an analog/a physical manner despite the digital format of the event. Make a group project out of it. Use the facilities you have at hand, use them as a joint group resource (i.e., 3D printing, paper model, video of the surrounding physical environment, city exploratory walks, etc.).
4. Address the Process, Knowledge, and Material in your group project.
5. As a group find a way to present your group project to all workshop participants – presentation on Friday.
6. Create your own project glossary (no specific format restrictions or requirements).
7. Create a Group READER – collect relevant literature references.

- Group-based supervision and feedback session offered by the expert team of the **BuildDigiCraft** project

Day 3: Process

Initial input

- Lauri Tuulberg, *CEO Welement*, Estonia
  Lecture Title: ***Prefabricated Craftsmanship***

Joint discussion and group work

- Joint post-keynote discussion in the larger round (participants and **BuildDigiCraft** team)
- Unsupervised group work (three breakout rooms)
- Group-based supervision and feedback session offered by the expert team of the **BuildDigiCraft** project

Day 4: Knowledge

Initial input

- Henric Benesh, *University of Gothenburg*, Sweden
  Lecture Title: ***On situated knowing, digitalization and two burning buildings***
- Prof. John Ochsendorf, *MIT Architecture*
  Lecture Title: ***Building from History for a Low-Carbon Future***

Joint discussion and group work

- Joint post-keynote discussion in the larger round (participants and **BuildDigiCraft** team)
- Unsupervised group work (three breakout rooms)
- Group-based supervision and feedback session offered by the expert team of the **BuildDigiCraft** project

Day 5: Art and Crafts

Initial input

- Didzis Jaunzems, *Didzis Jaunzems Architecture*, Latvia
  Lecture title: ***Symbiosis of the past and the future***
- Group presentations and joint discussion

Group presentations and joint discussion

- Joint post-keynote discussion in the larger round (participants and **BuildDigiCraft** team)
- Final group presentations
  - Craftsmanship and the digital twin
  - Craftsmanship and shaping the city (Fig[● 22])
  - Craftsmanship and design process (Fig[● 23])
- Critical joint discussion round
- Closing exhibition based on the Preparatory task 2
  "Craft your (PhD) project"

Pre-task 2: Assignment

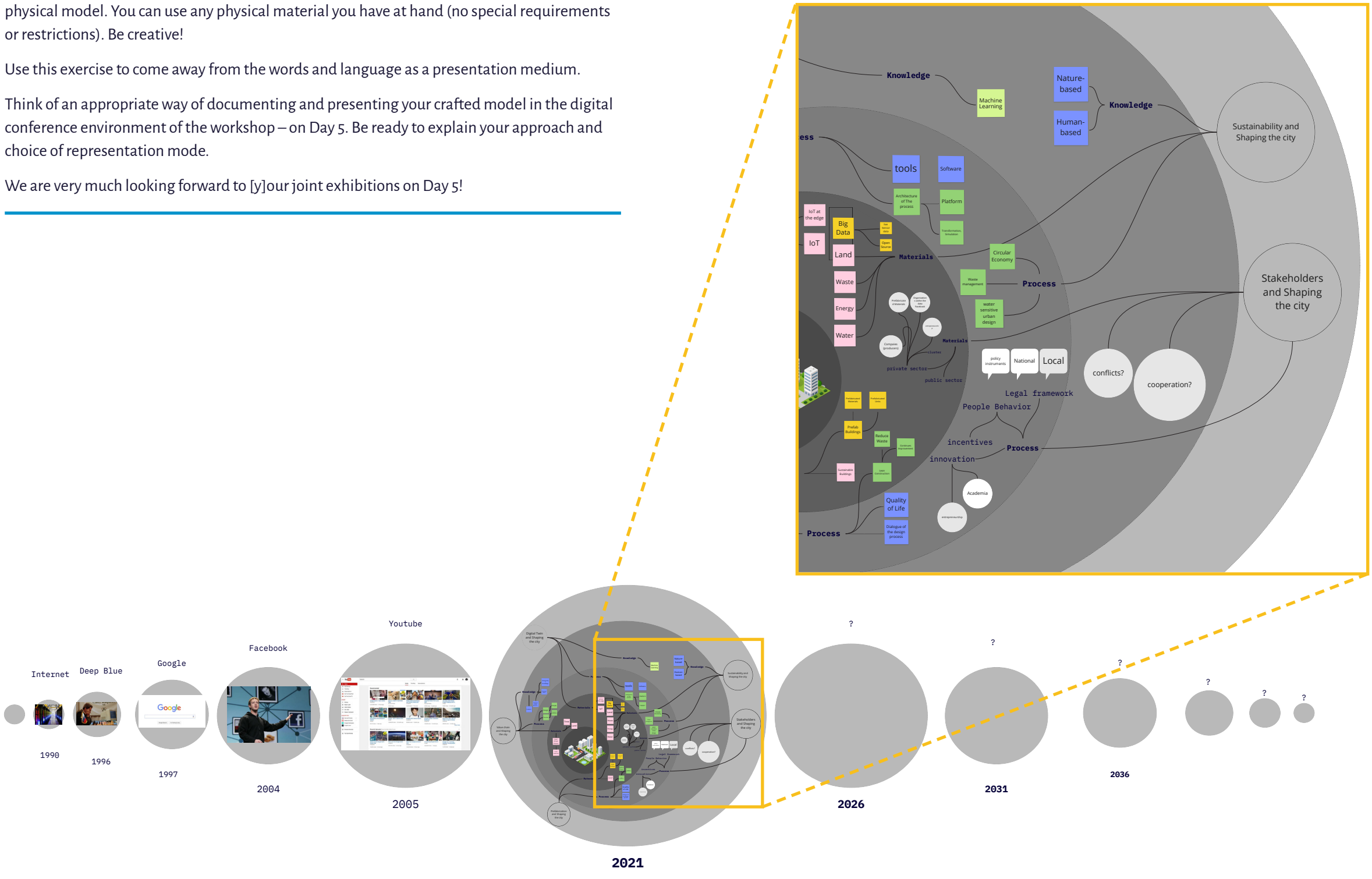
Build a physical model of your (PhD) project. Try to approach your research question(s)/ your research topic unconventionally by representing them in a two- or three-dimensional physical model. You can use any physical material you have at hand (no special requirements or restrictions). Be creative!

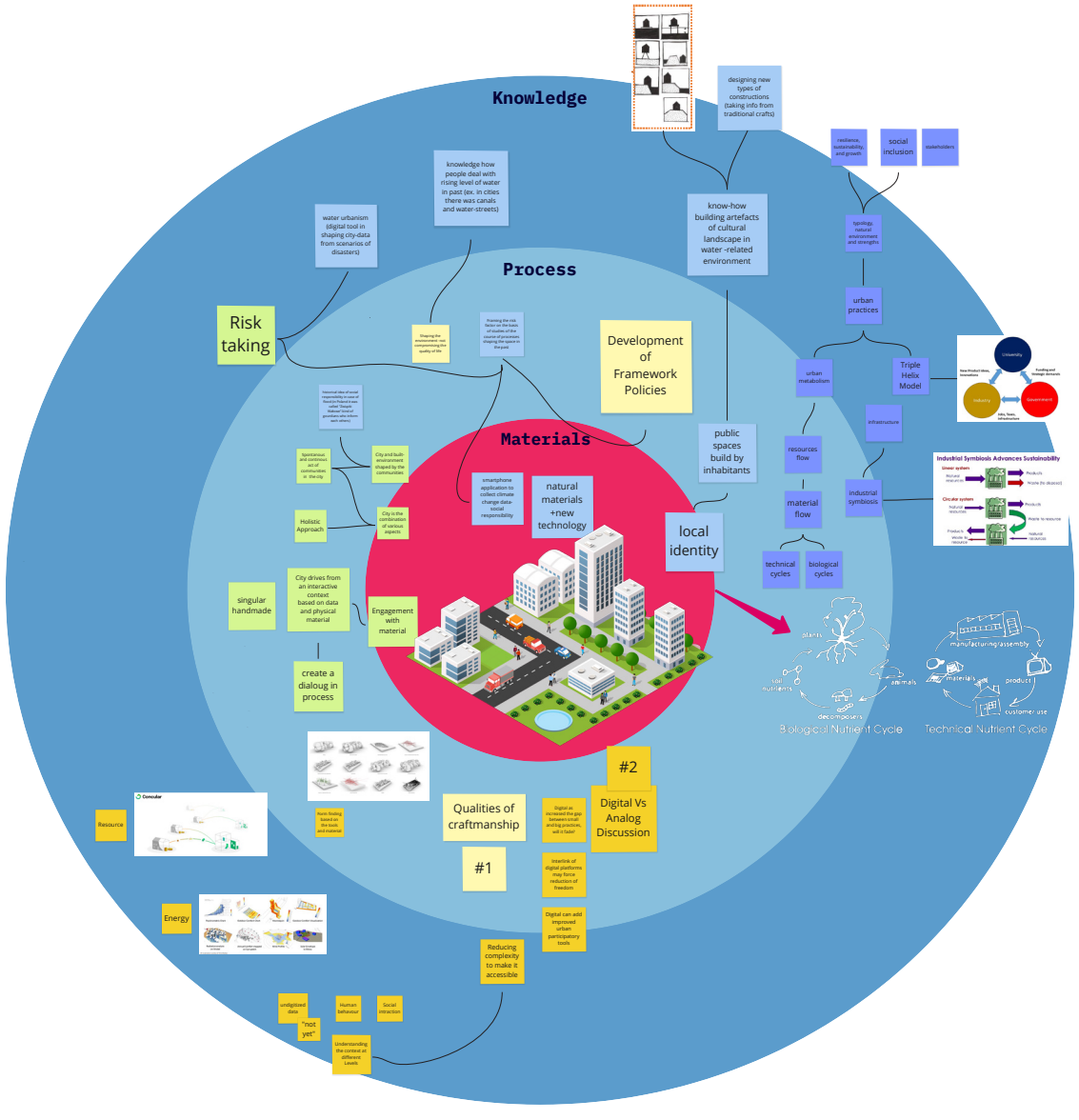
Use this exercise to come away from the words and language as a presentation medium.

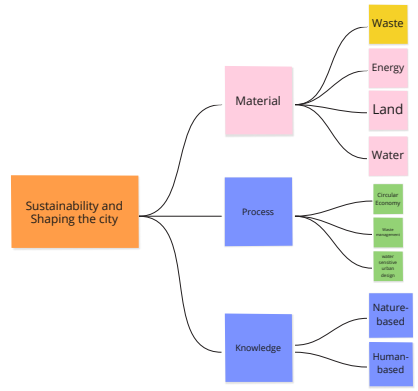
Think of an appropriate way of documenting and presenting your crafted model in the digital conference environment of the workshop – on Day 5. Be ready to explain your approach and choice of representation mode.

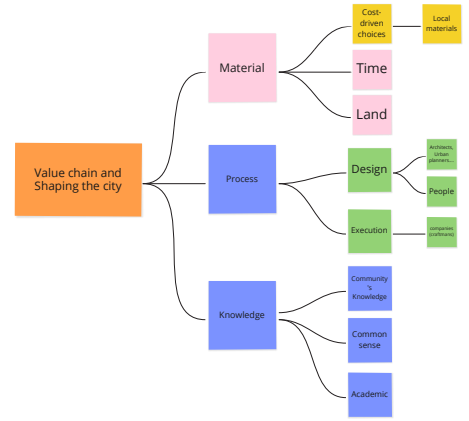
We are very much looking forward to [y]our joint exhibitions on Day 5!

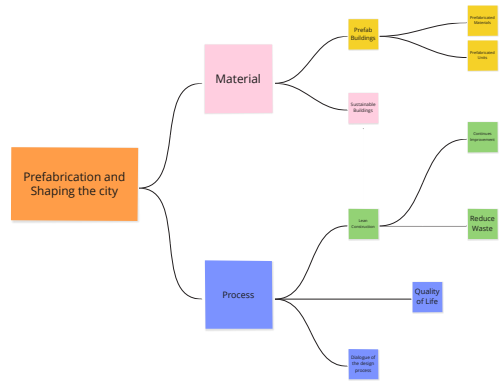
Fig[● 22] Final presentation of the "Shaping the City" Group. "Isometric City" Picture credits: Vecteezy.com

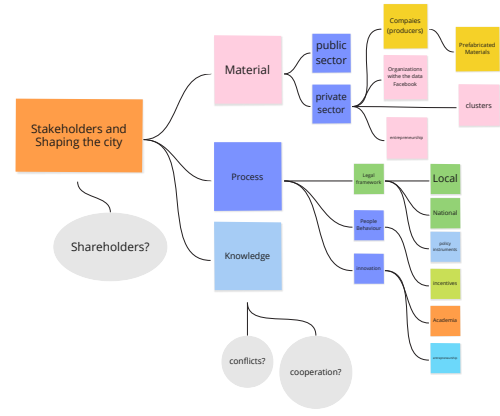


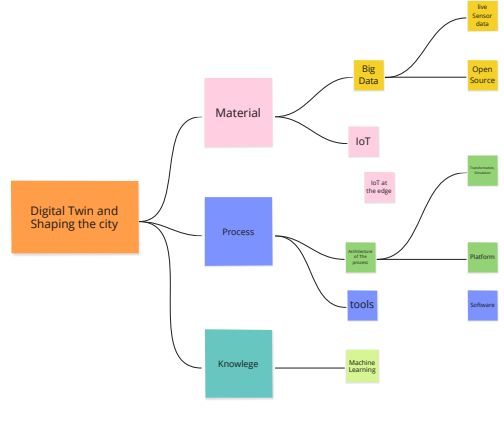

Knowledge
Process
Materials
Risk taking
Development of Framework Policies
local identity
public spaces build by inhabitants
designing new types of constructions (taking info from traditional crafts)
know-how building artefacts of cultural landscape in water -related environment
knowledge how people deal with rising level of water in past (ex. in cities there was canals and water-streets)
water urbanism (digital tool in shaping city-data from scenarios of disasters)
resilience, sustainability, and growth
social inclusion
stakeholders
typology, natural environment and strengths
urban practices
urban metabolism
Triple Helix Model
infrastructure
resources flow
material flow
industrial symbiosis
technical cycles
biological cycles
Industrial Symbiosis Advances Sustainability
smartphone application to collect climate change data-social responsibility
natural materials +new technology
City and built-environment shaped by the communities
City is the combination of various aspects
Holistic Approach
singular handmade
City drives from an interactive context based on data and physical material
Engagement with material
create a dialoug in process
Biological Nutrient Cycle
Technical Nutrient Cycle
plants
soil nutrients
animals
decomposers
manufacturing/assembly
materials
product
customer use
#2
Digital Vs Analog Discussion
Qualities of craftmanship
#1
Resource
Energy
Reducing complexity to make it accessible
undigitised data
"not yet"
Human behaviour
Social interaction
Understanding the context at different Levels

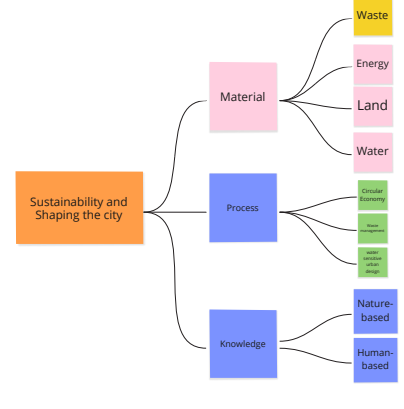

Sustainability and Shaping the city
Material
Waste
Energy
Land
Water
Process
Circular Economy
Knowledge
Nature-based
Human-based


Value chain and Shaping the city
Material
Cost-driven choices
Local materials
Time
Land
Process
Design
Execution
Knowledge
Community 's Knowledge
Common sense
Academic


Prefabrication and Shaping the city
Material
Prefab Buildings
Process
Reduce Waste
Quality of Life

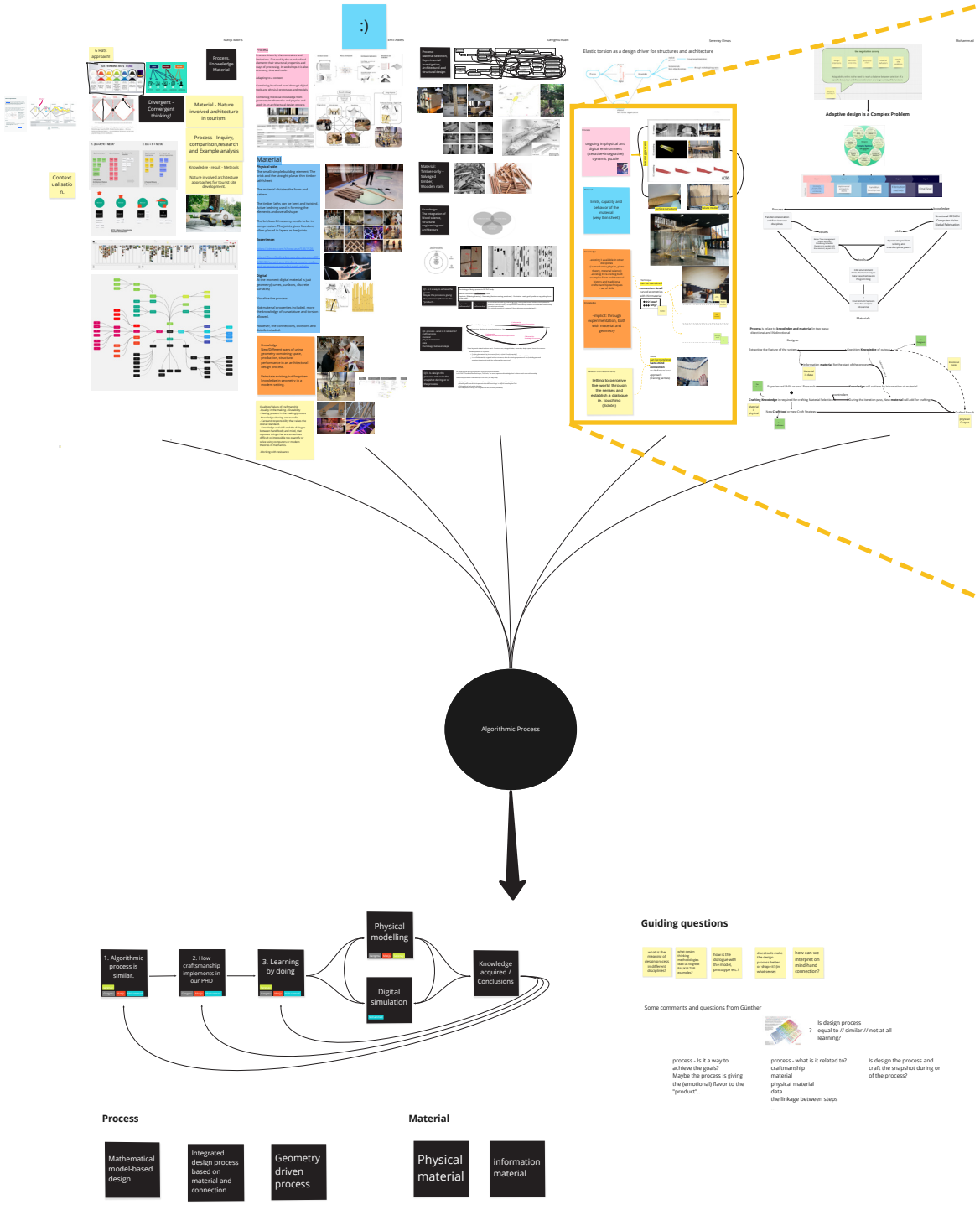

Stakeholders and Shaping the city
Shareholders?
Material
public sector
private sector
Compaies (producers)
Prefabricated Materials
clusters
Process
Knowledge
Local
National
Academia
conflicts?
cooperation?

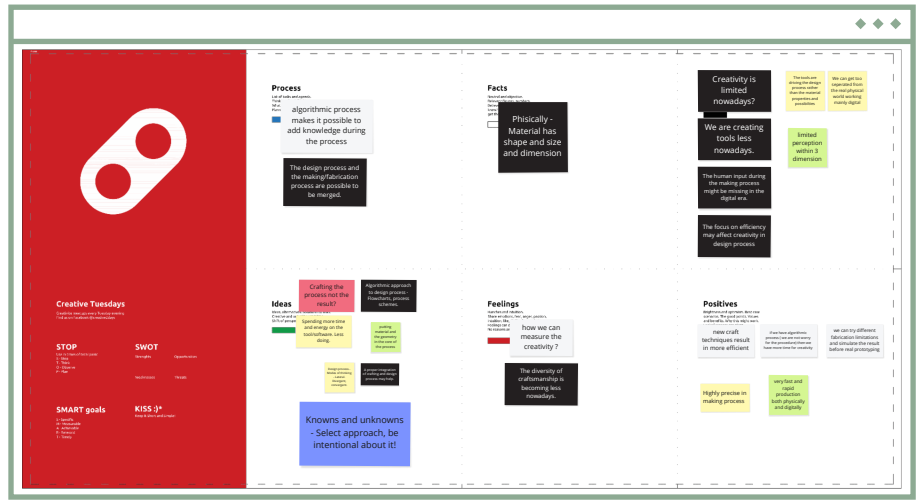

Digital Twin and Shaping the city
Material
Big Data
Eve Sensor data
Open Source
IoT
Process
IoT at the edge
tools
Platform
Software
Knowlege
Machine Learning

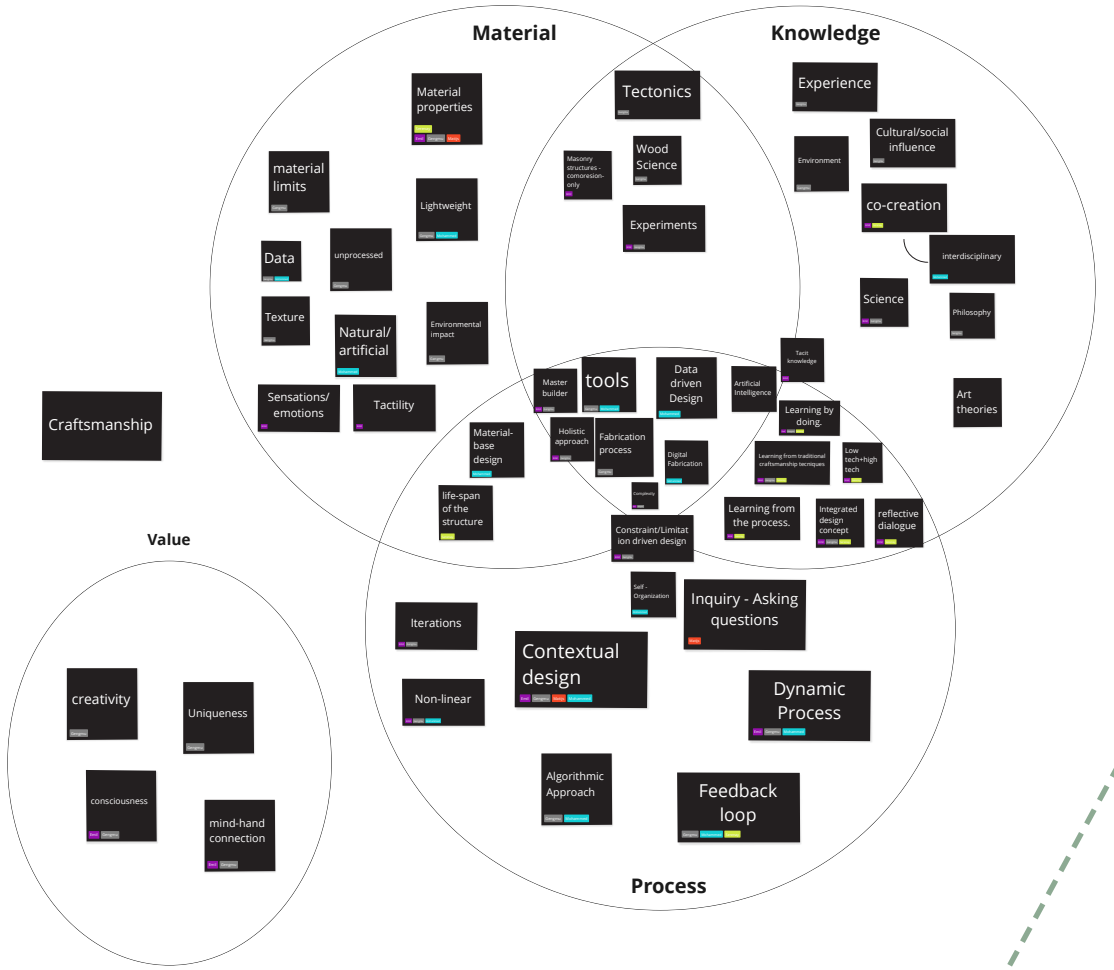

Sustainability and Shaping the city
Material
Waste
Energy
Land
Water
Process
Knowledge
Nature-based
Human-based

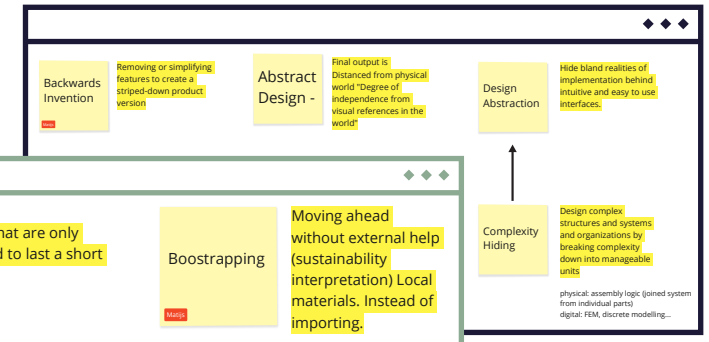
Fig[● 23] Final presentation of the "Design Process" Group. *(Some images removed due to copyright issues).*

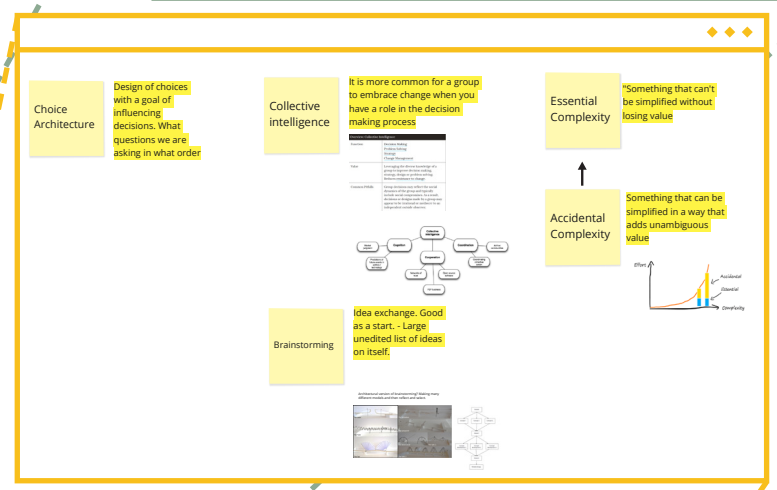
Design Process Group

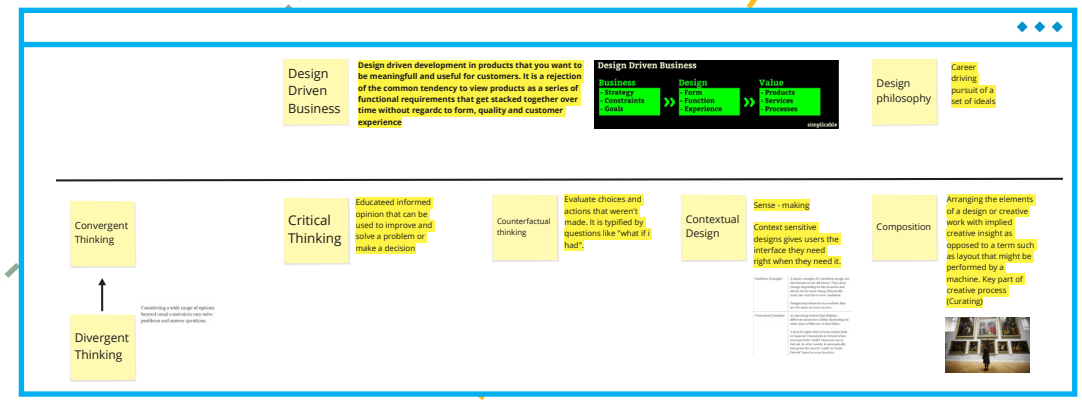












What design thinking methodologies lead us to great BAUKULTUR examples?

BAUKULTUR

Less related

More Related

ISP4 Rethinking Baukultur in the Digital Age

Thematic scope

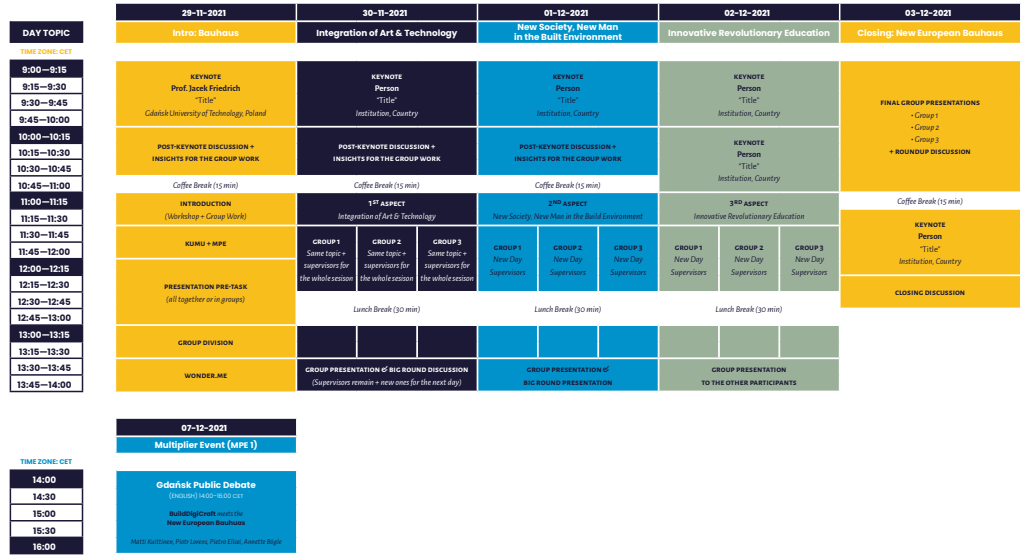
ISP4 "Rethinking Baukultur in the Digital Age" is the last of four consecutive training events organized between 2020 and 2021 within the thematic framework of the **BuildDigiCraft** project. Next to the Davos Declaration on Baukultur, this ISP also addresses the New European Bauhaus Initiative of the European Union by introducing a subtopic "From Bauhaus to the New European Bauhaus." Participants' attention is thus brought to two important political initiatives both aiming at high-quality Baukultur. This ISP brings insights on several historic, social, and artistic topics regarding the need for radical and revolutionary transformation of society as well as of the role of education in the disciplines of the building sector. The knowledge input within the ISP starts with a historic perspective on the Bauhaus movement, which with its radical approach to design introduced at the beginning of the 20th century the idea of the new society and new man in the built environment. It then focuses on the integration of art and technology and ends with the transformative role of teaching and education in design and constructions. Within interdisciplinarily organized teams for group work, participants receive one final joint task. They have to build up their own Manifesto for high-quality Baukultur in the digital age based on the values and principles of craftsmanship – a **BuildDigiCraft** contribution to the New European Bauhaus initiative.

Leading discussion questions

- *What is Baukultur in the digital age?*
- *What is the essence of the digital revolution in respect to the shaping of the built environment?*
- *How do we design, build and maintain the built environment based on craftsmanship, data and algorithms?*
- *What is the historic role of the Bauhaus movement and which Bauhaus values do we want to transfer to the Baukultur of the digital age and to the New European Bauhaus?*

The main questions raised during the ISP4 as well as throughout the whole **BuildDigiCraft** training program, are further discussed in **a publicly open professional debate** with invited guests from policy-making and the professional fields of architecture, design, engineering, and urban planning. It takes place subsequent to the ISP4. (Online Multiplier Event)

Fig[● 24] Full program ISP4 "Rethinking Baukultur in the Digital Age."



Day 1: Introduction to Bauhaus

Initial input

- Prof. Jadwiga Urbanik, *Wroclaw University of Science and Technology*
  Lecture Title: ***History of architectural revolution of the first half of the 20th century – waste of time or useful knowledge?***
- Introduction to the **BuildDigiCraft** Network Participant Map (enabled by the open access data visualization tool "Kumu")

The **BuildDigiCraft** network participant map is an interactive visual database map. Participants, teachers and experts can be filtered by type as well as by ISP participation using interactive buttons. Participants can be grouped by their university, or by their shared interests, again with the help of interactive buttons. See static screenshots in Fig[● 25–26].

The map can be accessed for interactive use via the project webpage – www.builddigicraft.eu – following the menu "Exhibition".[4]

[4] In case the map does not work, please try to open it using a different Internet browser or check the property settings of the current browser.

Personal data, except for the names of the invited input speakers, is anonymized. Speakers have agreed to share their data and video recording of the lecture publicly.

About Kumu:[5] Kumu is an online tool for visual databases, offering free open access for publicly used data. It allows for the creation of interactive multicriteria-databased network maps, with the help of which complex relationships can quickly be visualized, clustered or systematized.

[5] Kumu Inc. – online interactive visual database tool: https://kumu.io/

Group work

Presentation Preparatory task 1 "Bauhaus Reflection" in supervised randomly selected groups of four to five

Pre-task 1: Assignment

Use one of the following aspects of the Bauhaus Movement to reflect on your PhD thesis/ individual thesis project:

1. The integration of art and technology
2. The new society and new mankind within their environments
3. Innovative, revolutionary methods of education

(Or choose another Bauhaus-related aspect that you believe deserves to be addressed with your work.)

How do you think your PhD/thesis project does/might address the principles of the New European Bauhaus?

- Group finding for the project assignment ***"Build up Manifesto"*** (two to three groups working on the same topic)

ISP4 Project assignment

What is the **BuildDigiCraft** contribution to the New European Bauhaus to Baukultur in the digital age? **Build a Manifesto.**

Within the first three ISPs the following aspects have been addressed so far:

1. Baukultur, Digitalization, Craftsmanship – thematic approach
2. Process, Knowledge, Material – methodological approach
3. Values, skills, tools – actuators within the method

During the ISP4 we will address the Bauhaus/New European Bauhaus principles and ideas in order to together rethink the Baukultur in the digital age, focusing on the following three aspects:

1. Integration of art and technology
2. The new society and the new man in their environments
3. Innovative revolutionary education

Task: As an interdisciplinary group try to build a Manifesto that helps us to express our network statement.

"We want to have a high-quality Baukultur in the digital age. Using the values and principles of craftsmanship is essential for reaching that goal."

Try to refer to the six elements of the **BuildDigiCraft** model based on the input of the keynote lectures and post keynote discussions during ISP4. Also use the collected material project material bank as well as your experiences from the previous ISPs.

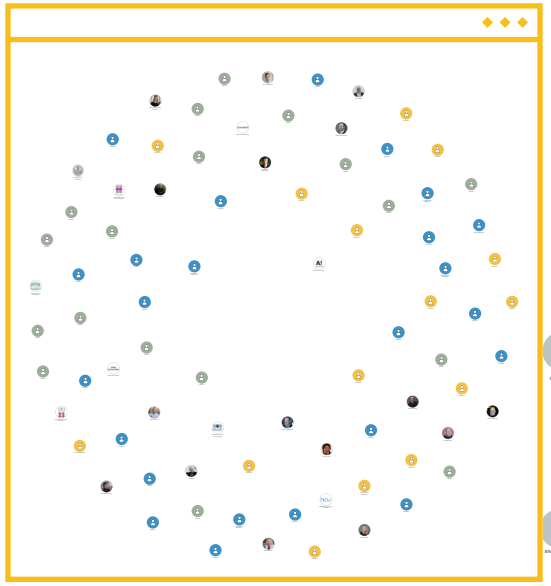
Guiding questions:

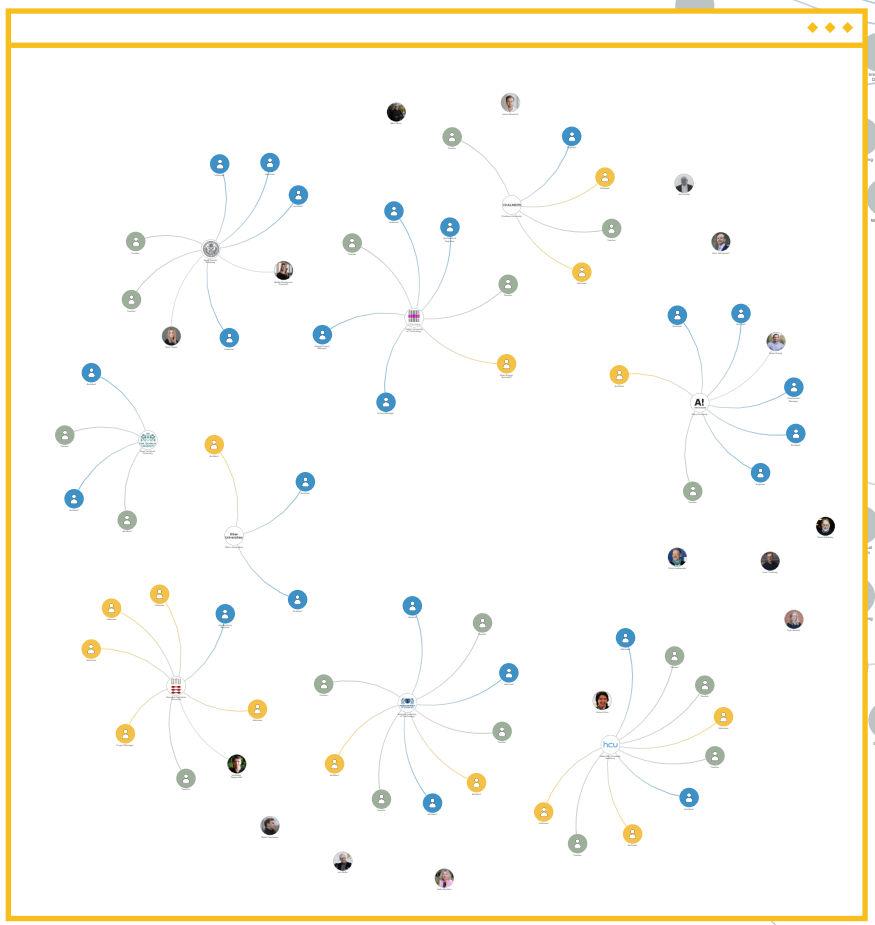
- *What qualitative framework do we need for the new design and planning process in order to reach the goals of the New European Bauhaus and thus manifest Baukultur in the digital age?*
- *How do we gain, define, and structure new knowledge within the new processes?*
- *What is the new material and new materiality of the New European Bauhaus and the Baukultur in the digital age and how do we use it?*

Use your individual PhD/thesis project as a starting point and main source of information.

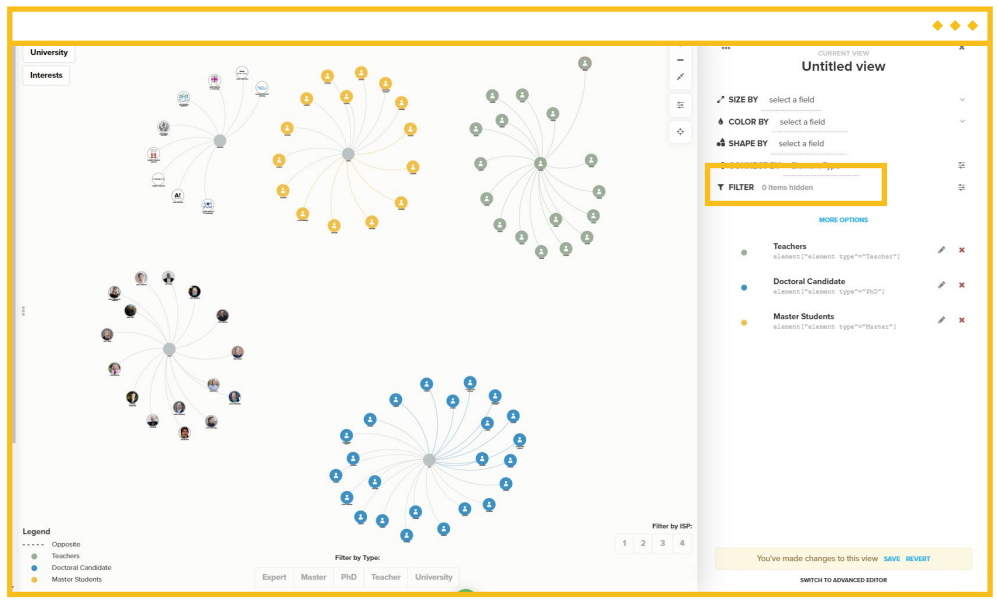
New tool: try to build a visual DATABASE MODEL as the basis of your joint Group Manifesto – test and use the Kumu tool.

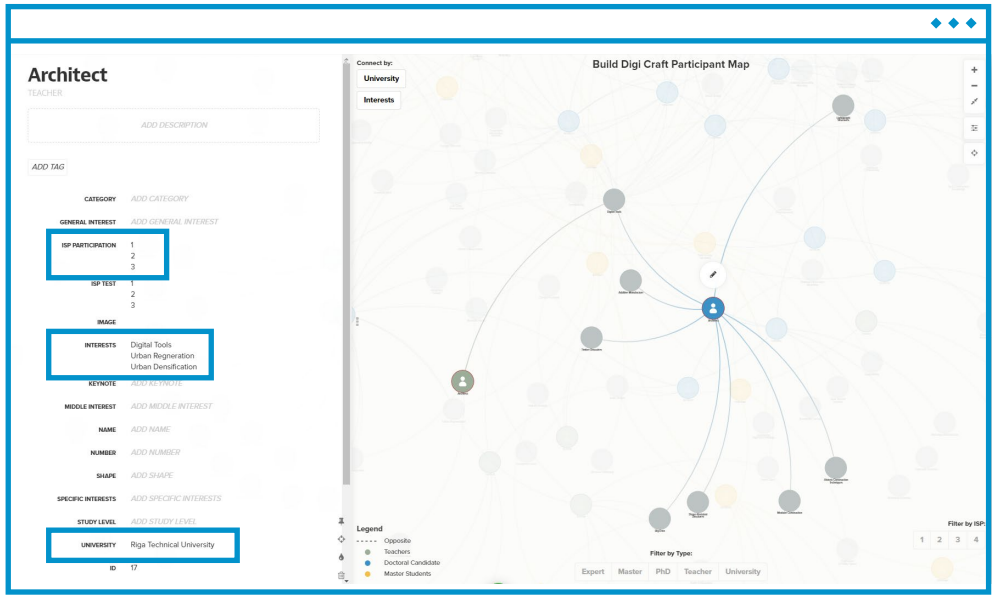
Fig[● 25] **BuildDigiCraft** Participant Network Map – participants' clustering by "Type", "University", and "Topic of Interest."

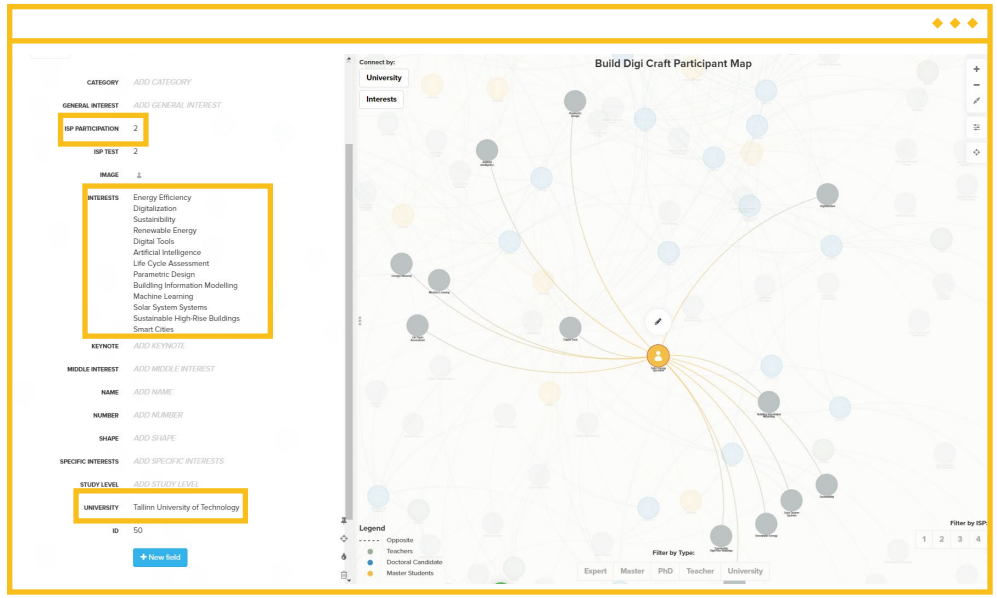




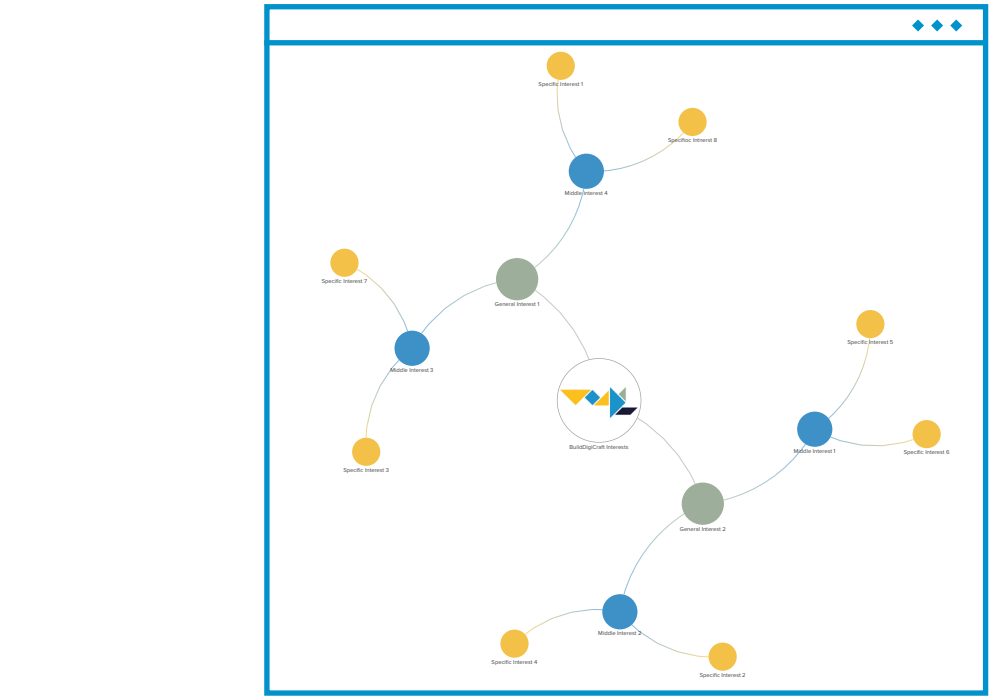
Fig[● 25] **BuildDigiCraft** Participant Network Map –
screenshots illustrating interactive clustering options
(Connection by Element Type [top left];
Zoom-in "Topic of Interest" [top right];
Zoom-in "Participant's Topics of Interest"[bottom left and right]).

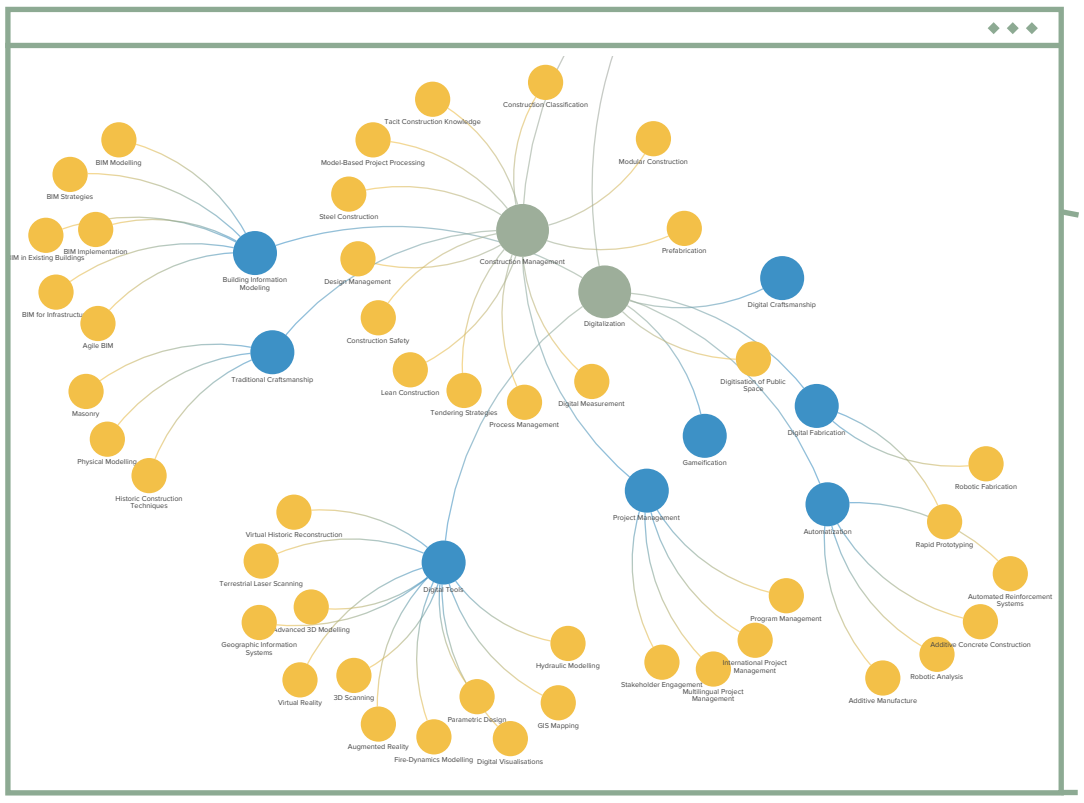


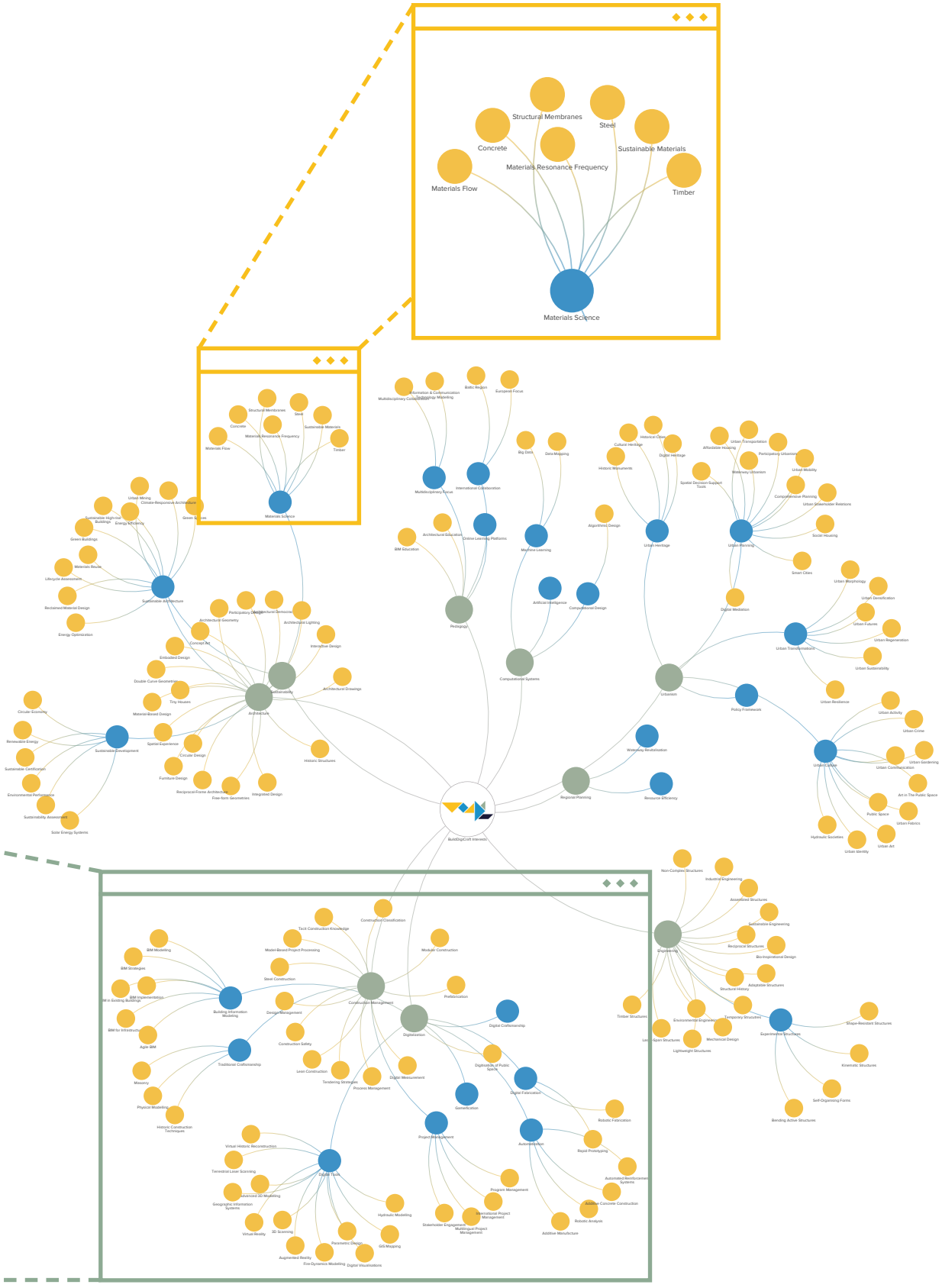




Fig[● 26] **BuildDigiCraft** Interest Hierarchy Map – Template Hierarchy Tree [blue frame]; Mapping by "Topic of Interest."







Day 2: Integration of Art and Technology

Initial input

- Robert Sochacki, *Wroclaw Art Academy*, Poland
  Lecture Title: ***The Integration of Art and Technology***

Joint discussion and group work

- Joint post-keynote discussion in the larger round (participants and **BuildDigiCraft** team)
- Unsupervised group work (two to three breakout rooms)
- Group-based supervision and feedback session offered by the expert team of the **BuildDigiCraft** project

Day 3: The New Society and the New Man in Their Environments

Initial input

- Leif Høgfeldt Hansen, *Aarhus School of Architecture*, Denmark
  Lecture title: ***The New Society and the New Man in Their Environments***

Joint discussion and group work

- Joint post-keynote discussion in the larger round (participants and **BuildDigiCraft** team)
- Unsupervised group work (two to three breakout rooms)
- Group-based supervision and feedback session offered by the expert team of the **BuildDigiCraft** project

Day 4: Innovative Revolutionary Education

Initial input

- Olga Ludyga, *WSB University Gdańsk*, Poland
  Lecture title: ***Teacher – the Architect of Learning Process***
- Fernando Manuel Alonso Pedrero, *University of Navarra*, Spain
  Lecture title: ***New Degree in Design ETSAUN – Winner of the New European Bauhaus Prize 2021***

Joint discussion and group work

- Joint post-keynote discussion in the larger round (participants and **BuildDigiCraft** team)
- Unsupervised group work (two to three breakout rooms)
- Group-based supervision and feedback session offered by the expert team of the **BuildDigiCraft** project

Day 5: Closing – BuildDigiCraft's Contribution to the New European Bauhaus

Final group presentation

- Group 1 – Digital Manifesto "**BuildDigiCraft**" (Fig[●27])
- Group 2 – High-quality Baukultur Manifesto (Fig[●28])

2.0 Results and sustainability

The **BuildDigiCraft** training program enables young scientists and professionals in the field of architecture, engineering and urban planning to come together and exchange their ideas, concerns and visions about the future of the built environment in the context of the quickly developing digital and data-driven work environment, without losing focus on the technological, environmental, and societal challenges of our time. The three core elements developed within the **BuildDigiCraft** project triad model for the deconstruction of Baukultur – Process, Knowledge, and Material – is offered to the participants as a method for scientific reflection, which allows them to set their individual research within the holistic framework of "high-quality Baukultur in the digital age through craftsmanship."

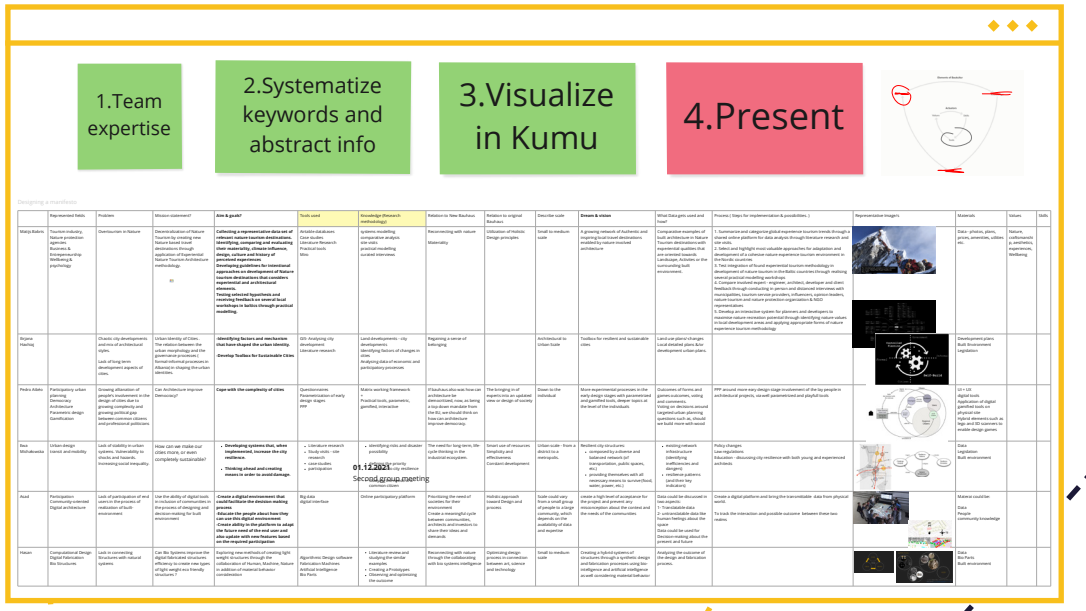
The training program is to be understood as an interdisciplinary, international, and interregional doctoral school. Each participant enters the training program wearing their own "digital," "disciplinary," and "ethical" lenses about a broad variety of thematic issues and questions related to the future of the built environment. In the pilot edition of the **BuildDigiCraft** training, the spectrum of the topics covered by the participants was quite broad and ranged between the research questions and topics briefly described below.

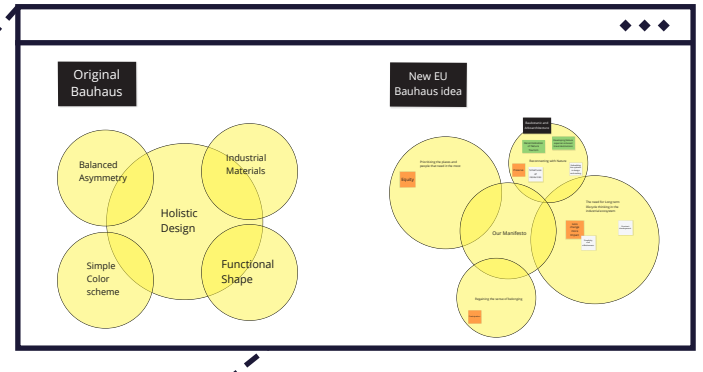
Some ISP participants were interested in exploring how to "resurrect geometry in architecture and engineering in connection with the rapid development of new digital tools for design and production," for which they considered the "mathematical breakthroughs in geometry, which have led to new ways of visualization and design of surfaces and structures."[6] Geometrical, structural and architectural potential and limits of digital tools and computational methods were explored in other research projects, too, for instance in the context of "bending-active torsional structures,"[7] but also in the context of "integrated sustainable, structural and architectural design concepts for timber-only structures (structures made from salvaged

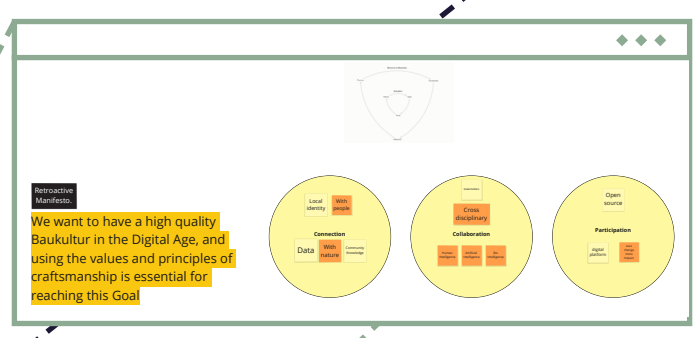
6 PhD project by Emil Adiels, Chalmers University of Technology (https://www.builddigicraft.eu/renaissance-of-geometry/)

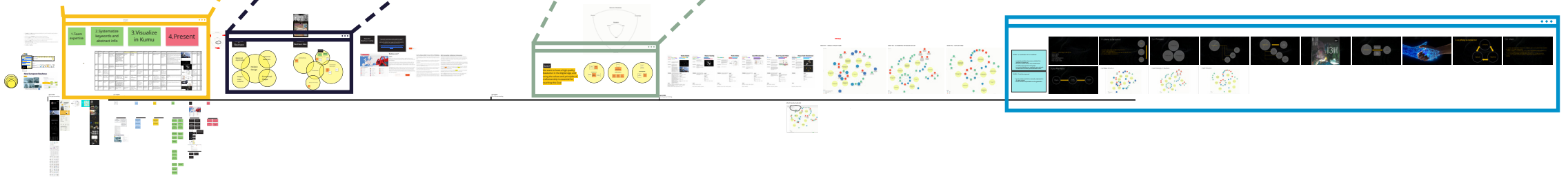
7 PhD project by Serenay Elmas, Aalto University (https://www.builddigicraft.eu/torsion-as-design/)

Fig[● 27] Group 1 project assignment outcome – Digital Manifesto **BuildDigiCraft**.

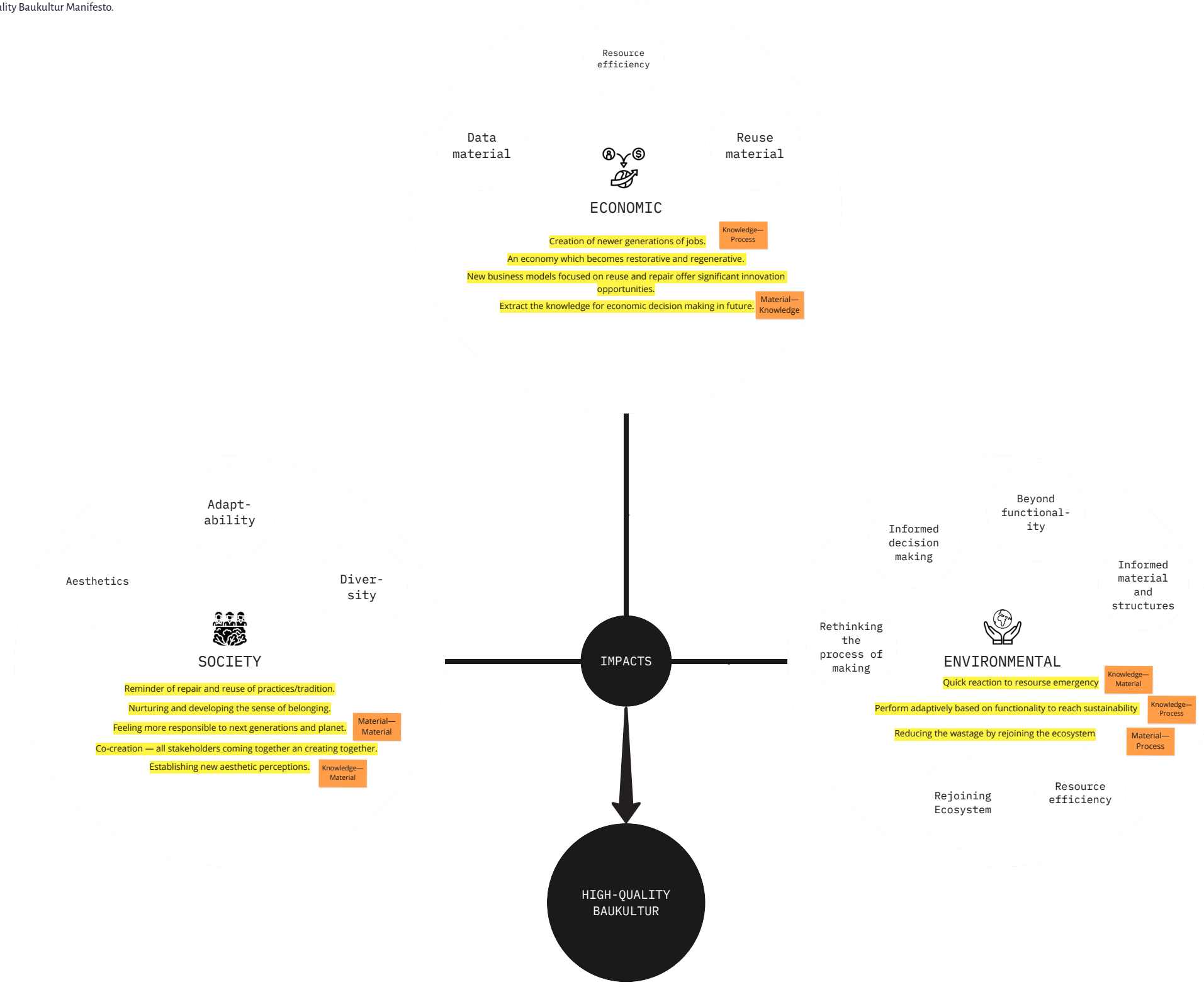








Fig[● 28] Group 2 project assignment outcome – High-quality Baukultur Manifesto.



timber and wooden nails only)."[8] Other participants of the training program looked at complex societal questions in the field of urban design and urban studies such as a research project exploring the question of architectural democracy, "focusing on how people can understand cities, with their increasing automatisms, and how one can still be relevant for the decision-making of these."[9] How urban data helps us to understand where and what the activities are that are offered at the interchange points where urban life occurs was explored in a research project on "informalities and urban identities of cities in Albania."[10] In a project about "experiential nature architecture" with the help of visual databases, nature architectural cases were cataloged in order to investigate the organizational typology of tourism application, which would eventually lead to a better understanding of the environmental impact of mass tourism on nature architecture reserves.[11] Further topics related to latest trends in the digital world such as "the digital twin" in the context of buildings and cities, new digital tools enabling public participation for planning processes as well as AI-based decision-making for finding form in structural and architectural contexts were also among the research interests of the ISP participants. This large range of topics was essential for the explorative process throughout the pilot edition of the training program.

Each of the four Intensive Study Programs carried out within the **BuildDigiCraft** training format has a specific focus, starting from the Concepts and Fundamentals (ISP1) through to the Digital Futures (ISP2) and Craft and Craftsmanship (ISP3), culminating in a joint reflection on Rethinking the Baukultur of the Digital Age (ISP4). Each ISP builds on the previous one, and participants took one part after the next. At the same time, a non-consecutive participation in the ISPs was possible, too. From the overall 69 participants in all four ISPs of the **BuildDigiCraft** training, six took part in all four ISPs, nine in three of them and 15 in at least two of them. One PhD project was finished within the program and at least one more is in the process of being finalized (upon publication of this material). Although the participation in the ISPs could be officially recognized and awarded with credit points for the transfer of record at the home university, only few PhD candidates actually used this opportunity. The reason for not considering it was mainly because they formally did not need any credit points for accomplishing the requirements within their doctoral studies. It turned out that the main motivation of the participants for joining the **BuildDigiCraft** training program was the relevance of its topic, the input offered by both the internal scientific staff and the invited experts and most importantly, the use of the **BuildDigiCraft** model as a method for scientific reflection on the individual research project.

Extensive material was able to be collected throughout the **BuildDigiCraft** training program. This included all the participants' contributions within the Preparatory task assignments, the individual presentations, the Glossary Matrix exercise, as well as the outcomes of the group work and the group discussions. The input of 21 invited experts, all offering insights on the current ongoing transformation in the building and planning professional sector as well as on the theoretical and ethical aspects behind the cultural values in both the built and digital environment should also be considered as outcomes of the **BuildDigiCraft** training program. In a next step, the scientific team of the project evaluated the material and outcomes of all ISPs by deconstructing it to the main elements of Baukultur, as suggested within the **BuildDigiCraft** model for scientific reflection. The outcomes of the ISP are thus transferred as an intellectual exploration of the Process, Knowledge, and Material, the three elements that enable the development of Baukultur. Additionally, an open framework for a shared understanding through the introduction of the Glossary method is established and a final joint declaration of statements about the future Process, Knowledge, and Material of the Baukultur of the digital age developed.

8 PhD project by Gengmu Ruan, Aalto University (https://www.builddigicraft.eu/timber-only/)

9 PhD project by Pedro Esteves Galvão Aibéo, Aalto University (https://www.builddigicraft.eu/architectural-democracy/)

10 PhD project by Ilirjana Haxhiaj, Gdańsk University of Technology.

11 PhD project by Matijs Babris, Riga Technical University.

Transfer of ISP results:

Process *Guidelines for a design process leading to a high-quality Baukultur in the digital age*

Knowledge *Toward guidelines for the development of a higher education curriculum: bridging craft and digital for a high-quality Baukultur*

Material *The meaning of Material, Materiality and the Digital for Baukultur*

Manifesto *Joint declaration of statements on Baukultur in the digital age*

Impact beyond the BuildDigiCraft training program

The outcomes of the **BuildDigiCraft** training program will be disseminated among higher education experts, professional communities and policy decision-makers. The **BuildDigiCraft** Manifesto is the starting point for a broader discussion on the future quality of Baukultur in the digital context, it introduces a new perspective on the Davos Declaration for High-quality Baukultur and seeks to introduce an innovative framework for scientific reflection on the qualities of craftsmanship in the digital work environment of the professionals in the built environment. The ideas of the **BuildDigiCraft** project have already given impulses beyond the participants' scope of the training program. The main concepts and ideas as well as some of the training formats are already being introduced to several qualification programs on Master's and PhD level at the participating project universities. For instance, they were presented in a multidisciplinary Master's course at Chalmers University of Technology, in the training format of the PhD division as well as in an ongoing application for a joint European course of studies related to digitalization in architecture at Gdańsk University of Technology. All keynote lectures, together with an exhibition of selected PhD projects that were part of the training program, remain publicly available on the dissemination channel of the project as well as on the project web page.

3.0 Critical review and recommendations

The **BuildDigiCraft** training program is taken both in physical and digital format. The current guidelines are based on the experience had during the coronavirus pandemic in 2020 and 2021, when international mobility was restricted through factors related to "force majeure." The new situation sped up the disruption processes related to the introduction of new digital technologies in our work and everyday life. New types of work collaboration, communication and product fabrication proved to be irreplaceable also in the professional world of the specialists in the built environment. Even though the training program proved to be manageable in a completely digital context, it is important to recognize the fact that some direct personal exchange through physical meetings could have helped participants intensify the intellectual discourse between them. Nevertheless, the first digital contact established between some of the "regular participants" proved to be of long-lasting interest for future collaboration on similar research topics. Further opportunities for continuation of the exchange using other scientific formats were recognized and some participants of the training program managed to meet physically outside of the **BuildDigiCraft** project.

One of the main critiques regarding the implementation of the training program in digital format was its intensity. A five-day long intensive study program can be easily carried out in physical format, allowing for breaks and unplanned informal exchange between the participants. This was possible, however, only to a limited extent in the digital realm. Also, the fact that collaboration and discussion rounds were possible only via the constant use of a digital device influenced the level of perception and concentration of both participants and supervisors. Even though the daily program within the ISPs was limited to only four to five working hours per day, the duration of five consecutive days turned out to be hardly manageable by all participants. In a time when all academic and training offers became

available online, the competence for keeping the attention of participants only to one training course for one whole week proved to be very difficult. Therefore, in order to improve the future performance of the program when carried through in a digital format, the **BuildDigiCraft** team suggests a new distribution of the workload. Instead of five consecutive days, the program can be achieved in a combination of three intensive study days in the first week and two or three additional ones in the following one to two weeks. In between, the participants thereby have the chance to continue and intensify their studies in an offline mode.

In all cases, the **BuildDigiCraft** training program is the foundation for further and future collaboration on a doctoral level in the Baltic and North Sea region. It created a holistic framework on a highly relevant societal topic that brings a wide spectrum of interdisciplinary research projects together and aims to uncover the essence of the changing culture in the Baukultur in the digital age.