



BuildDigiCraft

New Mindset for
High-quality Baukultur
in Europe:

Bridging Craft and Digital

Annette Bögle, Emiliya Popova (eds.)

Imprint

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ISBN: 978-3-947972-58-6

DOI: 10.34712/142.37



Co-funded by the
Erasmus+ Programme
of the European Union

The creation of these resources has been partially funded by the **ERASMUS+** grant program of the European Union under grant no. **2019-1-DE01-KA203-005059**. Neither the European Commission nor the project's national funding agency **DAAD** are responsible for the content or liable for any losses or damage resulting of the use of these resources.



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3.0 Manifesto

Intellectual Output 5

Manifesto for High-quality Baukultur in the Digital Age



Authors

BuildDigiCraft project team

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1.0 The story behind the Manifesto [introduction]

Ideally, in every piece of work that designers, engineers, and planners create, there should always be an inner striving to achieve higher quality in the surrounding built environment.

In a technologically advanced and highly digitally-driven professional environment **the values and leading principles of traditional craftsmanship**, such as dedication or pride in one own's work and the mindful and sustainable dealing with the building material, need to be reintroduced into the processes of the built environment and validated again.

At the same time one should ask: *What is the high quality of the built environment? And how do we measure and enhance the perception of this quality in the digital age?*

With two major political milestones – the **Davos Declaration 2018 “Towards a European vision of high-quality Baukultur”** and the **New European Bauhaus Initiative 2020**, a very clear message was sent throughout Europe. This was an open invitation to reflect together on the need for a crucial change in the mindset of the professionals responsible for the built environment as well as of society as a whole. It also invites us to look at how we want to address and shape the built environment of the future in the context of global societal and climatic challenges.

The building and construction sectors are known for being very conservative when it comes to risks and changes, and at the same time not flexible enough to manage and adapt quickly to changing circumstances. Therefore, it is not surprising that it's this sector precisely that meets most challenges in finding a way to adapt its rules and regulations as well as its business policies and logic to the ongoing digitally-driven transformation. There is a **need for a fundamental change in the way “we are doing things” and the way “we communicate and collaborate with each other”** and digital technologies play a major role in this transformation process.

This Manifesto results from exploring the following questions:

- ◆ *How is the ongoing digital revolution affecting the work of designers, architects, engineers, urban planners, and other professionals responsible for the shaping of the built environment?*
- ◆ *What new opportunities arise from the available digital and data-processing technologies for creating innovative solutions for the design, construction, maintenance, and management of buildings and cities (beyond standard workflows and material use).*

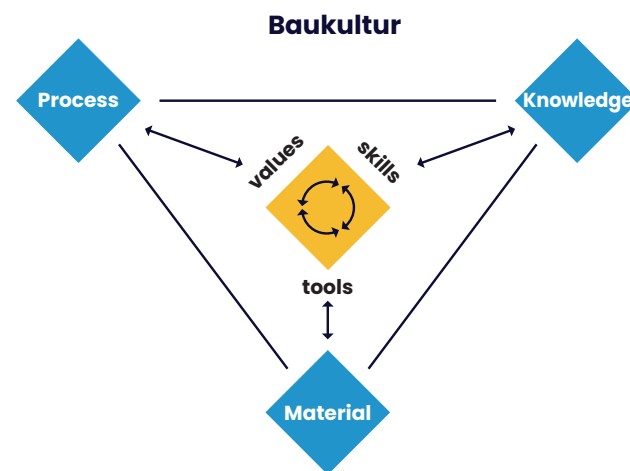
BuildDigiCraft builds on the holistic concept of Baukultur and seeks to explore opportunities to further develop it in the context of a highly digitalized world.

2.0 Acknowledge the elements of Baukultur [method]

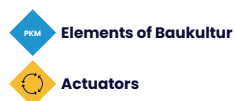
Dealing with the built environment is a complex task that has direct impact on the physical space and on social and societal processes taking place in that space. Specialists of the built environment use different tools, methods and intellectual models to manage this complexity.

BuildDigiCraft introduces a new model for intellectual reflection on any type of physical intervention in the built environment. With its help specialists can better assess the quality of their work process as well as the quality of their intervention.

Therefore, **we deconstruct Baukultur down to its core elements, i.e., Processes, Knowledge, and Material** (Fig[1]). Shaping and maintaining the built environment results in complex and diverse processes and includes design, planning, construction, maintenance as well as end of use phase. In broader terms, these Processes behind the intervention of the built environment are influenced by the available Knowledge and understanding of Material. The project development is actuated by values, skills, and tools being used by designers, planners, developers or builders as well as the building society.



Fig[1] BuildDigiCraft model for scientific reflection.



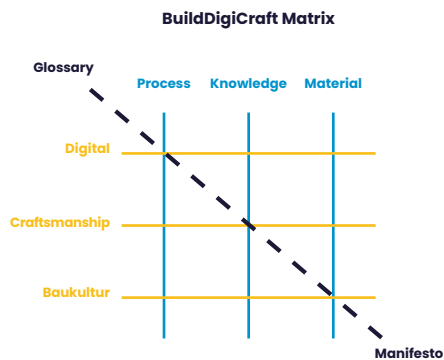
Process–Knowledge–Material reflection

Analyze and reflect on your individual design and intervention project by answering the following questions:

- Q1** *What is the Process, what is the Material, and what is the Knowledge that you are addressing and using in your design project, and what is the Process, Knowledge, and Material that you would like to derive from it?*
- Q2** *How do you see the relation between the Process, Knowledge, and Material in the context of your work?*
- Q3** *What are the values you are following and addressing in your project?*
- Q4** *Which skills are you applying, and which are the new skills that you are developing within your project?*
- Q5** *What tools do you use and plan to use?*
- Q6** *Try to define the term Baukultur in your own words and in respect to your individual project.*

3.0 Structure your project with the BuildDigiCraft matrix [method]

The **BuildDigiCraft matrix** is a tool to structure your project concepts and to gain a contextual analysis. The matrix is based on the **core elements of Baukultur** (see Fig[2]): **Process**, **Knowledge**, and **Material**, which intersect with the three major thematic concepts of Baukultur, Craftsmanship and Digitalization addressed in the **BuildDigiCraft** project.



Fig[2] BuildDigiCraft matrix.

On the **vertical axis** we find: (1) **Digital(ization)**, which influences the current and future process of shaping the built environment, (2) **Craftsmanship**, which addresses the gap between the actual situation of digitalization and its potential, and finally, (3) **Baukultur**, which lays the values and principles we follow in the process of shaping the built environment and which at the same time joins the above concepts. We believe that there is a strong connection between these three components as they all refer directly to the quality of space created by the design team as well as to the acceptance of the proposed design by civic society, including all the actors involved both directly and indirectly in the process.

The horizontal axis consists of the following components: (1) **Process**, which includes the whole cycle of design, planning, construction, maintenance, end of use, and start of reuse, (2) **Knowledge** defined as tacit and implicit knowledge that influences these processes and (3) **Material**, which relates to the physical representation of design in the built environment and also responds to the need of understanding materiality in the digital context.

One of the questions related to trying to position concepts and ideas within the matrix-based intersection of the pillar concepts of the **BuildDigiCraft** project:

Q *Can you deconstruct the concepts and ideas you use in your work/intervention in such a way so that they can fit in the matrix grid?*

4.0 Apply the Glossary Matrix tool to your project [method]

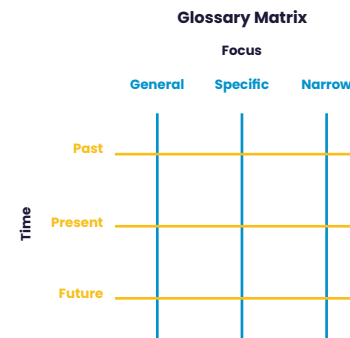
The **Glossary Matrix tool** (see Fig[3]) allows for a temporal as well as scale-oriented exploration of the terms, concepts and ideas used in the project. The Glossary Matrix serves as a framework tool for establishing the dimensions within which the posed concepts and notions can be explored. The Glossary Matrix helps to identify and structure the content of your own project-related Glossary.

Apply the matrix-based Glossary tool to the concepts, ideas and terminology you use in your project. The Glossary builds on the concept of the **BuildDigiCraft** project matrix and specifically on one of its two main axes, containing the three components of **Process**, **Knowledge**, and **Material**.

The two axes of the Glossary Matrix are: **focus** and **time**.

The “**x**” axis of the matrix – **Focus** – enables the identification and use of notions and ideas according to the scale of their focus, which is connected with the availability and use of different terms derived from a broad spectrum: **general**, which is available to a wide range of non-specialists, through to a more **specific** one, which is used by specialists in the context of their profession, up to a **narrow** one – used strictly in relation to the problems of specific research projects such as PhD or Master’s theses of the ISPs’ participants.

Time factor, pictured on the “**y**” axis, is used to describe the meaning and appearance of notions and ideas throughout time. This section is divided into the **Past**, meaning both the distant and more recent past, the **Present**, which includes both the present time and the very near future, and finally, the **Future**, both near and distant, including the future that is very difficult to predict.



Fig[3] Glossary Matrix.

Q *Can you place your concepts and ideas in a temporal and scale context (in the time and focus matrix) for others to understand them?*

5.0 Understand the changing paradigm of Baukultur in the digital age [context]

Digitalization is revolutionizing our society and all actions related to our everyday life, our professional world, our social interrelations as well as the way we are dealing with physical space.

We have identified seven major aspects which characterize the changing paradigm of Baukultur in the digital age:

A Dialectic between the visionary world of design and the physical world of project realization

In the context of the built environment we need to deal with the dialectic between the generally creative and interactive character of the design process on the one hand and the targeted character of the realization process on the other; a continuous interaction with the physical world is necessary and characterizes the intersection between the visionary world of design and the physical world of project realization.

Transferring this understanding/these circumstances into the world of digital possibilities implies new approaches: for example, digitalization allows the transfer of an idea or vision into materiality already during the design process. This implicates a change of the process: now we can control the design process for example through physical representations, for example by a printed model of the digital vision. This means on a printed, materialized version, a design idea can be conveyed through physical representations, for example by a printed model of the digital vision. This means a design idea can be quickly evaluated on a printed, materialized version. .

B Digital twin representation

Another aspect of the dialectic between the physical and digital world is the digital twin, or more precisely, the digital representation of a design as well as a real object. There is a need to assess the benefits and roles of a digital twin for the physical built environment and its future use in the virtual world. A discussion is necessary about the costs and the efficiency of the digital twin, too. However, it is first the design process behind the digital twin that needs to be better understood in order to be able to later answer further questions related to its performance.

C Connection between the creator and the creation

Any process is characterized by the creator and the connection between the creator and the creation. What seems to be most obvious needs to undergo a new evaluation process under the conditions of the digital time boundary conditions. The most pressing question then is whether the connection between the creator and the creation will be set in a contemporary process and how rapid digital prototyping influences it. This will help prove the design idea in multiple evaluation loops, without losing time in manufacturing. It thus links the creation closer to the creator. The qualities of craftsmanship therefore need to be reintroduced consciously in the digital process in order to fill up the connection gap between the creator and the creation.

D Roles and responsibilities in a complex collaborative context

Collaboration and interdisciplinary exchange are essential for the processes dealing with the built environment. The digital context collaboration between design stakeholders has become much more flexible, accessible and transparent. New digital technologies allow more participants to be part of the design process. At the same time, participation and collaboration do not immediately mean shared

responsibility. The designer as a professional, for example, remains responsible for the shape of design. Yet there is in particular a need for ownership of the project, which incorporates responsibility among all stakeholders.

Roles and responsibility allocation is seen as a crucial aspect of any design and intervention process. Design ideas need a critical review and discourse which is part of the characteristic iteration inherent to the design process. The designer needs to feel responsible for the design and the decisions necessary during the design process. Such an attitude needs to be developed individually by the designer/creator, and it's also based on a social understanding, which in turn reflects individual and social values.

In the context of digitalization new responsibilities now arise. An array of digital tools influences and shapes the design process. This also reveals an ambivalence toward the new tools and processes. On the one hand, digitalization offers new methods and approaches toward essential questions but on the other, digitalization comes with the fear of standardization, simplification, and automatization – to an extent, the designer's fear of being replaced by a digital process is stirred. But the role and responsibility of the designer is non-negotiable, which at the same time needs to be understood by the designer while he/she is drawing own consequences from this fact.

E Speeding up, time as a crucial factor and the non-linearity of the process

The role of time is crucial to any design process but this aspect becomes even more essential and influential on the process itself when set in the digital context. First, digitalization allows for much faster processes. Secondly, it allows for the introduction of new contents and knowledge at any step of the process chain. Traditionally approved sequence of process steps can be questioned now

or can even be re-organized. The process is not only linear anymore. For example, digital production processes like 3D printing allow the making of a physical representation of a design version at any stage of the design process. These representations enable a more holistic evaluation of the design concept.

A digital model enables and at the same time requires the integration of vast sets of data, often unstructured, and information much more than in the analog design process. In a traditional design process this information merges step by step, while developing the idea from a vision to a realized and materialized intervention in the built environment. In contrast, the digital model requires the integration of information in a much earlier design phase, in a phase where “normally” this information is not available yet. This means that the initial design phase of any digital building process will require more attention, more time and more design loops.

F More data – more knowledge?

Any design and building activity is based on the availability of information, e.g., data. Through digitization the amount of available data increases enormously as well as the capacities and tools for handling data and big data. However, more data does not lead self-evidently to more knowledge.

Knowledge is based on data, but we cannot easily extract knowledge from data. Knowledge is also based on the experience of making/doing/creating as well as exploring. Data and experience joined together fill up the reservoir of explicit and implicit knowledge.

Knowledge in its essence can be explicit or implicit, the second also including the unspoken aspects that tacit knowledge includes. Where explicit knowledge can be easily accessed and transmitted to others by articulation, codification and verbalization, the tacit and implicit knowledge is gained by personal experience and is more difficult to express and transfer.

Today, physical and digital worlds are merging closer than ever before and digitization plays a big role in producing, transferring, and communicating all types of knowledge in formal, semi-formal and non-formal activities (workshops, conference discussions, training). Explicit knowledge is actively shared in e-journal publications, e-databases, e-books, websites and videos. Still, there is a changing paradigm on how knowledge about the real world is gathered due to significant and growing attention paid to AI, VR models, and collecting information from simulations of data variables in these models.

G Dealing with data

How to store, manage and in some cases restore data in future (as systems and software change)? The history of digitization spans a very short period in comparison to the history of our civilization, but the development in digital workflows, processes, and tools is extremely fast. Systems that a few years ago presented the height of human achievement in the field are now not only obsolete, but also impossible to use anymore. The data we use is short-lived if its supporting digital systems are outdated. Buildings that we celebrate as high-quality Baukultur need to be built to last for hundreds of years.

It is essential that digital systems, tools, and flows should have the in-built robustness and adaptability throughout the buildings' lifecycle and beyond.

6.0 The idea of Craftsmanship in the digital building culture [context]

Craftsmanship addresses in its essence **quality, beauty, and resource efficiency**; it promotes a relation to sustainable material and techniques and offers tangible experiences through synergies of mind and hand while intimating satisfaction in achieving a level of mastery and highest quality.

Craft entails **implicit and tacit knowledge** and is passed on between craftspeople. Its values are deeply sustainable as their core value is quality and reducing wasteful approaches.

The Craftsmanship ethos in design and building projects is essential for strengthening the **sense of belonging and commitment to the surrounding space** because **it gives meaning to the process** and because through Craftsmanship the process can be **identified with the material** and the physical outcome of the project.

The craftsmen of the past passed the data on physical material through tacit knowledge. The “new” digital form of material data is very rich but still detached from the tacit Craftsmanship process and knowledge. The symbiosis of material, design, and construction knowledge and (digital) data is very powerful.

Craftsmanship is associated with being as humanistic and having artistic values that stand behind the work and the “material.” Material is understood as both traditional building materials like “wood,” but also data, emotions, and information from a community. Craftsmanship is thus transformed into the digital realm as representing, for instance, uninterrupted experiments, a special time quality as well as artistic quality.

Baukultur as we know it epitomizes building quality, beauty, embraces aesthetics and human values where materials are crafted to a level that ensures the quality that Baukultur stands for. Many of the architectural masterpieces of the

past were created before digital opportunities had surfaced. Digital workflows enable us to handle complexities of building projects at present. Matching data levels and data requirements for achieving the quality of a new Baukultur is essential.

7.0 Recommendations and statements [outcome]

For achieving high-quality Baukultur, it is essential to establish the connections between data, material, design, and construction knowledge – making the tacit explicit. The craftsmen of the past passed the data on physical material through tacit knowledge. The “new” digital form of material data is very rich but still detached from the tacit craftsmanship process and knowledge. The symbiosis of material, design, and construction knowledge and (digital) data is very powerful – **making the tacit explicit**.

Process

Toward guidelines for a design process leading to a high-quality Baukultur in the digital age

The design process is often overlooked as something invisible, not tangible. However, it is this series of decisions made in a design process that will eventually lead to poor- or high-quality Baukultur. We now have a situation where designers involved in design processes of Baukultur have access to new digitalized, visualized information that was not accessible just a few years ago. We have thus the potential for creating design processes that will lead to higher levels of sustainability and cultural appreciation. Digitalization also poses considerable risk, because design processes used to be regulated by industry standards and tradition. Those processes are now much more free, and the guidelines are there to help designers reflect on the quality and values behind the design processes they perform.

Two main points to think about:

1. *Commercial mainstream processes and artistic process – what is the balance?*

Digitization may push forward any standardized, automatized process which in turn may lead to commercial mainstreaming. These seem to be the opposite of any free creative process. Keeping the balance is key.

2. *Criteria-driven or value-driven process – what is the balance?*

The role of digital tools in contemporary design processes is to support humans most effectively, allowing for the reduction of errors and the most accurate analysis and results. However, what can be seen from the illustration of these processes is that digital tools and new technologies do not dominate the processes, nor are they an end in themselves. The ultimate goal of the undertaken research issues is to strive to build better and better quality and search for new solutions and opportunities in the physical world, the true framework of human life.

One can also see the reflection and the questions posed as to whether such advanced use of digital tools is always economically justified, whether digital tools are not starting to lead a “parallel life” that has no impact on contributing to the improvement of the quality of reality in which people live.

Creating a design process to answer a specific contextual challenge is a skill that any designer/builder needs to excel in. Digital tools at hand can be used creatively and contextually – even though the tools themselves might not have been developed for a specific design stage, they can still be used in new ways.

Some aspects and guiding questions to be considered when creating/using a digital design process:

Informed design process (support decision-making and potentially provide access to better choices)

- Q *How is the design process created?*
- Q *Which design process could I propose to fit a specific context, place and design task? What are the questions I would like my process to answer?*

Access to the new levels of information behind the digital design processes

- Q *Who has access to the information? Who can afford a prolonged pre-design phase and can pay for the software, tools and IT expertise? What about those who cannot?*
- Q *Is there an open-source version of the digital tool you want to include in your design process?*

Use and misuse of information involved in the digital design processes

- Q *Will my use of data compromise the privacy and dignity of anybody?*

Non-linear design processes

- Q *Have I included more lifecycles and considerations about end of life and reuse?*
- Q *Have I taken enough time for reflection on the design loops into account in order to continuously improve my design?*

Collaborative platforms and stakeholder inclusion through visualization

- Q *How can I ensure accessibility to design collaborative platforms for all stakeholders?*
- Q *Are the visualizations adequately designed to communicate to stakeholders and create transparency and inclusion?*

Respect of humanistic values and social sustainability (beyond quantitative data)

- Q *Have I included considerations of environmental impact?*
- Q *Have I included in the design process information concerning:*
 - ♦ *sense of place (genius loci)*
 - ♦ *biodiversity*
 - ♦ *beauty?*

Transparency in weighing qualitative and quantitative information

- Q *Do I have a multi-criteria framework where I have an overview and can weigh qualitative and quantitative information and criteria?*
- Q *Have I established transparency in how to weigh different criteria and indicators? Have I included both qualitative and quantitative information in my design process?*

Art and work of the human hand (creative process)

- Q *Have I left space for “the mark by the work of the hand”?*
- Q *Have I reflected on whether the digital tools in this project have improved or indeed at times restricted the artistic freedom and the work with values?*

Control of the design process

- Q *Have I checked whether the automated iterations are running wild? Who or what controls the “design” of the design process?*
- Q *Have I assigned respectively clear roles and responsibilities within the design process?*

Time for the design process

- Q *Have I planned enough time for the initial design phase to “build” first digitally, then in reality?*

Strategic recommendations:

- Criteria needs to be flexible at the beginning of the design process.
- The process should be based on values (art, culture, sense of place, nature, humanity ...) not data-/criteria-driven.
- Use more time and resources on design process – make sure it is artistic, driven by humanistic values (digitalization can harm the quality of the design processes behind the built environment because it is tempting to “copy and paste” financial reasons, instead of creating a sense-of-place-driven original design process for it).

Knowledge

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

The human factor in decision-making

Digitalization addresses the way we are handling knowledge today in terms of the increased amount and intensity of the available data and the indefinite number of complex relations that can be recognized within the specific data vs. information vs. knowledge context. However, decision-making on how data should be acquired, selected, arranged, evaluated, and communicated remains a process principally dependent on the human factor. Humans tend to rely on implicit knowledge, which also involves some sense of intuition, when dealing with specific problems that require customized decisions (sense of place).

Knowledge as a public good

Knowledge should be viewed as a public good rather than intellectual property. Knowledge application, relevance, contextualization, outreach, transfer, and management should be developed in society and cannot be traded like other goods or services can. Here the higher education institutions play a big role as “knowledge hubs,” animating indigenous development and innovation that spans between industry, government, and society. This stresses the growth of mutual learning between scientists and societal actors.

Qualities of good craftsmanship

The qualities of good craftsmanship need to be sustained in the digital era. It is suggested that focus should be in gathering professional knowledge, understanding and training skills in relation to “materiality” (being real, not virtual), “location” (being grounded), “sustainability” (being adapted to nature), “diligence” (being passive and professional), “openness” (being vague), “good life” (being human).

Ethical knowledge and the role of design education

Knowledge should be about training the ability to take well-grounded design decisions in complex situations. The contemporary role of academia needs to serve as a facilitator of emerging modes of learning, preparing future generation of designers to take responsibility for shaping high-quality built environment. Education and research should be directed toward how we can prepare individuals to grow in all three of Aristotle’s categories of knowledge – “episteme” (scientific knowledge), “techne” (knowledge of craft) and “phronesis” (ethical knowledge). The new modes of learning require creating opportunities for students and young professionals to make informed design decisions and exploring phenomena-based knowledge. This includes learning about cultural values like the history of architecture and built environment (old and contemporary), humanistic understanding of design questions, state of the art, and that every problem is unique involving phronesis.

Material

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

For achieving high-quality Baukultur, it is essential to establish the connections between data, material, design, and construction knowledge – making the tacit explicit. The craftsmen of the past passed on the data about physical material through tacit knowledge. The “new” digital form of material data is very rich but still detached from the tacit craftsmanship process and knowledge. The symbiosis of material, design, and construction knowledge and (digital) data is very powerful – **making the tacit explicit**.

How to understand material and materiality in a digital building culture? The building culture of today is one relying on and supported by digital workflows, processes and tools. Materials with their inherent characteristics are not only understood, but also described through highly sophisticated and detailed data. The availability of digital tools and the ease of handling complex data enables us to manipulate material giving rise to new types of designed material behavior. Through the new digital material, understanding material's behavior and performative qualities can be tuned, customized, and optimized, leading to the development of new materials with specific designed performance.

This leads to three perspectives on material:

Perspective 1.

Added value through digital materials

Digitally defined/created/optimized/fine-tuned **materials** will have a designed performance. It will embrace both measurable and qualitative Baukultur values.

Perspective 2.

Added value through digitally modified materiality

Building longevity, good indoor climate and resources optimization can be achieved through digitally modified **materiality** – achieving values closely associated with Baukultur.

Perspective 3.

Added value by short-cutting digital workflows linking and speeding between the design idea and final creation/product/object

Digital workflows enable real-time simulations and optimizations. Constructing while testing and before designing enables new workflows and opportunities that will secure quality.

Final remarks

A final comment that arises from the **BuildDigiCraft** project relating to material is that digital materials/data will not replace the physical realm. For a high-quality Baukultur, the physical and digital realms are becoming increasingly inseparable and have the potential to inspire each other. Therefore, the crafting qualities, tacit knowledge, the qualitative-unmeasurable qualities have to be interlaced in new meaningful ways with the digital, quantifiable, and data-driven qualities. This will result in future high-quality Baukultur and the high quality of spaces.