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CONCEPTS OF TRANSFORMATION

Editors: Anne Elisabeth Toft and Magnus Rönn

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FOREWORD

Anne Elisabeth Toft and Magnus Rönn

The Nordic Association of Architectural Research (NAF/NAAR) is an independent association of architectural researchers from universities and schools of architecture in the Nordic countries. It has been in existence since 1987.

The present book is the proceedings publication from the 2021 NAF/NAAR symposium by the name of *Concepts of Transformation*. NAF/NAAR symposia are held once a year. They are important platforms for critical reflection on architecture and architectural research in the Nordic countries. To ensure their dynamic and democratic format, the events are conceptualized and organized in collaboration with various partners and each year hosted by a different university or school of architecture. True to tradition, the symposium focuses its discussions on a topic or theoretical framework representing the current research interests of NAF/NAAR and its collaborators.

Fifty researchers from the Nordic countries and abroad attended *Concepts of Transformation*, which took place on 3–4 November 2021 in Aarhus, Denmark. It was the result of a close collaboration between NAF/NAAR and colleagues from Research Lab 1: *Transformation* at the Aarhus School of Architecture. Twenty-nine paper presentations were given during the symposium. In addition, three keynote speeches were held by distinguished scholars, whose interesting lectures contextualized the discussions of the event, along with welcome addresses by NAF/NAAR president Anne Elisabeth Toft and by Mogens A. Morgen and Tom Nielsen, professors at Research Lab 1: *Transformation*.

Critically pursuing different concepts of transformation, how they have emerged—why and when—the symposium set the stage for discussions about the role of transformation and transformation processes within architecture, landscape architecture, and urbanism.

All eleven articles in this proceedings publication—except those by the invited keynote speakers Sven-Olov Wallenstein, professor at Södertörn University in Stockholm, Sweden, and Mo Michelsen Stochholm Krag, associate professor at Aarhus School of Architecture, Denmark¹—were submitted to a double-blind peer-review process conducted by NAF/NAAR. The publication also includes a not-peer-reviewed written contribution by Mogens A. Morgen and Tom Nielsen. At the request of NAF/NAAR, they have kindly authored an introduction to Research Lab 1: *Transformation's* focused engagement with transformation.

As president and vice-president of NAF/NAAR, we extend our sincere gratitude to the many colleagues who kindly contributed to the symposium and/or to the present book. Thanks go to our collaborators at the Aarhus School of Architecture: professor Mogens A. Morgen, professor Tom Nielsen, research coordinator Hanne Foged Gjelstrup, and research assistant Sidse Martens Gudmand-Høyer for successfully co-organizing the symposium. Equally, on behalf of the association, we wish to thank the many researchers from Research Lab 1 who participated as moderators during the symposium.

We are very grateful to the individual authors who submitted articles to the publication and to the many peer reviewers who have supported NAF/NAAR and its work by offering their time and professional expertise in reviewing the articles. We would like to express our appreciation to all of these people.

Last but not least, we address our gratitude to our financial benefactors. The publication of the present book was made possible thanks to the generous support of Dreyers Fond, Brandförsäkringsverkets Stiftelse för bebyggelse-historisk forskning, Stiftelsen Arkitekt Agnar August Palmér's Minne and Stiftelsen Elna Bengtssons Fond för Vetenskaplig Forskning.

Anne Elisabeth Toft
President of NAF/NAAR

Magnus Rönn
Vice-President of NAF/NAAR

NOTES

¹ The three keynote speakers at the symposium were: Sven-Olov Wallenstein, professor at Södertörn University in Stockholm, Sweden, Mo Michelsen Stochholm Krag, associate professor at Aarhus School of Architecture, Denmark, and Ellen Braae, professor at Copenhagen University, Denmark. The latter did not develop her keynote lecture into an article for this publication.

INTRODUCTION

Anne Elisabeth Toft and Magnus Rönn

With the present proceedings publication, NAF/NAAR and its collaborating partner, Research Lab 1: *Transformation* at Aarhus School of Architecture, wish to shed light on different concepts of transformation that exist within the disciplines of architecture, landscape architecture, and urbanism. Our point of departure is a shared interest in architecture as an act of transformation. We are interested in how concepts of architecture and the transformation of architecture give way to new design problems and solutions. Moreover, we are concerned with how the transformation of architecture may change its epistemological frameworks, such as the architectural discipline or the notion of architecture itself. Our interest in transformation embraces questions of how architecture can be conceptualized, how in practice architecture engages with and reacts to its contexts, and how transformation may be used as a strategic approach in addressing future societal challenges. It furthermore includes questions of architectural representation and its related production, aesthetic practices, and norms.

Transformation can be understood as an act or process of change, or of being changed. From this perspective, a transformative process in architecture, landscape, and urban form may be a sequence of activities that causes change to existing structures or situations to be brought about. Transformation implies time, whether short or long. As discussions of sustainability and architecture have evolved, the concept of transformation has gained in significance as an approach to developing the built environment more broadly. And it is presently a concept that drives the overall green transition in society. In recent years, we have seen transformation emerge as a key concept with strong normative connotations across different fields of architecture and scales.¹ In this development, transformation is often related to ethics of reuse, and to the idea of reducing the footprint of the built environment and of the expanding cities.²

The articles included in this proceedings publication reflect on how the concept of transformation has been used in both theory and design processes. They focus on different issues and approach the concept from many different angles. The articles represent the research interests of the scholars who participated in the 2021 NAF/NAAR Symposium, but they also represent the research discourse of Research Lab 1: *Transformation* at Aarhus School of Architecture.

As an introduction to the latter and a backdrop to the topic of the book, the architects Mogens A. Morgen and Tom Nielsen, both professors at the lab, reflect on its commitment to concepts of transformation in architecture. Their contribution 'Concepts of Transformation' describes how the researchers of the lab have been united around a critical discussion of the subject matter since 2016. The research discourse of the lab comprises architecture, architectural heritage, landscape architecture, cultural environments, and urban design and planning. Researchers at the lab work with transformation processes at all levels of scale by exploring their significance, history, and relevance, as well as their potential for the future development of society.³

Thoughts, concepts, and the development of the same invariably require a background and an epistemological framework. In his article 'The Invention of Space', the Swedish philosopher Sven-Olov Wallenstein explores the cross-disciplinary creation of the concept of space in architectural theory. Concepts are constructions, he writes, and his reflection on the concept of space in architectural theory, its development, transformation, and discourse, presents a dynamic process that takes place from the latter part of the nineteenth century to the first decades of the twentieth century. Pursuing this subject and its epistemological framework, Wallenstein turns to philosophy. Although the invention of concepts is not limited to philosophy, it nevertheless, according to the author, constructs or produces concepts and to some extent also the 'conceptual personae' that surround the concepts and form their 'environments'. Philosophy has informed architecture, and along these lines Wallenstein discusses the interaction between philosophy and architectural theory.

With the article 'Rurality of Ruins', the Danish architect Mo Michelsen Stockholm Krag reflects on the contemporary transformation and preservation of architecture. In his view, his research offers an alternative to the traditional preservation approach in Denmark, which, based on preservation ideals

from the nineteenth century, primarily focuses on monumental architecture and its preservation. Michelsen Stochholm Krag's research in contrast deals with the mundane—the Danish villages and their current depopulation process; a process which has changed rural Denmark and its image. Ruins of abandoned buildings have become a common sight in many Danish villages. In his article, Michelsen Stochholm Krag discusses a series of preservation attempts developed and tested as the transformation of abandoned buildings undertaken at full scale through a subtractive architectural practice. His research initiates a discussion of possible new directions in the preservation of the rural built environment and a renegotiation of the ruin per se. In his article, he aims at pointing to alternative ways of dealing with the growing number of rural ruins; ways that, in his view, are perhaps better than the current large-scale strategic demolition projects initiated by the Danish government to counter the ruinous villages in Denmark.

The theme of ruins, and how heritage can become meaningful in the process of its passing, is also central to the article by the Danish architect Katrine Majlund Jensen, 'Artistic Practice as Preservation Process: An Experiential Conception of Heritage in Transformation.' She asks how architectural testimony can take a different form than preservation, suggesting that attention should be 'redirected from material stabilization onto how creative experiential accounts of decay and obsolescence can also be a part of future remembrance' (p. 67). Discussing this particular take on modern ruins, or ruins of the recent past, Majlund Jensen explores two cases—two modern concrete structures whose decay, as she points out, has attracted an experiential pondering, whether in words or pictures, on the value of the sites at the time of their continued ruination. Thus calling attention to the mediation of the two cases, her article also reflects on representation and the documentation of ruins and their transformation.

The built environment can be seen as a catalogue of traces of time, patterns of previous usage, and echoes of history that are constantly recreated by the new users and functions. In the article 'Socially Driven Urban Transformations,' the Polish architect Urszula Kozminska and the Spanish architect Nacho Ruiz Allen investigate transformation as a sequence of activities that has the power to change certain urban situations, their physical constituents, existing social relations, and engagement. Their contribution is framed by the concepts of heterotopia, participatory design, and co-evolutionary planning, and it centres around community-driven transformation processes.

Kozminska and Ruiz Allen present three different cases of transformation: one in Detroit (a powerhouse), one in Berlin (an office building), and one in Aarhus (a square) where the architects behind the projects acquire the role of mediators and interpreters. The analysis by the authors focuses on diverse community-driven, participatory transformation processes, in which citizens, social agents, influent organizations, and alternative networks play a central role. According to Kozminska and Ruiz Allen, inclusive design practices may enrich urban transformation processes. The authors conclude that urban transformation, handled with attention and care, has the potential to preserve existing social relations, enhance them, and build new communities that give a sense of identity and belonging to previously disconnected urban actors.

‘Typologies of Sharedness: From Utility to Spatialized Focal Practices and Exchange’, co-authored by the two Spanish architects Rosana Rubio Hernández and Fernando Nieto Fernández, reflects on how novel architectural types may respond to contemporary needs for sharing spaces and resources in urban areas. According to the authors, their article ‘draws on the hypothesis that motivations for sharing spaces and communal resources in urban areas have changed from modern utilitarian and affordability concerns towards a balanced approach, incorporating contemporary needs and desires to overcome excessive individualism, and to fulfil personal and collective goals’ (p. 118). Hernández and Fernández’s overall concern is how architects can provide qualified conditions for co-living in the city. The article is divided into two sections. The first section reflects on context-related factors leading to the above-mentioned transformation motivated by sharing spaces and communal resources. The second section outlines a theoretical framework based on the German-American philosopher Albert Borgmann’s concept of focal practices to enhance local community values. The authors’ research approach is founded on a case study of the new urban development of Hiedanranta in Tampere, Finland. In the article, Hernández and Fernández identify and discuss three specific types of sharedness in architecture: ‘placemaking sharedness’, ‘uprooting sharedness’, and ‘structured sharedness’.

Concepts and methods supporting reduction, recycling, and redesign in architecture are a challenge for academia and for practising architects, public sectors, and the industry alike. Kemo Usto, Marie Frier Hvejsel, and Camilla Brunsgaard discuss this challenge in the article ‘Towards a Metabolism of the

(Im)Material: Transformations of an Urban Sink'. The team of authors, consisting of Danish architects and engineers, is trying to find ways to minimize the negative effects of the built environment on nature by testing sustainable 'design scenarios' and developing sustainable 'design rules'. The article introduces the 'urban sink' as an overall key concept and architectural typology in testing how larger volumes of construction waste may be safely stored and reused. The urban sink, conceived as a safe storage space for building waste materials in the city, is described by the authors in a design scenario for the Danish city of Aalborg, experimenting with five design rules. In the article, the latter are presented as: 1. Context and material flows, 2. Materials, geometry, and transformation principles, 3. Transformational functionality, 4. Transformational gesture, 5. Transformational concepts and narratives. Pursuing metabolism as a concept of transformation in architecture, the article sets out to give a methodological and theoretical background for the author's design approach, leading to descriptions of and reflections on the scenario, the urban sink and its integration into the urban landscape of Aalborg. According to the authors, the scenario findings show that 'through a tectonic method of thinking, a metabolic transformation of material and immaterial aspects, the design holds spatial, recreative possibilities which can help to potentially increase the amount of reused materials and help to slow and narrow material flows—thus overlapping the act of storage with recreative use, providing an alternative to material libraries in larger warehouses, et cetera.' (p. 170).

In his article 'Representation of Architecture through Virtual Media', the Danish architect Anders Hermund reflects on how architects, and architecture, in his opinion, can benefit from the emerging digital media and tools such as virtual reality, eye tracking and EEG analysis, and insights gained from neurology. His interest in the latter concerns the relation between (virtual) media and the perception of architecture. More specifically, Hermund is interested in how architects can establish a use of digital virtual reality representational models in architecture that come close enough to the reality of human perception to make it a useful tool in the design and transformation of architectural projects. Drawing on theory and knowledge from recent neuroscience, in describing how the human brain works when perceiving two-dimensional surfaces and three-dimensional forms and spaces, he sets off to discuss his own research on the subject area, illuminating various cases of research into the applied use of virtual reality in architecture. Together with colleagues, Hermund has created several experiments and set-ups to evaluate

and develop a functioning virtual reality representational model system that, as he argues, includes useful feedback for architects when working on the transformation and design of architecture.

‘Reflecting Societal Discourse on Underground Station Transformations’ by the Finnish architect Annika Tuominen examines the interaction between underground stations and public discussions of mass transportation in New York City. Underground stations are spatially complex structures, and their spatial arrangements and configurations are often redefined over time so that the infrastructure can meet contemporary needs regarding connectivity, transit service, use, et cetera. This kind of transformation can be seen in the New York City subway, which Tuominen uses as a case study in her investigation of the dialogue between physical alterations and changes in public discourse. The overall aim of her article is to reflect on transformations in underground station configuration and their relation to discussions of the time, to which they may have been responding. The presented study has been conducted in the context of a specific station complex which includes the interconnected *14th Street–6th Avenue* and *14th Street–7th Avenue* station facilities in New York City. Tuominen identifies formation and transformation of the circulation patterns qualitatively through floor-plan annotations, archival material studies, and by analysis of the building phases of the subway complex. She also reflects on the media coverage of the New York City subway during the years of expansion of the station complex. In her article, five transformational phases are recognized in the station complex. The first four phases took place in the early decades of the twentieth century. The fifth transformation phase, during the 1970s, did not include the construction of new stations. However, a new underground passageway was introduced in the area connecting the last separate station to the complex. According to the author, the citizens of New York City have not always been pleased with the expansions of the subway. The general opinion regarding how the subway should tackle public needs has shifted over time from collective success stories to the dissatisfaction of individuals.

The article ‘Terrain Vague: A Proposal for a Landscape Laboratory in the Charente Estuary’, authored by the Italian landscape architect Francesco Cauda, deals with transformation at a large scale. The article reminds us of how climate change is altering our landscapes with consequences that are often unpredictable, not least at coastal and riverine landscapes, which are the focus of Cauda’s interest. In his article, he elaborates on the dramatic

effects of a rising sea level, heavy rainfall, and related floods as he unfolds a case study from 2020 connected to the Charente Estuary on the French Atlantic. His thoughts on landscape transformation concern the future of marginal areas—that is, sparsely populated regions with little agricultural and industrial value—such as the area of his study. Based on insights gained from this, and sustained by topical research on climate change, Cauda sets out to discuss the perspectives of landscape protection and nature restoration in the age of the Anthropocene, and the potential of developing a so-called landscape laboratory in the Charente Estuary. Cauda argues that a landscape laboratory in the Charente's floodplain could become part of an urgent public discussion about climate change and contribute to the development of adaptation strategies useful for other similar areas along the Atlantic coast as well.

With the Peruvian architect Alexander Auris Gonzales, the concept of transformation once more is connected to the grand scale. In his article 'Cajamarquilla: A New Proposal for Intervention in Archaeological Sites', we are introduced to research on the urbanization of the Global South and its consequences for the protection of archaeological heritage sites. In his article, Auris Gonzales presents to us the case of the pre-Columbian site Cajamarquilla—a 167-hectare open-border archaeological site in Peru—presently integrated into the dynamics of the outskirts of Lima. One might claim that it is an archaeological site which is not very well protected, since the population living around it uses the site and has integrated it into everyday life. Tensions between urban development, preservation of archaeological heritage, and the everyday life of urbanites, Auris Gonzales argues, are often neglected, which leads him to ponder alternative strategies and new approaches to so-called public archaeology, being the practice of presenting archaeological data and interpretations of that data to the public. The focus of Auris Gonzales's article is thus to discuss the right of the people to use archaeological heritage sites not only as visitors but also as actual users and dynamic agents.

The final article in this proceedings publication is 'Life-Cycle Assessment of Transformation Scenarios of a Traditional Danish House' by the Danish author team consisting of Teddy Serrano, Thomas H. Kampmann, and Morten W. Ryberg. The multidisciplinary team includes an engineer, an architect, and a sustainability specialist. With a view to sustainability, the article describes how a small, neglected, half-timbered building in Denmark from 1887 can be transformed into a house suitable for dwelling through

restoration or renovation. A life-cycle assessment, a widespread and standardized tool for assessing the environmental performance of products and systems, was conducted to quantify the environmental impacts related to four scenarios of transformation, three scenarios of restoration, and one renovation scenario. Thus, the old building has been used as a test bed. The objective of the authors was to identify the most environmentally friendly way to make the building inhabitable again. They wish to bring forward new perspectives and knowledge on renovation and restoration that can contribute to development in both architectural research and practice. Their study was conducted within the master's programme Cultural Heritage, Transformation and Conservation at the Royal Danish Academy. Dansk Håndværk (Danish Craftsmanship) purchased the old half-timbered building in 2017. Serving as a concrete example of good craftsmanship, the idea was that the building should be used in the education of young students becoming craftspeople.

Architecture may be seen as an act of transformation. In fact, transformation as a key concept, method, process, and professional practice in architecture, landscape architecture, and urban design has many facets, which this publication clearly shows. An important conclusion from the 2021 NAF/NAAR Symposium is that the transformation of architecture implies new design problems and solutions that may retroactively change our perception and conception of the past and how we previously understood architecture. Architecture is always both about the reproduction of society and about proposing an alternative future. Balancing between concepts of the past and the present, between tradition and innovation, between memory and change, this book aims to foster new insights so as to help illuminate the concepts of transformation in architecture, landscape, and urban form. It intends to bring forward new perspectives and knowledge that can contribute to development in architectural research, professional practice, and architectural education.

NOTES

¹ See, for example, Julianne Hanson, 'Urban Transformations: A History of Design Ideas', *URBAN DESIGN International* 5 (2000); Aseem Inam, *Designing Urban Transformation* (New York: Routledge, 2013); and Ellen Braae, *Beauty Redeemed: Recycling Post-Industrial Landscapes* (Risskov: IKAROS Academic Press, 2015).

² See, for example, the programme of The International Union of Architects (UIA) World Congress of Architects 2023: Sustainable Futures – Leave No One Behind!, which took place in Copenhagen on 2–6 July 2023, <https://uia2023cph.org>. The UIA organizes a World Congress of Architects every three years. The 2023 event attracted more than 6,000 participants from 135 countries.

³ See <https://aarch.dk/en/about-research-lab-1/>.

CONCEPTS OF TRANSFORMATION

Mogens A. Morgen and Tom Nielsen

ABSTRACT

The Aarhus School of Architecture has been focusing on concepts of transformation as a special area of teaching and research for some time. Changes in the built environment are important knowledge for the understanding of contemporary architectural practices and include a professional concern: how to make design contributions to a pre-existing context. This challenge serves as a fundamental starting point for the School's Research Lab 1, *Transformation*, and its development of concepts, methods, and theories on the relationship between architecture and resource awareness. The Research Lab 1 has taken a broad research approach to transformation that includes architecture, architectural heritage, landscape architecture, cultural environments, urban design, and planning.

In 2017, visiting professor Andrés Mignucci from Puerto Rico was invited to the Research Lab to reflect on concepts of transformation in a workshop at the School. He presented a comprehensive overview of transformation in architecture and added a list of concepts. The discussion that followed shed a new light on alterations in the built environment, and resulted in a thinking-and-writing process at the Research Lab 1 developing to find a mutual understanding of transformation processes. The outcome was a book called *Concepts of Transformation* presenting fourteen perspectives on transformation. In this collection of ideas, changes throughout the life of a built environment are seen as a consequence of natural processes. Alteration is a companion to architecture. Accordingly, concepts of transformation must be defined by their contemporary context, which in turn leads to time-bounded interpretations. Transformation becomes a professional ethical obligation of architecture and a new ethos of architectural theory.

KEYWORDS

Concepts of transformation, time, value palimpsest, ethos of architectural theory

TRANSFORMATION AT AARHUS SCHOOL OF ARCHITECTURE

On the occasion of the 2021 NAF/NAAR Symposium held at Aarhus School of Architecture and hosted by the research lab *Transformation*, we wish to briefly explain why and how we at the lab see transformation as an important area of architectural research.

Transformation has been one of Aarhus School of Architecture's focus areas of teaching for more than a decade, and from 2016 onwards the school has also focused on transformation as a special area of research. When, in 2021, the lab *Transformation* hosted the NAF/NAAR Symposium 'Concepts of Transformation', the concept of transformation was already important to much of the discussion of architecture. And in the nearly two years between the conference and this publication, it has almost become a maxim in ever wider circles. Knowledge and research about transformation is important to understanding contemporary architectural practices. Fortunately, transformation is not just a sensible requirement imposed on architects due to necessities outside the discipline. It is also a professionally extremely interesting and rich field that may contribute to architects making an even greater effort, as it requires us to relate very precisely to what is already given: the context. Wishes and demands for constructing fewer new buildings and focusing more on recycling and rethinking may mean we have to reduce the pace. That has most often turned out to be a good thing for the quality of the architecture that is created!

In Aarhus School of Architecture's research lab *Transformation*, we do research into, among other things, the connection between good architecture and resource awareness. And in this context, 'good' does not just mean living up to various (more or less) measurable performative aspects related to energy use. Good architecture is also rich in experience, meaningful, and sensuous; it is functional architecture that roots us in the world. Basically, we employ a broad understanding of the concept of architecture. Architecture may comprise both landscapes and buildings. And it can be anything from design to strategic long-term plans for developing spaces and physical environments.

In our lab we conduct research broadly across architecture, architectural heritage, landscape architecture, cultural environments, urban design, and planning. We work with processes of transformation at all levels of scale by

exploring the processes' significance, history, and relevance, as well as their potential for the future development of society.

Transformation is a specific technical term from the field of architecture. But the term also, on a more general level, refers to the processes of change our society is constantly undergoing. To our lab, transformation is about listening to changes in society in order to focus our research on robust, long-term, and sustainable solutions within the transformation of urban spaces and cultural environments with a strong focus on the benefits of preserving, restoring and reusing existing buildings in terms of resources and the environment.

We understand the lab's field of research as a culture that has developed continuously throughout history, a culture that seeks to create knowledge about (and strategies for) how understanding and using this culture can be employed to create the architecture of tomorrow. Research into landscapes, processes of urbanization and built structures is connected with heritage ranging from existing buildings and cultural environments to small-scale interventions and human practices that are part of the built environment. The field of research also comprises international and regional networks with professional fields within landscapes, urban development, planning, urban spaces, heritage, and buildings that comprise material as well as immaterial aspects and mindsets. This is in recognition of the fact that our environment and building culture are constantly undergoing transformations. And we strive to ensure that in our time these transformations occur with a special focus on sustainability and the green transition—be it environmentally, socially, economically, or culturally. The lab's research aims to connect with other disciplines and to base itself on a wide range of methodological approaches. It includes theoretical approaches, academic approaches, empirical research based on architectural methods—as well as forms of practice, development work, and research by design.

ANDRÉS MIGNUCCI

In 2017, visiting professor Puerto Rican architect Andrés Mignucci (1957–2022), at a workshop at Aarhus School of Architecture, invited our lab to engage in a scrutiny of the concept of transformation. He asked us the question: 'If every act of architecture is an act of transformation, then what distinguishes our understanding of transformation as different from how it is understood by others?'

Being engaged in urban design, architecture, and cultural heritage, Mignucci presented a comprehensive but at the same time well-summarized text, as an overview of the field. By looking at Mignucci's list of transverse concepts, aided by his analysis of numerous examples, we were inspired to see the concepts anew: that is, in a way that upsets how we traditionally use the concepts within our respective frameworks of research. During autumn 2017, we commenced, as a team, a thinking-and-writing-together process, the concepts being subject to mutual, enhanced examination in a process of—sometimes heated—discussions. In this way new common ground was discovered, new perspectives and insights gained, and we anticipated a breeding ground for future cooperations that go across our subject groups. This led us to write the book *Concepts of Transformation* and, some years later, to arrange, in collaboration with the Nordic Association of Architectural Research (NAF/NAAR), the NAF/NAAR Symposium on the same topic under the same headline.

CONCEPTS OF TRANSFORMATION

Our book *Concepts of Transformation* and this present proceedings publication from the NAF /NAAR Symposium of the same name discuss the concept of transformation as a 'network of concepts'. The interrelationships between them will emerge in the research, design, and teaching springing from the activities of the laboratory.

The concept of transformation cannot be defined once and for all, as it is determined by context and time-bound interpretations. Our research engages in discussing such interpretations and in understanding the contexts which, at given periods of time, have been dominant and have constituted meanings. We are interested in finding out how they work, how they have come about, and what supports them—and what still relevant potentials they may have suppressed.

Time, Context, Palimpsest, and Value are key concepts of this investigation:

Time

Time is an absolutely fundamental concept because, when we talk about transformation, we talk about changing, improving, and adapting something that has existed for some time. This may only be a short period of time because the quality of the thing in question was low to begin with. Because it did

not last. Or perhaps the use it was created for suddenly became irrelevant. This points to a concept of quality of architecture that concerns itself with that which lasts, with being relevant over a long period of time, regardless of function or durable materials, etc. This does not bring about any new perspective on architecture, but rather an emphasis on specific aspects of architecture. Thinking about timescales and different lifetimes for different parts of buildings is key. This is something people who work with the art of restoration, landscape architecture, and urban planning are accustomed to doing.

Time and temporality define how we perceive ourselves as part of society and as part of nature around us. A temporality that is relative to the context in which we define ourselves and scaled to suit a certain narrative, making us part of millions of years of natural evolution, or a cultural entity defined by the technologies we have mastered. It is worth asking if (and, if so, how) creative practice can help us to recall that we are living along this continuum of time, bound to spaces and dimensions well beyond our own human lifespans? We need to remember that architecture can also, maybe more than anything, be understood as ‘time machines’, in which time is a concrete building material that helps make spatially visible this continuum of past, present, and future. All our actions are elements in the ravages of time, and tuning in to this constantly evolving continuum both helps make us more aware of the present moment and also shifts us into a more appropriate sense of relationship with the rest of the world.

Context

Context now most commonly refers to the environment or setting in which something exists. When we say that something is contextualized, we mean that it is placed in an appropriate setting, one in which it may be properly considered. But if we remind ourselves that the word ‘context’ is deeply rooted in the Latin word *contextus* and the present infinitive of its parent verb *contexere*, meaning to ‘weave together’, we may realize that context also, and maybe more appropriately, refers to the act of transformation. Contexts establish relationships between otherwise disparate parts. Thus, context has an active root dealing with the act of weaving together things, patterns, events, materials, forms, and spaces. In this understanding of context, it is not only a collection of (more or less static) elements placed on a given surface. More than anything, it is an act of gathering together

different dynamic relations, in which people and things are continually coming together, merging, and splitting apart again, only to come together once more in different relationships.

Palimpsest

The term palimpsest refers to a parchment that has been written upon several times, often with the earlier writing showing through the later. It has been easy to make a metaphorical comparison between the palimpsest as an artefact of many meanings and the configuration of cities. Architects have used the concept as a tool for reading existing cities, but they have also developed it into a descriptive model for working with the contemporary city's stratification, and with its superimposition of interlinked layers and uses. A palimpsest approach to transformation urges us to pay attention to the layers that came before the present layer. It urges us to work with new layers as a modification, elaboration, sequel, superimposition, or extension of earlier layers. As the palimpsest originally contains an element of chance, it also allows us to bring together materials that *a priori* have nothing to do with one another. In this way transformation laid out as a series of actions can reveal previously unseen relationships and contrasting scales. Thus, the architecture as palimpsest can tell a narrative of history or simply a story.

Value

Every act of transformation implies valuation. Value is relational and hierarchical. Something is of particular value in comparison to something else: something similar, something different or maybe even something absent. Transformations are formed and informed by the values of the actors involved. Transformations are responses to existing conditions or may stem from a lack of caretaking, a lack of use, or from changes in patterns of use, technology, or climate. Regardless, transformation is an act of valuation in the sense that something was not prioritized enough to uphold it as it was. Likewise, patterns of use change due to preferences or needs. Deliberate transformations of landscapes, townscapes, buildings, or infrastructures are based on existing qualities, or the lack of such qualities, valued by the involved actors. Still, values may not be agreed upon, and sometimes they are not even likely to be actively articulated. Moreover, even deliberate valuations seldom result in an established common ground. On the contrary, it may well be the very controversy over values that provides an opportunity to explore and create transformations.

TRANSFORMATION, THE CURRENT ETHOS OF ARCHITECTURAL THEORY

When we read comments that are part of the discussion of architecture, see headlines at architectural exhibitions, et cetera, there is an awareness by the people who drive and lead the more principle-based discussions of the architectural profession that the climate crisis must be tackled, and the need is for a more sustainable circular approach to the built environment, based on recycling and transforming what we have already built and the materials that have already been extracted and processed. If we look at the role architects play in efforts to mitigate the worst effects of the climate crisis, it becomes clear that their role is to be the ones who can see the potential of transforming, converting, renovating, and recycling—and can also demonstrate and point out this need to others. Transformation has become a professional ethical obligation of architecture, and a new ethos of architectural theory.

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Also, for our mission statement we have reused and quoted from the website and research plan of Aarhus School of Architecture.²

NOTES

¹ Stefan Darlan Boris et al., eds., *Concepts of Transformation* (Aarhus: Arkitekt skolens Forlag, 2018).

² 'About Research Lab 1: Transformation', Aarhus School of Architecture, <https://aarch.dk/en/about-research-lab-1/> (accessed in September 2023).

THE INVENTION OF SPACE

Sven-Olov Wallenstein

ABSTRACT

This essay investigates the invention of the concept of space in architecture, in a process that took place from the latter part of the nineteenth century to the first decades of the twentieth century. Beginning with a reinterpretation of Immanuel Kant's theory of space as a form of intuition, which comes across in Gustav Fechner's claim that aesthetics must be done 'from below', it then continued through a series of reflections on the idea of empathy in Robert Vischer, Adolf Hildebrand, Heinrich Wölfflin, and August Schmarsow. These debates formed the implicit backdrop for the architectural theory of early modernism, notably in the writings of Sigfried Giedion, in which a theory of spatial interpenetration forms the bedrock for an analysis of architecture as a tool for the organization of social relations.

Drawing on Gilles Deleuze and Félix Guattari's claim that philosophy should be seen as the art of forming concepts, I argue that similar creation processes can be found in the artistic field, connecting components from psychology, philosophy, and a host of other disciplines. While not invalidating Deleuze and Guattari's model, the example of space beckons us to reformulate their theory in a more complex manner than comes across in the triad philosophy–science–art, which will prove useful for theorizing historical transformations and ruptures.

KEYWORDS

Space, empathy, Gilles Deleuze, Sigfried Giedion

INTRODUCTION

In *What Is Philosophy?*,¹ Gilles Deleuze and Félix Guattari attempt to define philosophy by referring to what it does, rather than by its claims to truth, or the type of methods that it proposes. What, they ask, is the specific practice of philosophy that sets it apart from other disciplines? Rather than a series of answers to alleged perennial questions (the nature of God, truth, being, etc.), philosophy, they argue, is the art of creating and constructing *concepts*, whereas science (which here seems to exclude the humanities and social science) deals with *functions*, and art engages *percepts* and *affects*.

The first thing we can note is the absence of a normative claim: we are dealing with something like a meta-theory (a vocabulary they would probably not accept) that does not say which concepts should be produced, which concepts are to be accepted—should we become Platonists, Cartesians, Kantians, or something else? The issue is not what philosophers *say* they are doing, which already places us inside a particular philosophy and its procedures of justification, but what they *in fact do*. To this one might object that such a neutral description is not possible, and in the book, there are indeed many instances of polemic, where the authors seem to cross the line and display their own preferences, and the tension between normative and descriptive remains unresolved.

Negatively speaking, the claim that philosophy is the art of creating concepts implies that it has no need to answer to the requirements of other types of discourse. If it is true that Deleuze and Guattari's book assumes a meta-perspective, then it is just as true that philosophy as such is anything but a meta-discipline for them. It is not the 'logical syntax' (if we extend Carnap's term somewhat beyond its original meaning) of other sciences or discourses, although it can use other discourses as material or draw inspiration from them—and the collaborative work of Deleuze and Guattari is surely one of the most striking contemporary examples of such a transversal and nomadic philosophical activity. Philosophy is not subjected to anything else; it is a radical constructivism, and what it constructs is concepts and to some extent also the 'conceptual personae' that surround the concepts and form their 'environments'.

In these constructions, the task is not to solve problems handed down by the tradition, clarify issues in our use of language, or provide a more secure

basis for our everyday beliefs or the sciences. The concepts created do not exist beforehand in some dim state, but are precisely creations, which in one sense draws them into the vicinity of art, yet without the two merging into unity. Only philosophy produces concepts in the proper sense, which also means that they are signed in a peculiar fashion, though without belonging exclusively to anyone: the Platonic, Cartesian, Kantian, et cetera, concepts are neither free-floating universals nor simply embedded in their original context; they exist in the time of the virtual that allows for reactivations and transformations, as it were a continuity made of ruptures, each time reshuffling the cards and letting us see the past in a different perspective.

From another angle, Deleuze and Guattari need to determine the practice of philosophy by setting it apart from three of its most insidious rivals. Thinking, they claim, is not the *contemplation* of readymade forms or ideas as they appear in the Platonic tradition—Plato, Nietzsche once said, was the most resolute and cunning of liars when he claimed to have discovered and contemplated the ideas, since this obscures the fact that he first had to create them. The second rival, closer to us in history (roughly from Kant onwards), is the idea that philosophy is the *reflection* on experiences or objects already produced in other spheres (science, mathematics, art), which relegates philosophy to a secondary position, without any objects of its own, as well as denying scientists, mathematicians, and artists the capacity to reflect on their own. The third, contemporary and perhaps most insidious rival, makes the claim that philosophy deals with *communication*: its task would be to lay down a set of rules for the transmission of knowledge, assuring the prevalence of consensus, as in Habermas, or a more loosely understood cultural conversation ('dinner at the Rorty's'). Communication, Deleuze and Guattari write, is something required of us by the market, by the powers that be, and it is in fact the end of philosophy, its dissolution into the media. Against this, they stress the need to defend the autonomy of philosophy and the singular quality of what it produces.

This place of philosophy does not, however, signal superiority in the sense that it would dominate the other disciplines; it rather exists alongside them, often intersecting in unforeseen ways to produce resonances, drawing on their results to generate a concept that yet belongs to none of them. Thus, the question as to whether philosophy is or can become a science, constantly recurring at least since Kant, is misguided and disfigures both sides.

If philosophy can be taken as 'knowledge through pure concepts', a claim inherited from rationalism (one can here think of Leibniz and Spinoza) that Deleuze and Guattari still uphold, and these concepts in turn need to be created, then how does this creation take place? There is no single method available, and there may be a necessity of forging new words, exploring archaisms and etymologies (Heidegger would be a case in point here), or examining terms drawn from other disciplines by detaching them from their original context, all of which requires a moment of style or taste that too cannot be defined in advance. Furthermore, if concepts have their own life and rhythm, it is because they do not simply emerge as answers to problems given elsewhere: problems emerge together with solutions, and to create a concept is to create new problems.

This is why Deleuze and Guattari reject the theme of a possible 'end of metaphysics', largely inherited from Heidegger, and they do not worry over the name 'philosophy', which is at stake too in Heidegger's claim that the 'end of philosophy' would signal 'the task of thinking', so that we would be caught (forever, as Derrida would add) at the threshold that separates the two. Philosophy begins anew each time that a concept is produced, and it does neither advance towards completion (Kant's 'secure path of a science', Hegel's absolute knowing) nor towards an exhaustion in which metaphysics ends in being dissolved in the sciences—the latter it might do, but only if we stop doing it and become the functionaries of communication.

Many of these claims would require lengthy comments, which is, however, not what I intend to do here, but rather to draw on them to reflect on how 'conceptual transformation' could be understood. One weakness must be pointed out nonetheless, for it has direct bearing on our topic and concerns the triad philosophy–science–art, which seems like a neo-Kantian conception that strays from much of the earlier work of Deleuze and Guattari. It is true that philosophy forms the centre of their analysis (as is indicated by the title of the book), which might explain why science and art remain comparatively underdetermined. But while Deleuze and Guattari say that the latter indeed think, too, although in a different fashion, their respective forms of thinking seem to remain caught up in an opposition to philosophy, without being sufficiently developed in their own right. And, as noted at the outset, there is a striking neglect of the humanities and the social sciences, which

tends to make the conventional inventions in these fields invisible to the extent that they cannot be grasped as 'functions', which is only rarely, if ever, the case. Thus, I would argue, we need think across the divisions proposed by Deleuze and Guattari to do justice to the creation of concepts in other disciplines. My example here, the concept of *space* in architectural theory, shows how the act of invention draws on philosophy, sciences, and the arts, producing a new entity that in turn shifts the valence of other concepts in all three spheres. It is a transformation that is also an invention, since to invent means to transform.

THE CATEGORY OF SPACE

In a book that has been rediscovered as a decisive document of early modernist architectural theory, although it received little attention in its own time, Sigfried Giedion's *Bauen in Frankreich* (Building in France, 1928),² the author proposes that the division between subject and object, and between the organic and the technological, is undergoing a fundamental change. (Figure 1) In the modern world, Giedion suggests, individual things are dissolved into a single, intense, and malleable space, where mind and machine merge in new unity that he terms 'interpenetration' (*Durchdringung*).³ This unity depends not only on a series of technological achievements, but also on signals, through the changes that it effects in consciousness, a political shift towards a space of communality, a being-together of subjects and objects as well of classes and social groups. It is, Giedion claims, an emancipation that produces a collective order, while at the same time providing architecture with a decisive yet diffuse role in the creation of this order.

The examples cited are significantly drawn from modern engineering, the Eiffel Tower, the Pont Transbordeur in the harbour of Marseille, and from the architecture of Walter Gropius and particularly Le Corbusier, who becomes the object of long and lyrical descriptions. Of Corbusier's apartment buildings in Pessac, Giedion writes, 'neither space nor plastic form counts, only RELATION and INTERPENETRATION. There is only a single and indivisible space.' And the lightweight and slender wall elements that had been criticized for resembling sheets of paper to him rather appear like 'Cubist paintings, in which things are seen in a floating transparency', producing a 'dematerialization of solid demarcation that distinguishes neither rise nor fall and that gradually produces the feeling of walking in the clouds.'⁴

The concept of interpenetration that binds all of these cases together first involves a set of architectural parameters: spatial volumes that intrude upon each other, levels that are made to intersect by the partial removal of floors,



Figure 1. Front page to Siegfried Giedion. *Bauen in Frankreich* 1928.

Source: <https://www.berlinbook.com/book/siegfried-giedion-bauen-in-frankreich-1928/>

osmotic relations between interior and exterior, buildings composed of several intersecting volumes that create a fluid whole. And as we have noted, his flattening of compositional and tectonic hierarchies, as it extends along a continuum from the single building to the city—eventually rendering these two poles if not obsolete then at least depriving them of their absolute status—corresponds to a levelling of social divisions between forms of labour and social classes. A common task begins to emerge, Giedion suggests, although it requires that we discard traditional ideas of architecture as a bearer of merely aesthetic and formal values if we are to perceive the true stakes. This space is indissolubly at once architectural, perceptual, and social, and in drawing together the subjective and the objective, the social and the aesthetic, it prepares and promises a new form of life.

Hence, space no longer appears as an empty, neutral container for things or as a set of abstract coordinates, but rather as a field of transformation, traversed by forces—it is, we might say, using a term forged much later by Deleuze and Guattari, a ‘smooth space’ made up of virtual relations, rather than an already ‘striated’ geometric space into which entities would be inserted. This also means that architecture faces a new task: no longer to produce self-sufficient forms that symbolize, represent, or even express something that would precede them, but to create specific conduits for a stream of life that flows through them and to enhance its potential. Architecture striates the smooth, while also, as we will see, itself being questioned by the new space that it is called upon to organize.

Giedion here synthesizes a long development that he edits and transforms into a story of his own. In relation to recent architectural history, he emphasizes the role of construction, which finally, after having been pushed down into the un- or subconscious throughout a long and confusing nineteenth century, is raised in the twentieth century up to the conscious level: ‘Construction in the nineteenth century plays the role of the subconscious (*des Unterbewusstseins*). Outwardly, construction still boasts the old pathos; underneath, concealed behind facades, the basis of our present existence is taking shape.’⁵ The new conception of space would then be both the result of construction and the element in which it unfolds, both product and a precondition, invention, and discovery. Here Giedion seems oblivious of a long legacy of predecessors, and with this question of space as a foundational category we enter one of the most decisive prehistories of modernist architectural theory, which still reverberates in many discourses that would claim

to either disown or pursue the modernist legacy, both with and against the later and more general use that Giedion would make of the term from *Space, Time and Architecture* (1941) onwards.

INTUITION, CATEGORY, CONCEPT

The discourse of space as an explicit category in aesthetic theory has a short but dense history, and it can be traced back to the turn towards new psycho-physical theories that emerged in the mid-nineteenth century, and then to the discussions of ‘empathy’ (*Einfühlung*) from the 1870s, as they developed from the pioneering work of Robert Vischer, through Adolf Hildebrand and Heinrich Wölfflin, up to the first explicit claims for space as the founding idea of architecture made by August Schmarsow in the 1890s.⁶ (Figure 2)

These claims all derive from Kant’s transcendental turn, in which space and time were reinterpreted as forms of intuition and thus as conditions of possibility for knowledge rather than as features of the things themselves. Space is not a category that actively organizes cognition, like substance, causality, et cetera; instead, through space a manifold is given in passivity, which is why



Figure 2. August Schmarsow. Photo: Nicola Perscheid/ullstein bild via Getty Images, Wikipedia.

space for Kant cannot be taken as a concept, and the very expression of the 'category of space' is in fact confusing in his case. In the later development, however, Kant's claims were filtered through a new experimental science that aspired to displace traditional philosophy. Categories and forms of intuition were here understood based on scientific data, mainly from psychology and physiology, which they themselves originally were supposed to make possible.

Superficially, this blurring of the distinctions between concepts and categories on the one hand, intuitions on the other, might be seen simply as a curious and easily refutable misunderstanding of Kant's project. More productively, however, it can be interpreted as part of a gradual transformation of the very idea of the *a priori*. Following Michel Foucault's analysis of the epistemic formation of this period, the new psychophysical vocabularies could be called *objective transcendentals*, in which the contents of knowledge were made to function as transcendental reflection; they are both empirical givens and the conditions for any empirical givenness as such.⁷

While these data were largely drawn from psychology, both history and the emerging social sciences also made their respective contributions, resulting in the emergence of a kind of 'psychologism' or 'historicism', against which the two major new movements at the turn of the century would subsequently react: analytical philosophy with Gottlob Frege and phenomenology with Edmund Husserl.

The anti-psychologistic gesture of Husserl was instrumental in bringing about the renewal of transcendental philosophy (whereas Frege's analysis of thoughts as entities separate from the mind eventually gave rise to the linguistic turn in analytic philosophy that I here leave aside). The sharp divide that Husserl at first seemed to set up against the immediate past was misleading, however, and the dynamic and genetic dimension of the subject soon returned in phenomenology. This indicates the extent to which it was never a question of simply returning to Kantian *a priori* structures, but of integrating the results of the sciences in a new conception of philosophy. Husserl's true problem was rather that of a dynamic transformation of the transcendental for which the preceding investigations into the psychological genesis of knowledge could neither be ignored nor simply assumed as factual answers to the problem of epistemology. Instead, they called for a different type of founding, which had already impacted aesthetics. There, the attempt

to ground the discipline through a rapprochement to the new forms of psychology and psychophysiology had been particularly fertile, and it is this line of thought that can be followed up to the statements of Giedion, who, consciously or not, synthesizes a whole spectrum of theories and discourses.

STARTING FROM BELOW

The historically decisive formulations of this new field of inquiry can be found in Gustav Fechner, who advocates the shift in the most general terms: aesthetics, in order to finally become a science, must be developed from below (*von unten*), starting in empirical observations, and not from above (*von oben*), as in the idealist tradition from Schelling and Hegel.⁸ We should not analyse general ideas of art and beauty, Fechner suggests, but investigate our actual experiences; and aesthetics in this version becomes an experimental psychology that seeks the laws governing psychological processes, which in turn are ultimately grounded in physiological states.

The theory of empathy was an attempt to account for this lawfulness, and if we bracket the earlier discussions of the term in Friedrich Schleiermacher, whose main interest was the hermeneutics of historically distant texts, we encounter its first relevant use in the young Robert Vischer's dissertation *Über das optische Formgefühl: Ein Beitrag zur Aesthetik* (On the Optical Sense of Form: A Contribution to Aesthetics, 1873). Vischer distinguishes between everyday seeing (*Sehen*) and the specific and focused look (*Schauen*) that we direct towards works of art, and his question is why we tend to appreciate certain forms. The answer lies in a transference that occurs spontaneously between the mind and objects because of our physical interaction with them: in empathy we become part of what we see. For Vischer, this ultimately depends on a process of natural identification, an empathic transference that occurs in relation to all things but attains a higher level in art and the optical sense of form, through which we get access to 'a higher physics of nature,'⁹ with a formula that might have been picked up directly from Friedrich Wilhelm Joseph Schelling and early Romantic philosophy of nature.

Consequently, empathy is present just as much in the production as in the reception of artworks, and the process of which these two moments are part goes beyond the subject-object divide towards an integral philosophy of nature: empathy works in two ways, and the *Ein-fühlung* is a 'feeling-in' of the subject in the object as well as of the object in the subject.¹⁰ Ironically, the demand for empirical science made by Fechner almost immediately reverts

to its speculative opposite, although not necessarily as a misunderstanding, but rather as a working out of an inner tension that is constitutive of the new physiological aesthetic as such.

When art is brought back into and grounded in the sensorium—a process that had been underway since the initial stages of aesthetics, in Alexander Gottlieb Baumgarten's writings from the first half of the eighteenth century—the sensible, the sphere of *aisthesis*, does not remain the same as it previously had been, that is, a lower domain subordinated to our higher faculty of reason, to which it merely would deliver material in a raw and unprocessed state, but begins to acquire a relative autonomy that also demands a new and expanded understanding of thought itself.¹¹

The hierarchy between the sensible and the intelligible is transformed into a fluid exchange, continuing through the ambivalent position of aesthetics in Kant (on the one hand, a transcendental aesthetic, with space and time as the sensible 'elements' of pure reason, and on the other hand, a new dimension of the faculty of judgement that requires a critique of its own), the rapidly shifting theories of philosophy's grounding in intellectual and aesthetic intuition in Schelling, the fluctuating evaluations of art in Nietzsche, and beyond him to a long legacy of twentieth-century thinking on art.

Nietzsche's own treatment is in fact exemplary of these ambivalences, and his varying views, from the early claims in *The Birth of Tragedy*, where art is determined as the 'highest task and the proper metaphysical activity of life', through his middle period, where he turns to a positivist critique of speculative aesthetics—which echoes in some of his last writings, where aesthetics is mockingly portrayed as 'nothing but applied physiology'—to his final period, where art is understood in terms a perspectivism that calls for an entire re-evaluation of the sensible, outside of the Platonic hierarchy.¹²

As these examples show, the trajectory of the aesthetic is anything but a straight and linear development; it sidetracks, backtracks, and follows a sinuous line that however eventually ushers into an important strand of twentieth-century art theory, where another feature becomes decisive, which was also there from the beginning, even though relegated to the margins, meaning that the sensorium is itself something that is produced by technological means.¹³

FROM EMPATHY TO SPACE

In the discourse on empathy, Vischer's initial intuitions were developed further in Heinrich Wölfflin's *Prolegomena zu einer Psychologie der Architektur* (Prolegomena to a Psychology of Architecture, 1886), which asks the question of how pure tectonic forms can be understood as being expressive. Here, too, the human body is taken as the ground, and the physiological aspect is even more pronounced, whereas Vischer largely remained within a more limited optical dimension. It is because of our body that we can understand weight, contraction, pressure, the bearing of loads, et cetera, which for Wölfflin ultimately stems from a dynamic inherent to nature itself. Matter strives to descend and to attain a state of formlessness, while the 'formative force' pushes towards gathering, elevation, and a higher unity. Forms can thus be taken to develop organically out of matter because of an 'immanent will' that wants to break free, and while Wölfflin perceives himself as Aristotelian, he seems to be more of a Baroque thinker, and there is an unmistakable Leibnizian inspiration in this idea of plastic forces.¹⁴ In Wölfflin the concept of space as such, however, tends to recede into the background in favour of the biomorphic motif, and it comes to be understood more in the sense of an environment or an *Umwelt* of an organism that itself remains a stable centre. Seven years later, the theme is brought to a new level in the works of Adolf Hildebrand and August Schmarsow. Hildebrand's 'The Problem of Form in the Fine Arts' focuses on the perception of sculpture, and for him space is a 'continuum', like a basin of water where individual bodies form separate volumes. In architecture, on the other hand, our relation to space is expressed directly; it becomes present in terms of a 'total spatial image' within which all tectonic relations acquire their significance.

This conceptual development culminates in Schmarsow's 'The Essence of Architectural Creation' (1893), where the autonomy of the single architectonic elements is even further reduced in favour of a total experience. We cannot understand the work of architecture if we see it as stones and vaults, Schmarsow suggests; instead, it relates to a total sense of space originating from our body as a zero point where the spatial coordinates intersect. Architecture produces a 'feeling of space' (*Raumgefühl*); it is a 'creatress of space' (*Raumgestalterin*), and only on this basis can its parts and tectonic details be expressive and have a specific meaning.

The conclusion that could be drawn from this is that the body is not simply—or, more radically put, not at all—in space, as if in a container: the objectivity

of space is fundamentally a projection, arising from or woven out of the subjectivity of the subject. While these ideas are only hinted at in Schmarsow, they prefigure many of the themes that would become central in the phenomenological tradition from Husserl to Heidegger: the reduction of objective Cartesian extension, the analysis of the kinaesthetic sphere through which the ego organizes a system of motility and tactility, the difference between the objective-physiological *Körper* and the living *Leib*, even the idea of the Earth as an ontological ground of the tectonic categories.¹⁵ But he also opens for something that would only enter phenomenology in Husserl's late work, and then become even more pronounced in Heidegger, that is, a *historicizing* of the ground, in which this foundational space is itself turned into a techno-corporeal assemblage.

If the history of architecture, as Schmarsow proposes, should be written as the history of the 'senses of space', then this also means writing a history of the *body*, and of the changing character of intimacy and self-relation. Architecture is rooted in an experience of space, which in turn is founded upon the body, but this body is itself subjected to change; it is inscribed in all those technological assemblages that induce and produce our experience of space, so that it becomes a subject-object compound, able to orient itself in the world because it is itself a product of this world.

AVANT-GARDE SPACES

The project of the avant-garde that we find in *Bauen in Frankreich*, as well as many others, can be placed in the wake of this discussion, even though none of its key figures seem to have been aware of the connection. So, for instance, Theo van Doesburg's *Grundbegriffe der neuen gestaltenden Kunst* (Principles of Neo-Plastic Art, 1925), or Moholy-Nagy's *von material zu architektur* (From Material to Architecture, 1929). The latter concludes with a celebration of Gropius's Bauhaus building in Dessau and Brinkmann and Van der Vlugt's Van Nelle factory in Rotterdam, both of which, Moholy-Nagy writes, produce an 'illusion of spatial interpenetration of a kind that only the subsequent generation will be able to experience in real life—in the form of glass architecture.'¹⁶

Pushing Schmarsow's ideas beyond their original meaning, the new generation perceives the task of architecture as the active production of a transformed space, breaking down the barriers between subjects and objects, people and things, to allow for a structuring of everyday life from the bottom up,

based on interpenetration. In claiming that architecture is not first and foremost a set of forms and structures placed in a neutral and pre-given spatial container, but a technique for generating space and the experience of the subjects that inhabit it, they draw a conclusion that was already prefigured in at least half a decade of intense research in aesthetic psychology.

In this shift we can see the invention of concepts imply new problems and solutions that in turn strike back at the discipline itself, so that perhaps even the very concept of architecture must be abandoned, or at least radically transformed, as Giedion does not fail to notice. If architecture used to be an art form that produces autonomous and free-standing objects to be judged according to inherited aesthetic and morphological criteria, it must now be perceived as part of a larger process, a 'stream of movement' (*Bewegungsstrom*) that requires different analytical tools. At the beginning of *Bauen in Frankreich*, Giedion writes:

It seems doubtful whether the limited concept of 'architecture' will indeed endure. We can hardly answer the question: What belongs to architecture? Where does it begin, where does it end? Fields overlap: walls no longer rigidly define streets. The street has been transformed into a stream of movement. Rail lines and trains, together with the railroad station, form a single whole.¹⁷

The idea of a stream, flow, or flux (*Strom*) might here seem merely metaphorical, but it shows the profound link not only to the tradition of empathy, but also to contemporary philosophical thought, above all Edmund Husserl and Henri Bergson, both of whom seemed equally oblivious to their recent past. Rather than a container or a Cartesian substance undergoing modifications, for Husserl phenomenological consciousness is a 'stream of experiences' (*Erlebnisstrom*) held together by its inherent temporal structure of retention and protention, just as Bergson's vitalism speaks of an *élan vital* held together by the power of memory. Giedion's stream belongs to the same philosophical conjuncture, the difference however being that it belongs not to the immanence of a consciousness, but to a 'movement' pertaining to an exterior of which consciousness is itself a part. But rather than a mere objectivity, this exterior now itself assumes some of the characteristics of subjectivity, or, more precisely, becomes a kind of subject-object, an intensive field out of which things emerge.¹⁸ Whether this is closer to Husserl or to Bergson is perhaps a moot question (the element of exteriority is probably closer to

Bergson, at least if we follow Deleuze's interpretation, though it is a possibility inherent in both).¹⁹

At the same time, this field of motion into which architecture is, as it were, submerged is also what is *produced* by architecture, no longer taken in the 'limited sense', but as generalized constructive activity; it is not simply dissolved but retains a capacity to give shape to a stream that otherwise would be simply formless. And what its techniques for spatial penetration produce is a particular kind of transparency that allows subject and object to remain on the same plane, open to each other, but also to retain an instance of control and regimentation; the openness of interpenetrative space is a function of a constructive power that produces transparency.

When Giedion mentions that walls no longer rigidly define streets, and that the street has been transformed into a stream of movement, we can note that his vocabulary is derived from a first machine age discourse on energy, movement, and velocity, claiming to dissolve all firm objects that pose obstacles to a new type of freedom, which however itself needs to be organized along the lines of rational construction. In retrospect, from the point of view of the post-war developments, it would be possible to see this as already pointing ahead to the need for a more stratified analysis that describes the conduits of such forces, how they are channelled and rerouted—in short, we could say that the futuristic energetics of the first wave of the avant-garde already called upon the cybernetic reconstruction that was to be undertaken in the second wave. If architecture in Giedion's vision ceased to be the paradigm for order and stability to the point that its 'limited concept' would be dissolved, then this transformation, which we might understand as ushering in its 'general concept', indicates a new role within the emergent network space: architecture provides a spatial form to the flows themselves and must henceforth be seen as part of a more encompassing organizational technology.²⁰

The erasure of the boundary between street and building, and, in the next step, between inside and outside in a more general sense, can then be taken as one of the fundamental modes in which modern architecture attempts to exert spatial control. On the other hand, this just as much implies an increasing capacity for free movement, the creation of a space that allows for variegated subject trajectories and modes of perceiving, of which Corbusier's idea of the *plan libre* is probably the most famous case. The machine of architecture is not just a machine for living, but also a viewing machine, a movement

machine, and perhaps on the most general level a war machine in the twofold sense proposed by Deleuze and Guattari: it points to the idea of a smooth and non-segmented space, it breaks down an earlier segmented space, and yet it always recreates, as a kind of counter-effect, various new forms of striated and segmented imperial spaces that function like apparatuses of capture.²¹

SUBJECT AND EXPERIENCE

Coming back to the claims of Deleuze and Guattari about the creation of concepts, it is crucial to add that the act of creating should not be understood as the activity of a pre-existing subject. In a certain way, thinking is an *event* that befalls us; and just as problems and solutions are co-implicative, the creation of a new thought object also means creating a subject, a subject for thought, or the concept of such a subject and of what its experiences can be.

Without entering into the details of Deleuze's development, we should note that while the lexicon of transcendental philosophy never disappears in his work, it undergoes strange mutations. From *Logique du sens* (1969) and onwards, Deleuze will talk about consciousness as a transcendental field without an ego and describe his way of approaching this field as a 'transcendental empiricism', occasionally as a 'higher empiricism'. Given the history of these terms, transcendental empiricism must seem like a provocation—strangely enough, however, at one time the expression appears in Husserl's *Cartesian Meditations*, as if to indicate that what the reflecting ego encounters in its 'working field' (*Arbeitsfeld*) is never wholly subsumed in advance, never just the object of a recognition. Aside from this short remark, or perhaps slip of the pen, for Husserl the transcendental field is necessarily individuated through the form of the ego, and ultimately through the temporal flow; in Deleuze the unifying synthesis is *temporary* rather than *temporal*, and it is brought about by what he calls 'pre-individual' forms of individuation, singular events around which other events may crystallize in variable forms.

The plane on which the events are found is never without direction, never entirely smooth, to use an image from Deleuze and Guattari's *Mille Plateaux*, but always transcendently striated, although not necessarily by an egological instrument—none of which, of course, implies that the ego simply does not exist, only that it may form one centre of individuation on the plane, though not the primordial One. Like all universals, Deleuze claims, the Ego is something that needs to be explained rather than assumed as an explanation. The subject is a result of a subjectification, a concrescence of singularities and

series of singularities that are prolonged into each other and form variable centres, a 'fold' that brings outside and inside into contact in a new way.

If we apply these conceptions to the invention—or rather the series of inventions, each picking up and prolonging the previous one—of space that follow upon each other from the mid-1800s to the avant-garde of the 1920s, we can see that it is not just the emergence of a new theme, a discovery of the fact that architecture had always, albeit without knowing it, been an 'art of space'. More profoundly, it is reorganization that impacts both subjects and objects, theories and practices, and that opens up a new field of experience that subjects of different types (individual, collective, transversal) can come to inhabit.

And against the too rigid distinctions proposed by Deleuze and Guattari, at least as they appear in their last book *What Is Philosophy?*, we see that inventions of concepts are by no means limited to philosophy, but occur in ways that cut across disciplines, drawing on resources that beforehand seemed unrelated but, once they are brought into the new constellation, allow us to discern links hitherto invisible. These links did not pre-exist the invention of the new concept, just as little as the subject that discerns them, but emerge through a retroactive redistribution that shows how continuity and discontinuity are opposed only on the surface.

NOTES

¹ Gilles Deleuze and Félix Guattari, *Qu'est-ce que la philosophie?* (Paris: Minuit, 1991). Published in English as: *What Is Philosophy?*, trans. Hugh Tomlinson and Graham Burchell (New York: Columbia University Press, 1994).

² Sigfried Giedion, *Bauen in Frankreich: Eisen, Eienbeton* (Leipzig: Klinkhardt & Biermann Verlag, 1928). Published in English as: *Building in France, Building in Iron, Building in Ferroconcrete*, trans. J. Duncan Berry (Santa Monica, CA: Getty Center, 1995).

³ For a discussion of Giedion's various uses of 'interpenetration', see Hilde Heynen, *Architecture and Modernity: A Critique* (Cambridge, MA: The MIT Press, 1999), pp. 30ff.

⁴ Giedion, *Building in France*, p. 169.

⁵ *Ibid.*, p. 87.

⁶ For a collection of source documents, with a detailed historical introduction, see Harry Francis Mallgrave and Eleftherios Ikononou, eds., *Empathy, Form, and Space: Problems in German Aesthetics, 1873–1893* (Santa Monica, CA: Getty Center, 1994).

⁷ See Michel Foucault, *Les mots et les choses* (Paris: Minuit, 1966), pp. 329–33. Published in English as: *The Order of Things* (New York: Vintage Books, 1994).

⁸ See the introduction in Gustav Theodor Fechner, *Vorschule der Ästhetik* (Leipzig: Breitkopf & Härtel, 1876), pp. 1–7. The book, which contains the most cited formulas, is Fechner's last, but the ideas of an 'experimental aesthetics' had appeared in many of his earlier writings, and he can be said to have initiated the new turn.

⁹ Robert Vischer, *Über das optische Formgefühl* (Leipzig: H. Credner, 1873), p. 40.

¹⁰ In the work of Husserl and other early phenomenologists, notably Edith Stein (*Zum Problem der Einfühlung*, 1917), the problem of empathy is mostly seen as an epistemological issue, and aesthetics plays no role; conversely, as phenomenological aesthetics began to develop in the circle around Husserl, empathy received little attention, and when Werner Ziegenfuss summarized the early discussions in his dissertation *Die phänomenologische Ästhetik* (Berlin: Arthur Collignon, 1928), the concept does not appear. Later scholars have attempted to retrace these connections, although they are still relatively obscure; see Gabriele Scaramuzza's pioneering *Le origini dell'estetica fenomenologica* (Padua: Antenore, 1976), chapter 1. To my knowledge, the relations between early modernist architectural theory and phenomenology remain uncharted.

¹¹ I discuss the new determination of sensibility in Baumgarten in more detail in my 'Baumgarten and the Invention of Aesthetics', *Site* 33 (2013).

¹² For the idea of a highest metaphysical activity, see the final sentence of 'Versuch einer Selbstkritik', in Friedrich Nietzsche, *Der Geburt der Tragödie*, ed. Giorgio Colli and Mazzino Montinari, vol. 1 of *Kritische Studienausgabe* (Berlin: De Gruyter, 1999), p. 24; many translations available, most recently in *Nietzsche's early literary writings and The birth of tragedy*, trans. Steven D. Martinson (Rochester: Camden House, 2022). The later remark on aesthetics as 'applied physiology' was made in the context of an attack of Wagner, and we should not immediately see this as exhausting the possible meanings of aesthetics for Nietzsche: 'My objections to Wagner's music are physiological objections: and why still dress them up in aesthetic formulas? Aesthetics is to be sure nothing but applied physiology.' (Original German: 'Meine Einwände gegen die Musik Wagners sind physiologische Einwände: wozu dieselben erst noch unter ästhetische Formeln verkleiden? Ästhetik ist ja nichts als eine angewandte Physiologie.') See *Der Fall Wagner / Nietzsche contra Wagner*, vol. 6 of *Kritische Studienausgabe* (Berlin: De Gruyter, 1999), p. 418. On perspectivism and the overthrowing of Platonism as a 'new interpretation of sensibility', see Martin Heidegger, *Nietzsche I* (Pfullingen: Neske, 1961), pp. 231–54.

¹³ In fact, some of these claims were made already in the initial stages. To correctly use the ‘weapons of the senses’, Baumgarten suggests that we need to immerse ourselves in ‘aesthetic empirics’ (*ästhetische Empirik*), which involves all aspects of the situation, from the purely physiological responses of the body to technical instruments like microscopes and telescopes, barometers and thermometers, which all have in common that they prolong and expand our senses. See the second of his ‘Letters to Aletheiophilus’, in Alexander Gottlieb Baumgarten, *Texte zur Grundlegung der Ästhetik*, ed. Hans Rudolf Schweizer (Hamburg: Felix Meiner, 1983).

¹⁴ For the connection between Leibniz’s conception of *vis plastica* and Wölfflin’s analysis of Baroque art, see Gilles Deleuze, *Le Pli: Leibniz et la baroque* (Paris: Minuit, 1988), p. 6. Published in English as: *The Fold: Leibniz and the Baroque*, trans. Tom Conley (Minneapolis: University of Minnesota Press, 1993).

¹⁵ As Husserl deepens the analysis of intentionality and its embodiment, he eventually hits upon the Earth as the unmovable background of all theoretical acts, an ‘originary ark’ that grounds all our categories. Husserl’s fragment ‘The Earth as Originary Ark Does not Move’ was written in 1934, the year before Heidegger’s ‘The Origin of the Work of Art’, with which it shares many motifs. For an attempt to cross-read some of these issues, see my ‘Husserl and the Earth’, in *Disorientations: Philosophy, Literature and the Lost Grounds of Modernity*, edited by Tora Lane and Marcia Sá Cavalcante Schuback (London: Rowman & Littlefield, 2014).

¹⁶ László Moholy-Nagy, *von material zu architektur* (Berlin: Gebr. Mann, new ed. 2001), p. 236. Published in English as: *From Material to Architecture*, trans. Katrin Schamun and Jillian DeStone (Zurich: Lars Müller Publishers, 2021).

¹⁷ Giedion, *Building in France*, p. 90.

¹⁸ It is probably not coincidental that something analogous can be said of Kazimir Malevich’s ‘non-objective world’ (*gegenstandslose Welt*, literally ‘without objects’, *bespredmetnost*). It is not a world that would be simply lacking objects, but a field that art must attain through a process akin to phenomenological reduction, and out of which objects emerge.

¹⁹ See Gilles Deleuze, *Le bergsonisme* (Paris: PUF, 1966). Published in English as: *Bergsonism*, trans. Hugh Tomlinson and Barbara Habberjam (New York: Zone Books, 1991).

²⁰ For this reading, see Reinhold Martin, *The Organizational Complex: Architecture, Media, and Corporate Space* (Cambridge, MA: The MIT Press, 2004).

²¹ For the war machine and the apparatus of capture, see Gilles Deleuze and Félix Guattari, *Thousand Plateaus*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), chapters 9 and 10.

RURALITY OF RUINS

Mo Michelsen Stochholm Krag

ABSTRACT

In the eighteenth century, the early preservationists Eugène Viollet-le-Duc and John Ruskin manifested their initial concepts of how to approach what we today know as cultural heritage. These concepts formed the basis of modern restoration, occupying the field with prolonging and upholding, in both theory and practice. Presently, and in line with their approach, the vast majority of safeguarded buildings represents imposing monuments of the distant past.

In contrast, this article reports on a series of alternative preservation attempts developed and tested as the transformation of abandoned buildings undertaken at full scale through a subtractive architectural practice. This practice was initiated in Denmark, aiming at temporary and dynamic preservation strategies for the rural built environment with an emphasis on the involvement of local village communities. The aim was to reactivate obsolete buildings as material anchorage points of personal memories of place, so as to facilitate an exchange of these memories to strengthen the collective memory, and to rebuild community cohesion within the depopulating rural villages.

Thus, the practice differs from the classic notion of cultural heritage practices as the buildings are preserved for those with a personal and geographic relation. Most of the transformed buildings belong to the everyday environment and originate from the recent past, in contrast to most acknowledged monuments.

KEYWORDS

Transformation, rurality, radical preservation, memories

INTRODUCTION

Since the 1950s, the rural population in Denmark has been abandoning their home villages and moving into the cities. This is part of a global tendency, in Denmark as well as most other European countries, caused by a decline in employment in the context of food production and the related industries. As a consequence, the social imbalance between urban and rural is growing, which is reflected in the market value of property. Especially the Danish rural built environment of everyday life suffers, as the homes of the remaining rural population increasingly become unsaleable and later abandoned. Therefore, abandoned buildings in various states of disrepair have become a common sight in such rural villages. Ruins are, in other words, an inevitable condition of the Danish rural setting.¹

The question is whether current large-scale strategic demolition projects, initiated by the government to counter the ruinous villages, are the best possible way to react to the growing number of rural ruins—and, if not, then what is the alternative? This is explored through a series of preservation experiments, undertaken as research by design, of which three—‘The Controlled Ruin’, ‘The Confectionary’, and ‘Bedsted’—are outlined and elaborated on in the following.² The two first-mentioned of the three preservation experiments were initiated as pilot projects, each undertaken in a single-family home in two different villages, whereas the third preservation attempt expands the scale of the practice and revolves around the preservation attempt of the entirety of a station town.

The two pilot experiments have a temporary approach to preservation in common, in which the preserved object, here the abandoned building, undergoes continuous alterations subsequent to the initiating transformative intervention. They also share the preconditions of being based on subtractive architectural interventions not unlike mechanisms of decay, the engagement of the local community, and finally the concept of forming a catalyst, linked to a specific place, for exchange of local place memory.³ Despite their similarities, the experiments differ in their time span. Hence, ‘The Controlled Ruin’ was initiated in 2014 as a long-term preservation strategy and is still active. Conversely, the ‘The Confectionary’, initiated in 2016, explored an event-based, short-term preservation strategy and was deliberately demolished completely after a two-month period. The third experiment, the radical preservation of ‘Bedsted’, still in its early stages (at the time of

writing), involves various preservation strategies given the larger scale and the fact that its implementation must happen in accordance with the speed of abandonment. However, the continuum of strategies, developed in stages, enables all to fit into the overall framework. Namely, the concept of 'Bedsted' as a station town that throughout the coming decades is to interweave the remnants of its constantly reduced built environment with an expanding neighboring forest south of town.⁴

This article outlines how these experimental interventions were implemented and describes the responses and attitudes to which they gave rise within the local communities. Further, notions of and attitudes towards ruins throughout history, in theory and practice, frame the two interventions, thus enabling a discussion on possible new directions in (radical) preservation of the rural built environment that potentially could be tested as part of the Bedsted project in the coming decades.

THISTED MUNICIPALITY: THE FIELD LAB

Thisted Municipality in the north-western part of Jutland constitutes the field lab and is hence host to all of the preservation experiments undertaken as part of what could be phrased as an emerging counter-practice of radical preservation. The municipality qualified as a field lab due to its isolated geographical location with several depopulating village communities in which strategic demolitions were already executed on a larger scale.

Furthermore, ongoing experiences of cooperation between the researcher and the municipality already existed, compounded by the courtesy of being a part of further experimental research and a desire to seek alternatives to the ongoing demolition of abandoned buildings.

In the first quarter of 2021, Thisted Municipality had a population of around 43,000 and covered 1,074 square kilometres. The main town within the municipality is Thisted, with a population of approximately 13,000 inhabitants.⁵

Pilot 1: *The Controlled Ruin*: March 2014—A Long-Term Strategy

'The Controlled Ruin' was based on a neatly curated partial demolition of an abandoned building which subsequently allowed the remaining remnants to decay naturally. This precisely designed intervention transformed the abandoned building into a controlled ruin without a predetermined programme.

This experimental preservation attempt was implemented in a single-family home, originally the sexton's residence, next to a medieval church, in the village Snedsted with approximately 1,200 residents. Most residents were exposed to the preservation prototype on a daily basis, as it was located on a controversial site neighbouring the medieval church and the busy main road into the village.

The intervention reversed private and public, as the roof and major wall segment were removed in a horizontal split-level section, which deliberately exposed most eras of the building's private history. The surrounding community was allowed to engage with the prototyped transformation, to reinhabit it, or even to demolish it.

Throughout its lifespan of more than 100 years, the building had undergone several alterations in the form of expansions. The exposure of these alterations was enforced by the intervention in that spatial-material intersections were pinpointed, through cutting and removal, in which the material stratification revealed the building's different historic layers.

The concept of making the private past become the public present was intended to catalyse an exchange of personal memories of the building, the place, and the people who used to live there. This exchange of memories may have been enforced by some of the inherent properties of the ruin, as elaborated on later in the discussion on the ruin.

Reactions to implementation: in addition to its intended purpose—an exchange of memory of place—the intervention also triggered a discussion of the merits of privacy among the local people. The central bathroom, including a bathtub covered with light-blue tiles, was one of the most private spheres of the building while still in operation. Now, the intervention made it a visible part of public space. This reversal touched upon some crucial points to pay attention to when introducing new heritage practices aimed at the built environment of the recent past in a real-life setting. When vulnerable aspects surface, it becomes obvious that not all memories are good memories, and not all memories are meant for the public.

The intervention completely exposed the blue bathtub to the public, and it became visible from almost a kilometre away. The reversal of private and

public portrayed the blue bathtub as a focal point in the new interpretation of the former sexton's house.

On the landscape scale, the composition depended on the seasonal cycle. The previous sexton's house, now positioned as an interpreted representation of its alter ego, held an extraordinary position amongst the surrounding landscape. The dualistic relationship with the medieval church was amplified as a consequence of the subtractive intervention that formed the preservation attempt, as the exposed bright interior colours were contrasting the context.

When 'The Controlled Ruin' was first implemented in the early spring of 2014, visibility from the distance was particularly high, due to defoliation of the surrounding trees. This supremely visible appearance and the newly gained dualistic constellation between church and what remained of the sexton's house caused an increase in public awareness, given that the medieval church was the landmark and the pride of the village. The triggered aware-



Figure 1. 'The Controlled Ruin', less than a month after implementation, April 2014. (Photograph by the author.)

ness fostered some scepticism towards the newly arrived and more visible element in the old villagescape, but subsequently this may have augmented the discussions and exchange of memories among the local residents.

Conversely, it appeared that when the surrounding trees came into leaf, they incidentally created an intimate space in the garden of the former sexton's house, as the public exposure decreased rapidly and the dualistic relation to the medieval church vanished. Furthermore, the intimate space may have created an opportunity for a different and more private kind of conversation regarding the past of the place, which was to the benefit of the overall exchange of memories.

Less than a year after implementation, 'The Controlled Ruin' faced the consequences of its first Danish winter. The effects of frost erosion scarred the prototype, thus significantly softening the previously rigorous, modernistically designed edges of walls. Some of the walls made of hollow bricks turned into piles of rubble, whereas walls of concrete and massive brickwork proved



Figure 2. Close-up of 'The Controlled Ruin', less than a month after implementation, April 2014. (Photograph by the author.)

more resilient towards the climate. This was expected, as were the immediate reactions from the local community.

Most of the reactions may be ascribed to the inherent properties of the ruin and thus elaborated in depth later on in the discussion. To obviate increasing criticism, a parish evening was organized by request of the researcher to equip the local community with a forum to address their questions and criticism. It also aimed at providing the village community with insights into the research perspectives and the international context of the research project. The parish evening convinced the local community of the legitimacy of the changes in the villagescape caused by the intervention. Afterwards, the community was relatively convinced that someone at a certain stage would take action and was allowed to do so. This actually happened on the initiative of the sexton and the Parish Council.⁶

In the spring of 2015, the sexton affiliated with the neighbouring cemetery cleaned up 'The Controlled Ruin' and began to add green plants. Moreover, the Parish Council furnished the prototype with two sets of tables and benches. From this point on, 'The Controlled Ruin' moved towards the concept of the classic ruin as known from the Romantic period. In addition, at this stage the ruination process began to slow down. The added Romantic cloak and refurbishing, at the initiative of the local community, changed the status of the prototype. The remnants of the original sexton's house were now revitalized as a recreational addition to the cemetery. This locally facilitated revitalization did not prevent an exchange of memories of the building and the place. Conversely, it increased the number of visitors and consequently the potential, too, for further exchange. The local community's attitude towards 'The Controlled Ruin' near the church changed in a more positive direction, as the criticism, according to the sexton, diminished following the local community-driven revitalization. The Romantic cloak, initiated by the community itself, may have established a less intimidating situation for the local residents, softening the prosaic aspects of abandonment and contemporary decay within the rural villagescape. In short, an act of appropriation took place.⁷

However, years later some of the more sensitive problematics related to preservation based on the public exposure of private spheres surfaced. Despite a positive attitude towards the research project in the beginning, close family members of the deceased previous owner complained about the

decaying remains of their childhood home, and especially about the fact that the place had become public. This added another dimension to the concept of long-term, yet still temporary, preservation strategies that build on partial demolition and the subsequent integrated decay processes, especially when it comes to preserved objects belonging to the everyday environment of the recent past. Attitudes of emotional nature simply tend to change over time dependent on the impact of several visible or invisible but unpredictable and very complex systems. In this case, the passing of a close family member may have swayed the attitude.

The fragility and diverging attitudes within rural village communities experienced through an age-long engagement in relation to 'The Controlled Ruin' indicated, on the one side, an urgent need for further investigations, as the local identity proved to be connected to the physical anchorage point within the village context. On the other side, the radical preservation experiment revealed a potential element of vulnerability, as the privacy of those with the closest personal relations to these anchorage points risks public exposure.⁸



Figure 3. Close-up of 'The Controlled Ruin' dissolving, August 2021. (Photograph by the author.)

Therefore, another preservation experiment was initiated. This experiment addressed, in contrast to ‘The Controlled Ruin’, a building which in the past played a more public role within its community. Further, the experiment was based on a concept of immaterial preservation. Hence, the implementation of the preservation attempt was of an event-based nature and did not leave behind any physical remnants subsequent to the intervention.⁹

Pilot 2: *Theatre Installation*: June–July 2016—An Event-Based Strategy

The ‘Theatre Installation’ was—in contrast to, but still learning from, the ‘The Controlled Ruin’—entirely aimed at setting an example of immaterial preservation of a building. In short, the strategy was based on boosting a central public building which used to be a communal gathering point in a rural small town before its complete demolition. The preservation itself was based on creating a temporary on-site catalyst of an exchange of personal memories with the collective memory, so as to substantiate the local identity and strengthen community cohesion.

The ‘Theatre Installation’ was implemented as an event-based transformation of an abandoned confectionary into a theatre installation, focusing on engagement with the local community during the entire process, from initial work prior to the transformative intervention to the completion of the demolition. Section-based interventions were integrated as part of the ‘Theatre Installation’ in similar fashion as in the ‘The Controlled Ruin’. The confectionary was chosen, as it played a major role as a gathering point for the local community from the 1920s to the early 1980s. Up until 2011, the building was partly occupied by the widow of the last confectioner. In 2016, although abandoned for almost five years and now condemned to demolition, it still held a central position in the middle of the pedestrian street of the second largest town in the municipality. The ‘Theatre Installation’ was implemented in cooperation with Teater Nordkraft, an experimental theatre located in the city of Aalborg, as well as with local residents and Thisted Municipality.

The intention of the installation was to transform the abandoned confectionary into a peephole box and, through real-time streaming, to mirror the event to a minimal reconstruction of the confectionary in a black box at Teater Nordkraft in Aalborg. Apart from the local impact, the streaming also represented an attempt to increase public awareness of the social inequality between the rural and the urban in Denmark. The transformed building was to become a mediator between the rural village environment and the city.

Furthermore, and more importantly, on location the theatre installation aimed at catalyzing an exchange of local memories embedded in the confectionary to redeem these intrinsic immaterial qualities before the immanent demolition of the building. The concept was to generate increased attention towards the confectionary through a two-month reopening during the summer of 2016 before the building vanished.

Cyclical lighting and audio tracks orchestrated the physical interventions, and the local community itself managed and maintained the installation independently during the daily opening hours. The reopening of the old, abandoned confectionary, as a temporary boosting of the exposed memories of both the building and the place, proved strikingly appealing to the local community. More than 150 people participated in the confectionary's grand reopening on 4 June 2016. Local residents made up a high percentage of the attendance throughout most of the summer. Many residents from the city, who had visited the mirrored installation at Teater Nordkraft in Aalborg, supplemented this, later taking the two-hour drive to Hurup to visit the confectionary.

In contrast to the 'The Controlled Ruin', the 'Theatre Installation' did not leave physical remains, as the intention was to create an immaterial impact. The confectionary remained open for almost two months (4 June to 31 July) during the same opening hours as the other shops on the pedestrian street.

It was through the engagement of the local community that the two months of reopening were possible. During the entire reopening period, the community itself facilitated and kept the installation running. Not only did they open and close the installation in accordance with the other shops on the pedestrian street, they also served coffee and pastries in the courtyard every Sunday. The courtyard was furnished for this purpose, using a refectory table and benches placed underneath an old elder. The idea was to encourage the visitors to gather around the refectory table, providing an informal setting for dialogue and encouraging an exchange of memories of the place.¹⁰

Reflections on implementation: the boost of the waning confectionary, before its inevitable destruction, proved to instill among local residents a greater awareness of the communal identity that they themselves are a part of.



Figure 4. 'Theatre Installation', July 2016. (Photograph by the author.)

Boosting an endangered building before its foreseeable eradication places several demands on both the building and the environment. First, the impact is dependent on the location. Second, the importance of the building in relation to the community will most probably be reflected in the degree of local interaction. Third, being present on site is crucial to succeed in involving the community and, thus, the success of the initiated preservation. In conclusion, when the intervention is running autonomously through total embedment in the local community, it can liberate itself and achieve its purpose.

Bedsted: *An Ongoing Preservation of a Station Town: December 2019 – ongoing*

Bedsted Thy is a rural Danish station town within Thisted Municipality with a population of about 830. Bedsted dates back to the late seventeenth century, although it was not until the 1880s that the town began to flourish, when the station and the inn were built to accommodate the demands of the newly arrived railway. During this period, retailers also began to play a role in Bedsted.

Since the 1950s Bedsted has suffered from depopulation. Today, the northern and newest part of town is managing quite well in contrast to the old quarters in the southern end.

Furthermore, the old part of town has in recent decades been marked by the presence of local druglords and associated gang activity. Thus, the former town center, including the old trading street, has hit a downward spiral and remains partly abandoned in various stages of decay. This includes buildings essential to the community in the past, such as the station, the medical care center, the inn, and the cinema. All of these buildings are located on the former central square.

Building on the already outlined pilot projects, a 3-hectare, state-owned afforestation project neighboring the depopulating station town was initiated in 2020 with the intention to interweave the town with an existing plantation to the south-west. From this initiative the initial concept of combining afforestation with radical heritage practices transpired, in a quest for future directions involving interdisciplinary approaches to the contemporary condition of the rural, from which new ruralities may emerge.

The afforestation project is part of Denmark's national afforestation plan, initiated in 1989, which has as its overall goal the doubling of the forest acreage in the Danish countryside, with the ambition that 25 per cent of the total land area will be forested within a tree generation. From the state's point of view however, the primary intention is to protect precious ground-water resources. Thus, afforestation will continue throughout the twenty-first century. The process of establishing new forests can be traced back to 1805, where a series of laws was implemented to safeguard any remaining forest from overcutting. Since then, forest cover in the country has risen from 3 per cent to almost 15 per cent.

In contrast to the outlined pilot projects, each of the buildings addressed as part of the radical preservation of Bedsted inserts itself into a larger plan for the town, which is to be implemented over several decades. The buildings are transformed into controlled ruins, similar to pilot 1, in a pace corresponding with the speed of the ever-changing depopulation of the station town. Some of the buildings are reduced to minor remnants such as concrete slabs and wall fragments, attesting to the fact that something used to occupy the place, whereas others are programmed to maintain clearings in the emerging young forest. These clearings are considered culture-historical gathering points, their purpose being to stimulate exchange of memories of place among the local residents through the facilitation of stays of various duration. Furthermore, a few of the buildings reduced to controlled ruins are to play a crucial future role in the redeemed station town, for instance as portals into the emerging forest. Hence, minor additions are allowed to promote their special status. This is rendered visible in the form of the reinforcement of existing structures, as well as safety measures such as railings. The partial demolitions that initiate the controlled ruin stage of the radically preserved buildings are all embedded in the machinery and economy of the already up-and-running, state-funded strategic demolitions.

The gardens of the abandoned properties are an important part of the attempt to radically preserve the rural houses. They act as mediators between the condemned buildings, now reduced to controlled ruins through partial demolition, and the young emerging forest. They interweave the building remnants with the forest, for they establish cultivated wilderness as cultural plants over time dissolve and merge with trees of the forest, creating a hybrid image.

Ideally, over time the continuum of the radically preserved buildings will form a hierarchical organized hive that is interconnected by a mesh of forest paths and clearings, functioning as gathering points and wayfinders. Slowly but surely, the controlled ruins will gradually dilapidate and, over time, dissolve completely, while the forest and its clearings will continue to mature and change. This is an image that draws on Danish garden art from the twentieth century. In *Havekunstens oprindelse* (The Origins of Landscape), the Danish landscape architect C. Th. Sorensen characterizes garden art as stylizations of the surrounding countryside.¹¹

This characteristic is based on a particular tradition within Danish garden art of working with the forest and its clearings as transformational spaces, which are capable, at one and the same time, of containing both the visible and the concealed.¹²



Figure 5. From the emerging forest towards the station square: the partially demolished medical care center is visible in the foreground. On the left, the abandoned inn is visible, whereas the abandoned station is seen in the background. August 2022. (Photograph by the author.)

Rather than approaching the afforestation as detached from the town and the demolished sites as cleared from their former content, we argue for a heightened attention to what is already there: remnants of former private homes and gardens turned inside out and brought forward as small-scale interventions woven together with the larger afforestation strategy connecting town and countryside in a new rural and public domain between Bedsted and its surroundings.

The subtractive intervention, initiated in early spring 2022, centering on the abandoned medical care center marks the first stage of the research by design implementation at building level, whereas the first trees were planted in 2021. The medical care center represents one of the above-mentioned portals into the forest and is located on the former central station square. Despite its faded status, the station square will enhance the future role of the medical care center, as the railway platform is to remain as an active hub. The medical care center is reduced to a horizontal platform at ground level containing a combined portal and public terrace. Spared remnants in the form of the reinforced basement walls create a boundary between the low-lying garden and the station square. An added boardwalk leads into the forest and creates a link to the nearby national park.

DISCUSSION: RUINS IN THE CONTEMPORARY RURAL BUILT ENVIRONMENT

By introducing the concept of *age value* as a measurement tool based on the appreciation of age itself, Alois Riegl did not only deviate from his predecessors in the form of Viennese academics who often ascribed the more intangible aspects of interpreting the past to divinity. Riegl did also, and more importantly in this context, expand the catalogue of what a ruin could be. Such expansion led to the concept of the *unintended monument* that would also allow previously neglected buildings of the everyday environment to assume value on the basis of the accumulated traces of their entire lifespan.¹³ Whereas the intentional historic monuments over time (through restoration) are turning into copies of themselves and presenting a particular past as if it were the present, the unintended monument of the built environment is comprised of a spatial material palimpsest.¹⁴

The buildings of the everyday environment are, as such, unintentional monuments. Especially the existence of the buildings of everyday life are particularly contested in several ways, as already outlined. In the context of the

rural village, these buildings form part of an interwoven mesh of immaterial networks and relations between buildings, places, people, and their memories that extends far beyond the physical boundaries of the individual building itself.¹⁵ The buildings of everyday life do not call for attention, as they are part of the ordinary, and thus their disappearance goes easily unnoticed. This does not mean that they are no longer important to the surrounding community, for they may, for instance, form an anchorage point for the collective memory and therefore also still play a crucial role in maintaining local identity and community cohesion.

Throughout history, attitudes towards ruins have oscillated depending on their contemporary artistic movements and geographical origin. Obviously, the Romanticism in Western Europe brought the ruin into focus and celebration. In contrast, the Russian and later Soviet view on ruins has a far more pragmatic position that may derive from widespread poverty but can also be seen as a counter-position to the imposed Romanticism of Western Europe.¹⁶ Similar tendencies were evident in the former East Bloc. In Riga, the capital of Latvia, the historic 'layer' of the Soviet era, physically represented as Soviet modernist buildings, is currently being eradicated through demolition and subsequently replaced with contemporary reinterpretations of pre-World War II art nouveau buildings. This consolidates a fast and irreversible eradication of the recent past of a nation, as seen so often before throughout history. The fast eradication of recent history in the Danish rural built environment may not be as politically imposed as in the case of Latvia, although the result is the same. The greatest danger in such eradications may be oblivion, as forgetting can produce a risk of history repeating itself, when all the traces and physical remains of the unwanted recent past are erased.

In late nineteenth-century Germany, national monuments were rebuilt and supplemented to substantiate the notion of the German empire. Until 1871 Germany was more bound together by 'a sense of a nation' than defined by territorial boundaries, as the latter was not rational due to Germany's construct of several kingdoms and unions, as well as its unstable complex of borders as a result of war. This is what could be phrased as programmed oblivion or rewriting the past of a nation.¹⁷

The question is whether a halfway deliberate programmed oblivion is taking place in Danish rural settings, utilizing the strategic demolitions as a method,

while inalienable anchorage points of the collective memory part of the foundation of local identity and community cohesion—are rapidly eradicated.¹⁸

To understand the properties of ruins in relation to the radical preservation of abandoned rural buildings, it seems relevant to introduce notions of the ruin in Romanticism, as the ruin was praised in Western Europe during this period.¹⁹

In the Romantic period, the ruin was said to have the ability to evoke emotional feelings. This is rendered visible both in literature and in the arts and architecture of the time. The fragmented writings of the period resemble the broken entities of the physical ruin. In other words, the gap between the fragments stimulated an individual interpretation of what might have connected them in the past.²⁰

Professor Jonathan Hill at The Bartlett School of Architecture describes the ruins as precursors of change, as they are bringing a particular past into the present, a particular past that is lost. As such, they also point towards an uncertain future.²¹ This automatically leads to a discussion on attitudes towards ruins in the contemporary context of the Danish rural. The ruin gradually reveals its private past to the public as the interior becomes exterior as part of the decay processes. Thus, the full history of the building is rendered visible as a material X-ray. Unleashing the private sphere into the public creates a disturbance in the atmospheres of the place or, in the words of the German art critic and philosopher Walter Benjamin, ‘a sudden shock of awakening’. This substantiates the Romantic notion of the ruins as being capable of evoking emotional feelings.²²

Similar to the Romantic notions of the ruin, the outlined interventions prompted a specific condition. It was as if the brokenness leading to the reversal of public and private through the section-like method proved an ability to instantly trigger latent personal memories linked to a specific building or place. In other word, the unleashed memories were filling in the missing parts of a broken entity—memories that prior to the intervention had been concealed.

However, the overall positive attitude towards ruins in the Romantic period is not necessarily shared by the people living in rural areas today. First of

all, the celebration of brokenness and fragments in Romanticism was for the elite only, and therefore not directly applicable to contemporary rurality in Denmark, in which the everyday environment is dominant. Accordingly, it may not come as a surprise that brokenness in the rural villagescape is not appreciated by the local communities, as it, in Hill's view, is a symptom of an uncertain future. This may be the reason why strategic demolitions are welcomed by many village communities, as the demolitions in the short term signify an act of cleanup. Furthermore, when fragile and vulnerable heritage aspects important to rural identities, embedded in the brokenness, are immaterial and intangible of nature, and thus invisible, the rural village communities are not to be blamed.²³

More recently, however, an awareness towards the immaterial and intangible aspects of cultural heritage has emerged, as stated by ICOMOS in the Convention for the Safeguarding of the Intangible Cultural Heritage in 2003 or by Laurajane Smith in the paper 'All Heritage Is Intangible'.²⁴ In the aftermath of the ICOMOS convention, the definitions of what can qualify as intangible heritage remain extremely broad, resulting in a lack in development of new alternative methods to identify and preserve or activate the more ephemeral parts of built heritage.²⁵

CONCLUSION

Ironically, vast amounts are spent on intentional monuments to prevent natural decay by turning them into copies of themselves over time, whereas other vast amounts are spent on the rural built environment of everyday life to prevent decay through strategic demolition.

Throughout the last century, the combination of urban development and preservation practices has resulted in monuments being isolated as historic islands, frozen in time, and completely detached from their contemporary context. Today they appear as museum pieces on display, alien and artificial in their appearance.

The rural built environment on the other hand is challenged more than ever. ICOMOS has brought attention to the intangible and immaterial aspects of cultural heritage. Still, two decades later, contemporary heritage practices have failed to develop new methods to identify, preserve, or activate material, immaterial, and intangible aspects of the rural built heritage. Bearing the outlined radical preservation attempts in mind, the contemporary discourse

on cultural heritage plays down the importance of engaging the rural built environment of everyday life in the discourse. Despite this, the preservation experiments unearthed several unrecognized intrinsic immaterial qualities linked to buildings or the built environment emptied of function. This reveals a gap—in research and in practice—that calls for new directions in cultural heritage, for new directions based on more dynamic and engaging approaches to the field. Approaches are needed that are embedded in the rural communities themselves to the benefit of the waning identities of the rural villages, and from which new rural identities can emerge.

Rural villages exist in a fragile equilibrium of material and immaterial networks that is vulnerable to abrupt interventions imposed as, for instance, top-down governance, such as state funds for demolition projects. Learning from the counter-practice of radical preservation, it seems crucial that the Danish rural must be changed from within. Nevertheless, there may be one difficult precondition for a redefined cultural heritage apparatus that can access the unseen aspects of rurality. Namely, a broader societal reconciliation with the recent past.

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ARTISTIC PRACTICE AS PRESERVATION PROCESS: AN EXPERIENTIAL CONCEPTION OF HERITAGE IN TRANSFORMATION

Katrine Majlund Jensen

ABSTRACT

If modern life has been associated with progress, a considerable part of its built legacy is facing rapid decay. Not only does this present a challenge for the preservationist imperative to save culturally significant buildings for the future, but it could also be seen as an incentive to explore preservation beyond the agenda of saving. While the aesthetic and critical potentials of ruination have been richly dealt with within the arts and philosophy, in the field of preservation, dealing with the flesh of ruination itself, it still seemingly equals decay and neglect. In this context, the article asks how architectural testimony might take a form different from preservation. It suggests attention be redirected from material stabilization onto how creative experiential accounts of decay and obsolescence can also be a part of future remembrance. The examples of Bernard Tschumi's essayistic description of Le Corbusier's decaying Villa Savoye and Tacita Dean's atmospheric film about the obsolete Denge sound mirrors are explored as vessels of a more affective understanding of how heritage becomes meaningful in the process of its passing. Experiential accounts of modern ruined concrete not only offer an alternative to physical intervention but evoke a critical position towards the aesthetic preferences of normative preservation. The outcome is preservation as a creative just as much as restorative field of practice.

KEYWORDS

Experience and built heritage, modern ruins, decay, experimental preservation

INTRODUCTION

Modern life has been associated with progress, but a good deal of its built legacy now faces rapid decay. Caught up in entropic forces, structures from modern architecture to the remnants of war are turning into modern ruins. Recognizing this as a challenge for the preservationist imperative of saving culturally significant objects for the future, this article advocates seeing the process of ruination as a potential for rethinking built heritage beyond the agenda of saving. Unlike their ancient counterparts where decay has been arrested for centuries, the cultural proximity and often premature abandonment of modern ruins make them susceptible to creative approaches to preservation just as much as restorative approaches. Hence, the article asks how architectural testimony can take a form other than preservation. It suggests attention might be redirected from material stabilization to experiential accounts of decay and obsolescence as a way of remembering for a future. Bernard Tschumi's essayistic description of Le Corbusier's decaying Villa Savoye and Tacita Dean's atmospheric film on the obsolete Denge sound mirrors are explored as vessels of an affective understanding of how heritage becomes meaningful in the process of its passing. The experiential accounts of ruined concrete not only offer an alternative to physical intervention but become a critique of the aesthetic preferences of normative preservation.

MODERN RUINS

This article suggests an exploration of two cases which arguably represent modern ruins. They are examples where nature and the passage of time is the main agency of their ruination. Human agency is thus that of abandonment—or, as suggested by Shannon Dawdy, buildings are never really abandoned but remain in use, just in different ways.¹ The first case will illuminate the essayistic account of Le Corbusier's decaying Villa Savoye, built between 1928 and 1931, in architect Bernard Tschumi's 1970s essay and work 'Architecture and Transgression' as well as *Advertisements for Architecture*. Now a fully restored piece of modernist architecture and a World Heritage Site, the case will be used to reflect on the affective qualities of ruination and its dissonance with modern preservationist ideals. The second case will focus on how artist Tacita Dean's atmospheric film *Sound Mirrors* (1999) transforms our perception of an obsolete modern warning technology from a threatened historical record, into poetic, ruinous sonic sculptures displaying the slow passage of time. Built between 1928 and 1930 at the same time as Le Corbusier's Villa Savoye, The Denge sound mirrors are three concrete 'ears' built on Britain's Kent coast to capture early warnings of incoming aircraft. The

technology quickly became obsolete, and, although the sound mirrors have become a scheduled monument, they face ongoing deterioration.

Modern ruins, or ruins of the recent past, here refers to neither a specific typology nor an architectural style, but to the phenomenon of the often all too rapid obsolescence or deterioration of more recent architecture. Gavin Lucas argues that ruins of the recent past offer an ‘unfamiliar familiarity’.² Referring to something as ‘modern’ may be a pitfall and a trigger for scholarly digressions on the term, so the ‘modernity’ of the ruins referred to here needs a little clarification. Modern ruins are not necessarily ruins of Modernist architecture, although in this case they partly are. Importantly, the ‘modern,’ as used here, directs attention to common existential and chronological features of ruins. In a chronological sense, they are recent compared to the ancient and neatly sanitized heritage ruin where decay has been kept at bay for centuries. In a heritage context, that such modern ruins are both culturally and temporally proximate to us perhaps makes their process of ruination more appropriate to alternative approaches that can re-examine normative preservation. The examples in this article were both erected in the expectation of progress—in technology and warfare, or in architecture’s ability to improve social life—and in both cases, concrete was thought to meet these functional needs. As Adrian Forty has noted, there is a ‘long-standing association between concrete and utopian movements of all kinds’; however, that both sites encapsulate modern utopias brings a peculiarity to their all too swift abandonment and ruination.³ As Bernard Tschumi remarked in his 1976 essay ‘Architecture and Transgression,’ a fear of decaying organisms appears in both conservationist enterprises as much as in utopian projects.⁴ Yet, both case studies are entirely different—one now a preserved work of art, the other obsolete technology—and might jointly illuminate the potentials and limitations of a creative approach to ruination. Common to both cases, though, is that the decay of these modern concrete structures has attracted experiential pondering, in words or in pictures, on the value of the sites at the time of their continued ruination.

This article addresses the field of preservation and its intimate relationship with the concept of transformation. While processes of natural transformation give the discipline its existence, it also constitutes preservation’s fundamental challenge. While the aesthetic and critical potential of ruination have already been richly dealt with in the arts and philosophy, the essence of ruination itself is still seemingly equated with decay and neglect, and

this focuses its research and practice on material stabilization and maintenance. This article delves into the process of natural transformation not as a threat to heritage but as something productive for its interpretation. This is indisputably reminiscent of earlier echoes in preservation theory where the force of the fragment is an age-old topic for critical thinking. In John Ruskin's 1849 extended essay *Seven Lamps of Architecture*, a philosophy of preservation which appreciates all found layers of a historical building can be detected.⁵ Although Ruskin lays the foundation for a minimal-intervention approach, despising any return to an original or new additions to a building, his approach still reflects preservation as an act of saving a building in a point of culmination in its history. As noted by Denis Byrne:

The productivity of heritage is disguised by the language of stabilization. It construes itself as a field that doesn't produce things, rather it simply conserves things produced in the past. In the nineteenth century, the advocacy of people like John Ruskin and William Morris for conservation over restoration . . . helped emplace one of the founding myths of heritage practice: the fiction of non-intervention: that heritage is a kind of non-practice.⁶

Of course, preservation is discursive, and always has been, but the rhetoric of care and stabilization has a tendency to hide this. Thus Byrne's statement is symptomatic of the kind of transformation it is acceptable for architectural heritage to go through: not that of decay but that of transforming buildings into the historical record that they are supposed to represent.

Half a century later than Ruskin, art historian Alois Riegl radicalized the view on the visibility of temporal layers in a building's fabric. In his 1903 essay 'The Modern Cult of Monuments: Its Character and Origin,' Riegl proposed 'age value' as pertaining to the affect stemming from ongoing natural transformation of a building, using this as an interpretive imperative instead of arresting decay.⁷ As Riegl writes: 'From the standpoint of age-value, one need not worry about the eternal preservation of monuments, but rather one should be concerned with the constant representation of the cycle of creation.'⁸ Riegl here identified a function of the monument beyond that of documentary record. However, at its most extreme, age value could also mean a 'self-abolition of conservation,' as Jukka Jukilehto noted.⁹ This might also explain why, in practice, age value has often been reduced to a question of surface patina.¹⁰ Consequently, contemporary scholars still argue

that preservation has failed to fully explore what age value could imply for heritage interpretation and management, when taken beyond the pleasure of patina.¹¹ Riegl wrote about ‘monuments’ but what he had in mind with age value was mundane architecture or the ‘unintentional monument’: buildings interpreted, but not erected, as monuments.¹² Furthermore, he might have envisaged a more picturesque decay than that often produced by concrete. In this article, Riegl’s thoughts will not be interpreted dogmatically, but function as leitmotifs and as a reminder of how heritage value is never inherent, but ascribed in acts of interpretation. It will be used to address interpretations of decay as a way of questioning the task of preservation beyond the extremes of abolition and maintenance.

PRESERVATION AS EXPERIMENTAL FIELD OF PRACTICE

Seeing preservation as an experimental field of practice allows one to view Dean’s and Tschumi’s work, not as subcultural engagements with heritage, but as part of the agency and purpose of preservation. But being experimental about the preservation of valuable objects has rarely been regarded as positive. Such objects are more likely expected to be handled with care, and ‘expert’ care at that. Nevertheless, experimentation is proposed as the game-changing approach in the book *Experimental Preservation*. ‘The starting point is doubt,’ as Otero-Pailos states, and with that the book positions itself as a critical alternative to what it defines as ‘the longstanding identity of preservation with the governmental protection of cultural objects, and the largely unquestioned narrative that preservation bureaucracies always act for the common good.’¹³ What was a threat is turned into an operational doubt. Preservation here becomes an epistemological investigation into how heritage becomes meaningful, and that opens a framework for perceiving creative engagements with heritage as acts of preservation. Experimental preservation is therefore also an interdisciplinary practice: the preservationist—whether an artist, researcher, architect or other—being both an insider and an outsider to this field.¹⁴ To provide a lens that enables the processes of decay and obsolescence to be seen as qualities included within preservation, a reinterpretation is needed of one of preservation’s most fundamental tools: intervention.

Intervention has always been a key act in the preservationist’s toolbox, and much preservation theory has consequently centred on how much intervention into the physical fabric is appropriate, and how it should be carried out.¹⁵ Intervention is here associated with maintenance and care, with the

aim of affirming a certain meaning reserved for an object. An experimental approach, however, needs intervention to actively question our relation to an object and its interpretive boundaries.¹⁶ In this way, it is a practice-based critique of what Laurajane Smith has called the Authorized Heritage Discourse, which refers to the governmental and official choices of heritage that current generations 'must' care for.¹⁷ Unlike discursive and textual critique of governmental preservation, experimental preservation uses intervention as a way of touching the realm of experience en route to questioning architecture and its function as testimony.¹⁸

In authorized heritage discourses, built heritage is often emphasized as something that testifies by virtue of its historical significance. Here, the historical structure equals 'document,' whereas weathering and decay become threats to a building's message. As noted by Otero-Pailos, a preservation criterion such as 'historical significance' was however established towards the end of the nineteenth century, when preservation was still very much bound up with national identity and hegemonic masculinity. Furthermore, he points out how much of what defines our contemporary environment had not yet developed.¹⁹ In her book *Curated Decay: Heritage Beyond Saving* Caitlin DeSilvey proposes a perception of decay other than as a threat to an object's historical significance. She suggests how decay of cultural heritage could be seen as a glass half full instead of half empty. Whereas a glass-half-empty outlook sees decay as an erosion of significance, the glass-half-full approach sees it as the site's own productive relation to the past. Here, a site's original function might become less legible, but at the same time other narratives might be traced. Likewise, this could invite new modes of letting the original historical function of a site persist, although not necessarily in physical fabric with a plaque of its history.²⁰ DeSilvey's perception arguably removes preservation from a representational paradigm, where its ability to represent a certain phase in time—whether an event, a typology, a style, etc.—becomes its life purpose. Instead, it allows artistic engagements as acts of preservation based on evoking experiential sensibility towards decay. By juxtaposing such creative and experiential interpretations with the official biographies of the sites, the process of natural transformation becomes a process of negotiation: between different temporalities and the modes in which architecture becomes meaningful as testimony.

TRANSFORMING EXPERIENCE—EXPERIENCING TRANSFORMATION

Case 1. Villa Savoye, Poissy, France

By the late 1960s one of Modernism's defining buildings, Le Corbusier's Villa Savoye near Paris, came under threat of demolition, resulting in many young architecture students demonstrating in favour of saving it. I was one of them. When I visited it, something incredible happened; the building was amazing, it was quite astonishing in its state of decay—in its state of complete dereliction from many years of neglect. It occurred to me then that perhaps architecture is not only about perfection and the realization of an abstract concept; it is also about the sensations of the occupant, including making room for an interaction between building and feelings/body. I therefore began to press for a resolution through which the Villa Savoye could be preserved in the state in which it was at the time. The building stank; it was filled with graffiti; it embodied a very different presence than that conceived by Le Corbusier, and more emotional charge than contemporary design could achieve. Amusingly enough, the building came to be completely restored, but the restoration was so pure it was shocking, prompting a programme of de-restoration—restoration with less 'make-up'.²¹

In the early 1960s, the architect and critic Bernard Tschumi visited the Villa Savoye, describing in retrospect his evocative encounter with the site in its weathered and abandoned state. Now considered one of the most recognizable and renowned examples of the modernist style in architecture, Villa Savoye in the French town of Poissy was designed by the Swiss-French architect Le Corbusier and his cousin Pierre Jeanneret between 1928 and 1931. The building was home to the Savoyes, but after only a few years living there they left the villa in 1938. Interestingly, from the beginning they had continuously complained about structural damage and leaking roofs.²² Decay was thus almost built into the building's original state. From 1940 to 1945 the house was used by the German occupying forces, followed by the Americans, and was finally used as an agricultural warehouse. When finally abandoned, the villa gradually deteriorated and was eventually scheduled for demolition by the municipality of Poissy, which had bought the property to build a school on the site.

Tschumi's retrospective writing is interesting, as it encompasses two views on what is architectural and shows how his change in perception affects his vision for preservation of the building. First, he sees architecture as a product of the mind—as a demonstration of principles. As a young student, thinking of Le Corbusier's Villa Savoye as a style icon of architecture, Tschumi's response to the building was to demonstrate for its preservation. This however changed when he encountered the building in its decaying state. Then the concept of architecture turned into a sensuous experience of space, with its meaning formed in a moment of encounter. Suddenly, the most affecting aspect was not the artistic vision of the place but the smell of it. For Tschumi, this was a transforming experience, changing how he envisaged preservation. As artist and architect Vito Acconci writes:

If the space presented is complete, what's left for the viewer is to relive the space—this is the domain of fiction, the impulse is preservation (conservative); if the space presented is not yet complete, what's left for the viewer is to try out the space, attempt the space—this is the domain of essay, the impulse is change (radical).²³



Fig. 1. Villa Savoye around 1960 with stains, vegetation, and agricultural machine. © Rene Burri.

Tschumi's experiential encounter with the Villa Savoye's transformation from complete to incomplete essentially marks a shift in perception of the site: from representation, a fiction to relive, into the site as uncertain performative space, a space to try out, with the essay as his tool of reflection. Tschumi's encounter with the villa in the 1960s was, however, followed by a rescue of Villa Savoye, which quickly developed into an international campaign, and in 1964 it became one of the first official monuments of the Modern Movement. Gaining monument status prompted several renovation campaigns, and as part of Le Corbusier's broader body of work Villa Savoye acquired the status of UNESCO World Heritage Site in 2016.²⁴

Not only did decay threaten the artistic idea of the Villa Savoye, but it might also have made it too 'ugly' to keep. At least, this seems to be a common aesthetic conception of the material of concrete. David Lowenthal, for instance, notes: 'Some substances age less well than others. Concrete becomes more ugly every passing year . . .'.²⁵ Architect and pioneer of the use of concrete Auguste Perret was also not reluctant when he stated how 'architecture is what makes beautiful ruins'—a statement supplemented by Adrian Forty:

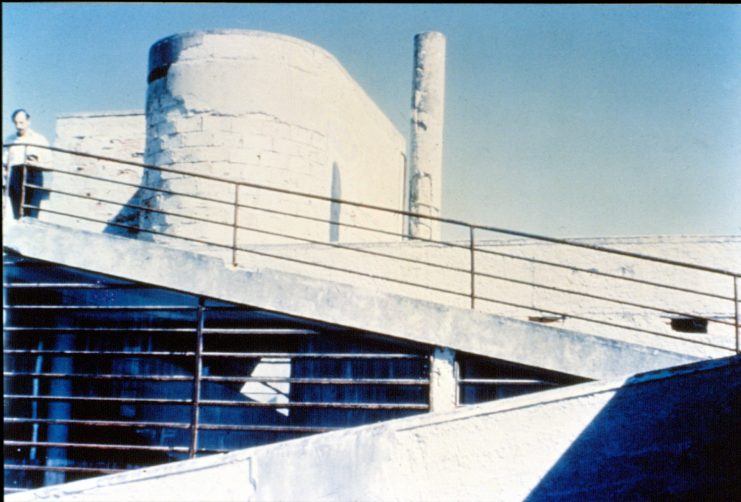


Fig. 2. Villa Savoye with make-up in 1997. © Jean-Christophe Ballot/ FLC (Fondation Le Corbusier) – ADAGP.

‘but ruined concrete, while quite possibly sublime, is not beautiful, and so risks letting architecture down.’²⁶ These statements hold a lot of information about the aesthetic preferences of architecture and not least its preservation. Tschumi, on the other hand, seemed to disagree, suggesting how the architectural stems from the ruin, including the concrete ruin, and not the other way round. In his *Advertisements for Architecture* (1976–77), a series of postcard-sized text and image compilations, Tschumi also processed his experience of the decaying Villa Savoye.²⁷ Each of them was a kind of manifesto dealing with the discrepancy between architecture as immediate spatial experience and as theoretical concept. The first advertisement was dedicated to the Villa Savoye, the image showing its state of decay, the text reading: ‘The most architectural thing about this building is the state of decay in which it is. Architecture only survives where it negates the form that society expects of it. Where it negates itself by transgressing the limits that history has set for it.’²⁸ Tschumi’s wording can be read as an anti-preservation manifesto, where preservation is indicated as an act of destruction depending on what is considered architectural. According to Tschumi, buildings only develop into architecture when they evade a controlled state.

Unlike Tschumi, experts and the public demanded control over Le Corbusier’s modernist icon. When one looks into the discourse of the history of the building and some of the most seminal works on it, the long phase of unintentional use and ruination (over two decades) has been almost entirely left out.²⁹ This is a telling example of how assessing something as significant goes hand in hand with a cleansing aesthetic. The most recent renovation, completed at the end of the 1990s, was based on the condition of the building as it was around 1930 as well as 1965, after the first renovation. To use Tschumi’s word, Villa Savoye’s most recent ‘make-up’ practically looks like a reconstruction, when compared to its deteriorated state during abandonment.³⁰ Ignoring the building’s phase of dereliction is symptomatic of how architects rarely envisage deterioration as part of the biographies of their designs. As noted in Kevin D. Murphy’s article on the Villa Savoye, the ruinous state of the building in the 1950s was in fact just a culmination of a process of decay that began almost before the house was completed.³¹ In a correspondence between Le Corbusier and Mme Savoye, she complained about numerous leaks in the house even before moving in, and shortly before moving out in 1937 she wrote again: ‘It’s raining in the hall, it’s raining on the ramp, and the wall of the garage

**The most architectural thing
about this building is
the state of decay in which it is.**



VILLA SAVOYE, 1935

Architecture only survives
where it negates the form that
society expects of it.
Where it negates itself by
transgressing the limits that
history has set for it.

Fig. 3. Bernard Tschumi. "Advertisements for Architecture" 1976-1977. © Bernhard Tschumi.

is absolutely soaked. What's more, it's still raining in my bathroom, which floods in bad weather.'³² Previously Mme Savoye had described the house as 'cold and damp'.³³ 'Authorship' most often refers to the architect's style and the vision behind a building, and these are often aspects that influence art-historical appraisal. The case of Villa Savoye shows how, right from the beginning, Le Corbusier himself was in fact the 'author' of his own building's deterioration. However, if one looks into the written material concerning the building in major institutions such as UNESCO and the Getty Conservation Institute, as well as the main literature like Jacques Sbriglio's *Le Corbusier: The Villa Savoye*, these aspects are largely ignored. Arguably, this suggests how Modernism and its objectives for its architecture have extended into the preservation of Modernist architecture. The preservation of the Villa Savoye thus affirms how architecture seen as testimony is closely interlinked with material stabilization, if it is to function as heritage at all.

Tschumi's experiential encounter with the Villa Savoye in the early 1960s and his processing of this in his works is however an experience of *unauthorized* agency. As the architect Andrew Ballantyne puts it, 'If we think of buildings in connection with the life that produces them, then we can see that when we look at the ruins of buildings, we are looking at powerful and incontrovertible evidence of *something*; but evidence of what? It is often difficult to say.'³⁴ In Tschumi's *Advertisements* project he elevates the natural transformation of architecture to be itself the most architectural thing, thereby provocatively cutting the umbilical cord between architect and architecture. This is reminiscent of Riegl's age value, long before preservation became an entirely codified practice. Here, the monument does not represent a deliberate message or an event to remember, but functions as a kind of material memory, described in the Torgeir Bangstad's words as how 'things literally perform the effects of their own pasts'.³⁵ The value of the visible signs of age thus turns the building into a slippery signifier whose meaning and messy temporalities we cannot easily resolve. For Tschumi, this provided impetus for preservation to approach its object in a different way.

Finally, we might use Tschumi's works to ponder the possible co-existence of a building seen through the immediacy of affective encounter and as a historical object. With reference to Brian Massumi and his concept of affect, immediacy is in fact intensively inclusive of the past, as it entails the *force* of the past in moments of increased intensity.³⁶ A sense of wonder is evoked and, just like immediacy, wonder is not a mode of cutting off the past but

may even be a radicalization of our relation to the past. With reference to Sarah Ahmed, wonder is arguably about suddenly stopping, contemplating, and seeing the world *as made*.³⁷ Upon encounter Le Corbusier's Villa Savoye, for Tschumi, was not there as an idea but there as made from wear and tear. Allowing wonder like this might be to open historicity, rather than to suspend it, thereby accessing an experiential conception of heritage different from that of being a representational record. In Tschumi's interpretation, the decaying building becomes a sensory avant-garde and a moment to reflect on the agency of architecture in its passing. With his evocative description of decay, Tschumi switches the ruined Villa Savoye from a detraction of heritage value to a productive and critical engagement with how such heritage value is upheld. As Lahiji and Friedman note in their essay about the Villa Savoye:

What the rescuers of the Villa Savoye preserve is not, in fact, Le Corbusier's *construction spirituelle*; it is rather their own corporeal ego, which projects itself in order to repress the one thing that constantly threatens to return to haunt the body: the abject, the 'leftover'.³⁸

While there is certainly truth in this, the architectural vision of the Villa Savoye in its ruined state also became less accessible, in experiential ways. So the question about the appropriateness degree of physical intervention does still remain. However, Tschumi did indeed contribute an alternative method for expressing a critical concern for the materiality and, in a sense, a mode of care for the building. To illuminate his works as part of the history of the Villa Savoye, is a way of accompanying its preservation with the reminder that preservation is never a self-explanatory practice but a discursive one. The way his point comes forcefully across is by applying experiential essayistic writing to one of Modernisms most famous icons.

Case 2. Denge Sound Mirrors

Now and then, one hears of something 'reassuring' such as the invention of a sensitive listening device that registers the whirl of propellers at great distances. And a few months later a soundless airplane is invented.³⁹

In the quiet Denge marshland, part of Romney Marsh on Britain's Kent coast, three monolithic concrete structures with cracks and growing mosses stand as emblems of a long-gone past. Built between 1928 and 1930 in what is now a nature reserve, the Denge sound mirrors were intended to give early warning

of incoming aircraft.⁴⁰ Built at the same time as Le Corbusier's Modernist masterpiece, the sound mirrors were likewise abandoned after only seven years, having been made obsolete by the invention of modern radar technology.

Although they are entirely different, both this article's case studies illustrate the life cycle of the built environment and its change between appreciation and abandonment. But, whereas Villa Savoye is now fully enrolled in an international preservation discourse, the Denge sound mirrors are still in a liminal state between historical remains and officially recognized cultural heritage. They have survived despite obsolescence and several attempts at destruction. Designed by the sound engineer W. S. Tucker the three listening 'ears' were built to detect the sound of approaching aircraft, gathering their engine noise in the curved concrete receiver dishes and reflecting it into microphones at a focal point in front of each dish where the sound would be amplified. However, they quickly proved unreliable; sound pollution from the surrounding spreading suburb and the local airport made the different sounds hard to discriminate from each other, and soon radar was invented. Acoustic research was abandoned of and its use ended in May 1939, as the Royal Engineer Board met with designer Tucker and agreed that the sound mirrors should be destroyed. They were subsequently used for experimenting with the effect of explosive charges, and then the War Department ordered them to be entirely blown up. However, since they were considered too unimportant for an enemy to use, this was finally deemed unnecessary and too expensive. Contrary to the logic of preservation, the Denge sound mirrors ultimately survived due to their *insignificance*—they were not important enough to destroy.⁴¹

As with Tschumi's work, Tacita Dean's 16-mm film *Sound Mirrors* (1999) expresses appreciation of heritage in its ongoing ruination through experiential means. The seven-minute film could be a compilation of black-and-white still photographs, if a breath of wind did not reveal the shivering water surrounding the concrete structures. As massive, irremovable giants they are awkwardly embedded in the landscape between the waving reeds and grasses in the low-lying marsh. With their weathered textures and analogue shapes, the sound mirrors evoke an immutable past. Their continuous reflection of sounds creates an eerie soundscape (the soundtrack to the film being entirely recorded within the 200-foot mirror, the biggest of the three).⁴² Lingering over the different black-and-white shots, the sound mirrors turn into

abstract, timeless compositions: minimalist sculptures. Like slowly eroding pieces of land art, their situation in the remote landscape is revealed by the continuing flutter of birds and the sound of wind and water—once harbingers of war, now modern relics. The noise of a small airplane makes a steadily buzzing soundscape to the film, reminding the viewer of the intended function of these gigantic listening ears. Tacita Dean's film moves around the site, capturing an ever-present past at the precise pace of the mind, and creates a mimetic picture of time and architecture as experiential matter.

Shot in black and white, and with stillness of the frame as its hallmark, the film presents the concrete structures from different angles all through one day, till sunset. All elements in the film are markers of time. The marshland is a reminder of a primeval time, with its fluttering birds and their natural cycles of coming and going throughout the seasons. The sound of a buzzing airplane amplified by the sound mirrors emphasizes that they were built in an aura of technological progress, but became obsolete almost before they were finished; their existence in the present is as archaic tombstones of an



Fig. 4. Tacita Dean. Sound Mirrors. 1999. © Tacita Dean/Frith Street Gallery, London, and Marian Goodman Gallery New York/Paris.

industrial and analogue era long gone. And, finally, there is Dean's analogue filming, with the blacks and whites as deep and textured as paint, and the images ticking through the projector when on display in loops. This is a medium defined by transience that, in a strange way, mirrors the mirrors it depicts. All these things expose the spectator to an intertwining of temporalities. In one sense we are faced with fading worlds, but at the very same time the film and the still-standing sound mirrors morph into sticky, persistent historical objects existing in a continuum. In this sense the spectator is faced not only with the grandeur of past technological inventions, but, just as much, with melancholia at its irreversibility and passing. Historical significance penetrates all levels—from the landscape and objects depicted to the temporality of film itself—but it goes way beyond a particular event in the past. Arguably, Dean's *Sound Mirrors* here reactivates Riegl's question about the possibility of reconciling a monument's historical value and its age value. When one encounters the sound mirrors on analogue film, the melancholia they emit and the film's urgent sensitivity to temporal transience open a space for cultural heritage as a collective self-reflective space.



Fig. 5. 200 Foot sound mirror. Tacita Dean. *Sound Mirrors*. 1999. © Tacita Dean/Frith Street Gallery, London, and Marian Goodman Gallery New York/Paris.

One would like to think that temporality is a key concept in the field of cultural heritage preservation; sadly, though, it is strikingly often reduced to the trichotomy, 'saving the *past*, in the *present* for the *future*'.⁴³ What Dean's film allows the spectator to do is to experience time as passage, beyond well-defined epochs. As Christine Ross notes, analogue film 'registers and transmits the phenomenological law of the irreversibility of the passage of time'.⁴⁴ The indexical nature of the camera likewise intensifies a sense of presence, but one that aligns with the slow and uneventful time that the sound mirrors are embedded in. In a sense, the film could be seen as a preservationist intervention, but one which de-dramatizes preservation and instead approaches its object enigmatically, presenting history as micro-eventful experienced matter. The film thus frames the structures as an ongoing archive to be re-actualized and experienced by the perceiver. Meanwhile, the texture of analogue film itself decays with time—and we are faced with a double task of keeping the story about the sound mirrors dynamic and alive, an ongoing work of re-interpretation. As Tacita Dean herself observed, 'I am attracted to obsolescence, so film is the perfect medium for me to work in.' A few years later she said, 'For me, making a film is connected to the idea of loss and disappearance.'⁴⁵ Here, the process of disappearance is not to be overcome. Instead, its slow, transformational quality is what makes the cultural resource something to be lingered on and worked with.

By capturing the site and framing its different temporal layers the film could be seen as an act of preservation, while simultaneously leaving the site to run its course. In fact, the film could be seen as response to the official although unwilling preservation strategy of non-intervention. The first suggestion that the 200-foot mirror should be listed was met with disapproval from high places, however in 1979 the sound mirrors in Denge became scheduled monuments.⁴⁶ Here, a preservation approach of 'non-intervention' was agreed upon, in this case to be taken literally as leaving the structures exposed to the weather and to their own natural degradation. Due to many years of gravel extraction the mirrors however became so destabilized, that ongoing conservation work was initiated in 2001, the approach being to 'undertake only critical repairs relating to overall stability of the mirrors—leaving the mirrors as follies in the landscape to degrade with time'.⁴⁷

In this way, the life of the mirrors was prolonged by stabilizing their foundations as well as mending structural cracks. Interestingly, the initial approach of not intervening in the fabric of the site was due more to a lack of funding

for the project from English Heritage (now Historic England) than to a considered approach. But this strategy could open possibilities of not necessarily stabilizing but *practicing* heritage, exploring means of preservation beyond the physical boundaries of the structures themselves. Such a practice is reminiscent of the approach to other British ex-military sites, such as the Orford Ness, where the Atomic Weapons Research Establishment had a base. Here, the National Trust has taken a deliberately non-interventionist approach and, in doing so, adapted its interpretation of the site to the shifts in aesthetics of decay, which transgresses the modern division of natural and cultural heritage.⁴⁸ However, as Caitlin DeSilvey notes we might in the end always be left with intervention, as in the case of the sound mirrors, whose lives have been prolonged. With reference to Riegl, our willingness to allow deterioration might finally meet our reluctance to witness complete loss, which would ultimately also mean an abolishment of age value itself.⁴⁹

While the paradox remains, practices that take the value of the visible signs of age beyond the question of patina have arguably been underexplored in preservation. To allow natural transformation to run its course necessarily means continuously reinterpreting a site, and one would need to find a more dynamic and creative language than the classifications normally used in ascribing significance to heritage. Interestingly, experimentation is fundamental to the sound mirrors and a central part of the history of their existence. They were erected as experimental acoustic mirrors, later became a site of experiments with explosive charges, and are now a site of experimenting with concrete repair. In this regard, their abstract formations and the poetics of sound also invite experimental preservation. While the Denge sound mirrors go through their ‘intervals of neglect’,⁵⁰ Tacita Dean’s film about them might be one such practice—the seemingly oxymoronic preservation of change.

AN EXPERIENTIAL CONCEPTION OF HERITAGE IN TRANSFORMATION

The article has argued for preservation as an experimental practice which, just as much as physical intervention, is about intervening in the ways we know about heritage. It has suggested two examples of creative engagements with sites as vessels for a more affective understanding of how heritage can also enter our lives: as heritage in its process of natural transformation. To see this as work of preservation is to acknowledge how meanings can be created in moments of sensuous encounter. Tschumi’s experience of decay

and the subsequent fate of Villa Savoye further illustrates how its philosophy of preservation is rooted in modern architecture's ideal of purity. As architects Mohsen Mostafavi and David Leatherbarrow argue in *On Weathering: The Life of Buildings in Time*, 'Staining erosion, and surface faults seem to be antithetical to the modern movement's ideal of "whiteness."⁵¹ Instead, what Tschumi encountered was how the erosion of a surface is also an addition to a building which invites new interpretations. In this sense, Tschumi's work still provides a contemporary impetus to reflect on the practice of preservation and its alternatives to the smoothly renovated monument.

Tacita Dean offers material that in its own way preserves the Sound Mirrors, although in pictures. Arguably, she offers one answer to a deliberate approach of non-intervention, which keeps the structures alive for interpretation alongside their deterioration. Her film becomes a preservationist alternative to the philosophy of material stabilization, within which the heritage object risks being reduced to 'a subject of management and conservation or tourist visitation' as remarked by Laurajane Smith.⁵² Instead preservation becomes a sensuous labour and a negotiation of meaning, and the film a therapeutic space to reflect on architecture and its temporalities. Attentiveness to the visible signs of age here becomes a widening of the historical, and not a threat to it. It is documentation of a site that does not serve goals of objectivity for the purpose of physical intervention, but it is a documentation with an artistic life of its own.

To 'save' a building is the rhetoric often still used as a self-explanatory term within preservation. This seems not to have changed with modern architecture starting to provide objects of preservation. However, as suggested by Susan Macdonald, 'if it is symptomatic of our society that longevity plays a minor role in the way we build, then perhaps the conservator's role of the future is in documentation rather than in physical intervention.'⁵³ This article has dealt with examples of ruination of modern structures as the ruination (and preservation) of these seems uncannily close. Yet, the examples have also already crossed the threshold of becoming historical. More generally, this threshold holds the potential not only to research how to repair newer materials, but likewise to question both the very approach to saving and the frames this sets for practicing heritage. Whether a now preserved architectural masterpiece or a remote and mysterious military site, the affective force of their ruined concrete is an acknowledgement of ambivalence that might account for all pieces of architecture becoming prematurely historical.

As when Riegl emphasized the subjective relation to the monument involved in ascribing it the value of age itself, Tschumi and Dean foreground the experiential interaction between building and body as a questioning of the claimed objectivity—‘operating for the common good’—of preservation. Artistic practice is here a process of preservation which not only deals with culturally significant objects, but is itself becoming a reflective practice significant for culture.

NOTES

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SOCIALLY DRIVEN URBAN TRANSFORMATIONS

Urszula Kozminska and Nacho Ruiz Allen

ABSTRACT

This article investigates transformation as a sequence of activities that has the power to change certain urban situations, their physical constituents, existing social relations, and engagement. The analysis of selected grassroots initiatives is framed by the concept of heterotopia, participatory design, and co-evolutionary planning and it centres around community-driven transformation processes. Sometimes social actors initiate a bigger urban change (e.g. Powerhouse Banglatown in Detroit, Michigan) or revitalize dysfunctional urban space (e.g. Rundhøj Turning Point in Aarhus, Denmark). At other times transformation connects seemingly separate actors in a strong community, which, by reusing abandoned buildings, redefines the citizen engagement and urban development strategies (e.g. Haus der Statistik in Berlin, Germany). These transformation processes are analysed as dynamic situations in an urban structure that is in a perpetual state of becoming, shaped by new encounters of social actors. The investigation of mentioned transformation processes discusses the role of the community and its ability to foster the change. Moreover, it explores a variety of user-centred design strategies and commoning methods necessary to develop critical elements of sustainable architecture: a sense of ownership, social engagement, and, finally, participation in altered public space.

KEYWORDS

Transformation, social change, commoning, sustainable architecture

INTRODUCTION

Transformation in architecture is often discussed in terms of physical alterations to existing buildings, their materiality, the dialogue between the old and new elements, their connection to the surroundings, et cetera. Adaptation projects are the catalogues of traces of time, patterns of previous usage, and echoes of history. But these signs of existence are not only the remnants of the past. They are constantly recreated by the new users and functions. Dynamic changes embedded in the transformation process ensure that the physical substance is in a perpetual state of becoming, shaped by new actions and encounters of social actors. But who are the actors involved in the process? How do they foster the change? What is the architect's role in the socially driven transformation process?

Furthermore, we should not consider only the spatial qualities of the transformed spaces in a dynamic state. The actors involved in the process, their overlapping agendas and complex relationships may also be affected by the process itself, being subjected to a dynamic condition. In short, the community that promotes, contributes to, develops, and eventually takes ownership of the renovated spaces also becomes a force driving urban transformations. The expression 'community building' seems to be doubly appropriate and gains significance when architecture is at stake. More questions can be addressed when this extra component is considered. How can a community be created, stimulated, and its bonds strengthened through an architectural transformation project? To what extent is its composition influenced by the transformation process? Which modes of communication and community involvement support the transformation process? How, and according to what, does the sense of belonging of its diverse members evolve?

Recent investigations claim that the sense of community is an asset in new urbanism theories and have analysed the influence of physical and physiological factors that may foster it. Parameters like community attachment/involvement, identity, social interaction, and safety, among others, have been outlined as important aspects for residents feeling that they belong to a community.¹ According to this approach, we may suppose that the lack of one or more of these aspects is behind its vulnerability, disconnectedness, invisibility, or non-existence; and physical transformations are implicitly suggested as healing solutions. Despite its undeniable value, it is possible to supplement this vision by inquiring into the impact that the transformation process itself has on the community. The way it is planned, organized,

coordinated, and performed may also create the optimal conditions for a community to be either identified, reformulated, strengthened, or enlarged. The hypothesis here is that it is not only the final result determines a change, but also its development and the community's participation in the process.

BACKGROUND

Participatory design, rooted in social, political, and civil rights movements of the 1960s and 1970s, builds upon Jane Jacobs's,² Henri Lefebvre's,³ and David Harvey's⁴ claim, which argues for the right to appropriate urban space and the right to actively participate in its production. The social space becomes the subject, and the instrument of production and power.⁵ According to Lefebvre, capitalist abstract space, based on commodity and exchange value, multiplies construction activities but also erases the differences and existing social relations. The hope for better urban life lies in differential space, or else heterotopia, which shifts towards use value, promotes inclusiveness and creates more heterogeneous spaces and relations. Heterotopia often unfolds in voids of abstract space and is governed through autogestion and appropriations. It collects differences left in the abstract space, allowing them to self-represent. Heterotopia manifests the society's right to the city that, according to David Harvey, is 'far more than the individual liberty to access urban resources: it is a right to change ourselves by changing the city'.⁶

The right to the city might necessarily be practised alongside other concerns such as inclusiveness, spatial justice,⁷ acknowledgement of the urban as an open field for experimentation,⁸ and commoning,⁹ all aimed at the formulation of more liveable and equal cities. In particular the last, commoning, is a movement that has acquired a special status among the scholars interested in architecture that engages with society. It not only attempts to elaborate an overarching discourse but also aims to be easily translated into an urban approach and strategic vision. According to its promoters, commoning is a set of social practices dealing with the production and management of collective resources and spaces, mutualized for the benefit of the citizens. It aims to regenerate social connections, identities, and cultural values overlooked by the economic power. This movement is open, inclusive, and participatory, and the urban setting it advocates is informal, tactical, experimental, and community-based.¹⁰

The popularity of commoning initiatives supports the observation that '... increasing attention is given to non-hierarchical, organic, insurgent, or

self-organizing forms of planning: forms of planning that are presumably emerging by themselves'.¹¹ This observation echoes in the co-evolutionary planning processes, which embrace mutual relationships between social and physical systems in the creation of places.¹² In the co-evolutionary process, the actors are entangled in complex, reciprocal relationships characterized by multi-level dependencies that occur continuously and erratically. Moreover, those relational interactions depend on the context and are particular for each community. Therefore, to plan future urban developments, it is crucial to understand the unique situations that the planners engage with¹³ and to involve multiple actors in the planning process.¹⁴ Planning activities should ensure a certain adaptiveness and proactiveness of the developed systems to accommodate ongoing contextual changes and potential future challenges.¹⁵ Furthermore, the contextual, adaptive, and proactive approach to the planning process proves to be necessary in the development of sustainable communities, understood as a place that 'engenders a feeling of belonging, an attractive and healthy place within a convivial community, a safe place that is pollution-free, uncongested, planted, less frenetic and offers a more locally based life with a balance of privacy and community interaction'.¹⁶ A sustainable community ensures a high standard of living and equality while reducing the negative environmental, economic, and social impacts.¹⁷ The attention is put on the needs of the future building users, regardless of their background, eliminating inequalities. To achieve these goals, sustainable communities are developed in inclusive, participatory design processes that involve all actors affected by the development in the decision-making, which gives them a sense of ownership.¹⁸

The participatory design 'combines the design of the physical realm with the design of the social world—infrastructure to support social and cultural life, social amenities, systems for citizen engagement, and space for people and places to evolve'.¹⁹ It appears everywhere where there are participatory practices, community projects, co-operative ownership models, self-builders, or 'public interest practices' managed by the public sector—in projects that aim to create social value. It extends beyond basic information or consultations, directly involving users to co-design the artefacts, processes, and environments that shape their lives.²⁰ Participatory design can be defined as,

a process of investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning between multiple participants in collective 'reflection-in-action'. The

participants typically undertake the two principal roles of users and designers where the designers strive to learn the realities of the users' situation while the users strive to articulate their desired aims and learn appropriate technological means to obtain them.²¹

The architect, while tactically entering the community, can engage through developing a consensus design,²² an alternative to representative democracy which favours partnership and collaboration, or through conflicting participation,²³ which starts a debate on the matters of minorities by introducing their subjective perspective, often dismissed in general democratic voting. Therefore, the architect acts less as an expert but more as 'an outsider' that has the capability to introduce change into the existing dynamics of the community.²⁴ The project results in 'a hard-won consensus and ethical probity'.²⁵ The participatory design influences the perception of all actors involved, it changes the way they think. It maps the community assets and creates a framework for its interactions. It delivers a learning experience and eventually co-designs the identity of designed community spaces.²⁶

Mutual learning defines commitments in the participatory design process, which increases the knowledge and understanding of all participants involved.²⁷ Thus, the 'genuine participation'²⁸ refers to issues of ethics and politics, promoting democracy and empowerment that includes marginalized groups and communities in the decision-making process. It changes the user's role



Figure 1. Levels of participatory engagement. (Source: U. Kozminska, based on Bassi et al. 1995; Sassi 2006.)

within the design process from being an informant to becoming a recognized participant. Users' involvement can be translated *to* the six levels of participation.²⁹ The first three levels relate to the passive engagement of participants who then listen only, listen and give information, or are consulted to provide insights for further project development, but are not necessarily involved in the design process. The other three levels entail more active involvement in the design process, requiring user participation and agenda-setting, participation in reaching consensus on the main strategy levels, or participation in decision-making on policy, strategy, or their components. Active participation and the demands of the users thus become fully legitimate elements of the design process.³⁰ Participatory design aims to cede control over project development to the local community.³¹ This way, the community involved in the decision-making process gains a sense of psychological ownership.

Methodology

This article investigates transformation as a sequence of activities that has the power to change certain urban situations—their physical constituents, social perception, and engagement—but also the communities that exist or are about to appear within them. Therefore, the analysis focuses on diverse community-driven, participatory transformation processes, in which citizens, social agents, influent organizations, and alternative networks play a central role.³² The urban sphere is qualified by its physical structure and its relational network that mutually evolve in unique contextual situations.

Nowadays countless grassroots initiatives manifest a deep engagement between architects and the local communities. Sometimes social actors initiate urban change or revitalize dysfunctional urban spaces. On other occasions, a transformation process connects seemingly separate actors in a strong community that redefines citizen engagement and urban development strategies. The investigation of these processes allows scope for discussing the role of the community, user-centred design and commoning necessary to develop critical elements of sustainable architecture: a sense of ownership, social engagement, and, finally, participation in altered public space.

This article explores selected community projects to understand and visualize how grassroots participatory engagements were supported by planners and architects in unique, local circumstances. Three case studies of urban transformation were selected—one local community house in Denmark and two international, of diverse scale: one in Germany (a building's master plan) and

another in the United States (a neighbourhood's acupuncture). The juxtaposition of chosen local and international cases was based on information content expectations, and aimed to address different contexts, trajectories, and scales to enable a comprehensive understanding of various user engagements. The literature review—of publications theorizing such concepts as right to the city, spatial justice, commoning, co-evolutionary planning, participation, user-centred design, sustainable community building—served as a theoretical framework for the case study analysis, which unfolded around three main parameters:

- **heterotopic context**—draws on the *right to the city*³³ concept and refers to heterogeneous space defined by the society, local communities, and users participating in the space-making process. This parameter is utilized to analyse the socio-cultural and economic context of selected cases.
- **participatory engagement**—organizes and evaluates user involvement strategies involved in the participatory processes according to the six levels of participation.³⁴
- **relational network**—explores the mutuality of relational interactions between physical and social systems, intrinsic to co-evolutionary planning.³⁵

The data concerning cases was collected through a literature review of scientific publications, project documents, and online articles published about investigated interventions. The document analysis, accompanied by the field visits and more subjective empirical observation of space, provided information on the spatial characteristics of the projects and the nature of participatory engagements. The data was supplemented with findings from the analysis of recordings from organized public lectures (e.g. Arki-lab, Raumlabor), notes from informal meetings and semi-structured in-depth interviews with architects responsible for the design of chosen cases (e.g. Kondens Arkitekter). The latter investigations gave insights into the sequence of participatory collaborations and a better understanding of the relational network which unfolds around them. It also showed the opportunities and challenges encountered during the design process.

Findings from the case study analysis were organized according to a repeatable structure that identifies the projects' heterotopic context (main characteristics and goals), participatory engagement (the process), and a relational network (the mutuality of relational interactions). This helped to define the

main learnings from the case study analysis, which are later extrapolated to formulate the discussion and more general protocols for participatory urban transformations presented in the conclusions.

CASE STUDIES ANALYSIS

Powerhouse Detroit

Heterotopic Context

Detroit was the epitome of urban decay in the twentieth century. In the 1950s, it was the fourth-largest city in the United States. Since then, racial segregation and off-shoring replaced its former splendour with a decades-long process of decay that persists. As a consequence, the city lost both inhabitants and buildings. The population has fallen more than 60 per cent, from a high of 1,850,000 in 1950 to less than 700,000 today. Industrial ruins, abandoned houses, and vacant lots define its landscape nowadays.

Contemporary culture tends to associate urban transformation with growth and prosperity. However, Detroit demonstrates that sometimes the opposite is the case: transformations triggered by processes of decline and degradation. This phenomenon, known as ‘urban shrinkage’, challenges not only conventional concepts of urban planning and design but also questions how we think about architecture when the creative power of bottom-up processes and community engagement take place. In the last decades, the city has become home to many initiatives to ensure its survival. Today, it is considered the world’s capital of urban farming, with more than one thousand non-profit food organizations, such as The Michigan Urban Farming



Figure 2. Detroit. (Source: N. Ruiz.)

Initiative, Earthworks Urban Farm, or Keep Growing Detroit. Other policy initiatives, such as the Empowerment Zone, or social and artistic ones, like Detroit Soup and Write to House, found their place in the midtown grid. The number of newly born initiatives running in the city since it hit its bottom in the 1980s is countless and the influence many of them had in decaying urban settings throughout the world is unmeasurable.

A couple formed by an architect, Gina Reichert, and an artist, Mitch Cope, is at the origin of one of them: Power House Productions, a neighbourhood-based non-profit organization funded through grants from local and national foundations. In 2008, they purchased for a low price a foreclosed drug-house from the bank in Banglatown, a so-called neighbourhood at the north-end of Hamtramck, where they had been living for several years. The strategy of recovering one of the decaying houses that punctuated every single street in the surroundings, usually prey to arson or squatting, soon evolved into a collective endeavour, a way of strengthening bonds in the community, and an opportunity to recover the neighbourhood's vitality.

Participatory Engagement

Reichert and Cope instigated a social catalyst that persuaded the neighbours to take ownership of their community and cooperate in its development.



Figure 3. Powerhouse Detroit—location. (Source: N. Ruiz.)

Their vision and proactiveness not only benefited the traditional inhabitants of the district, it also raised interest among creative young people, artists, architects, and social geographers who moved to Banglatown and took part in the reconstruction groundwork. This informal but local network of creative professionals envisaged their new neighbourhood as an innovative experiment in sustainable design, social change, and urban renewal. The multi-ethnic character of the district, with Bangladeshis, Eastern Europeans, and African Americans among its inhabitants, experienced increased diversity, dynamism, and porousness. One of the consequences detected by the people behind the initiative is that the animosity between groups—particularly between immigrants and older residents—decreased. While taking ownership of the renewed spaces and their related activities, they started to express themselves, share cultural experiences, participate in cross-cultural exchanges, and, eventually, set the basis for the emergence of a new community based on the district's particular character and activities.

Relational Network

The renovation of the first house resulted in new common space where neighbours could meet and organize self-driven activities. Its name, Powerhouse, not only reflects the fact that it produces its own electricity but also is a clear reference to the empowerment of the people, 'becoming an example of self-reliance, sustainability, and creative problem-solving through education, communication, and increased diversification of the neighbourhood'.³⁶ To this foundational operation, other transformations similar in approach, scale, and cost were added over the following years. Several scattered constructions within a four-block radius were purchased, transformed, thematized, activated, and run with the collaboration of neighbours, friends, and artists. They

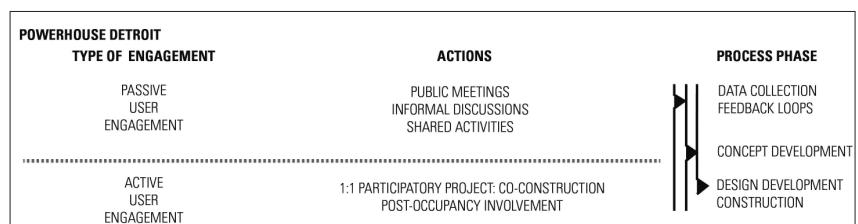


Figure 4. Powerhouse Detroit—participatory engagement. (Source: N. Ruiz.)

are the Yellow House (office space); the Jar House (research centre, archive, and library); the Sound House (experimental music studio); the Squash House (sports arena and greenhouse); and the Play House (theatre and cinema), where movie nights are organized for the children. The new spaces for art and cultural activities were close enough to each other to be understood as part of an all-encompassing initiative but widely enough spread to influence a significant part of the neighbourhood. The last addition, which reactivated a vacant outdoor space, is the Ride It Sculpture Park, where different generations meet and socialize in an area reformulated as a public skating park.

Learnings

The project started as an effort to keep the neighbourhood safe from crime and vandalism but eventually 'progressed beyond defensive tactics and evolved toward initiating routine creative projects within the community'.³⁷ Their open agenda allowed for a sequence of small-scale transformation operations with a flexible development of their different stages. It helped to counterbalance scarce economic resources with increasing engagement of the nearby community. Although its promoters always envisioned it as 'a long-term community plan, not a fancy art project',³⁸ the project also exemplifies the value of creativity in raising interest, both from a local and an external perspective, getting institutional support, encouraging people to participate and building up community engagement.

Haus der Statistik Berlin

Heterotopic Context

Berlin is not the porous place that inspired the understanding of a city as an archipelago any more. The juxtaposition of constructed mass and urban voids that defined its character after the reunification of Germany no longer exists, at least as a condition that explains the whole metropolis. Over the last thirty years the multiplicity of empty spaces and vacant structures available at affordable prices attracted several thousands of citizens to move and settle there. This considerably improved the city's social diversity and vitality. As a result, Berlin partially recovered its density and experienced a noticeable increase in the intensity of its urban life, making it one of the most vibrant European capitals today.

As a probable but not desired consequence, a well-known contemporary phenomenon added an extra layer of evenness, this one based on economic reasons: gentrification. Therefore, the few remaining vacant structures in the

city are no longer subjected to the rules of affordability, but to those of speculation and economic benefit. One of them is Haus der Statistik, former seat of the State Central Administration for Statistics (SZS) of the German Democratic Republic, built in 1968–70 and abandoned in 2008. It stands out for its prominent location, close to Alexanderplatz, and for its vastness, having 50,000 square metres of empty space. It was considered non-marketable and destined to be sold to investors, demolished, and rebuilt for commercial use.

However, in 2015 a group of artists, architects, cultural workers, and politicians frustrated those plans with an initiative aimed at securing the place for a cost-effective mix of uses for the common good. In 2017, it was acquired by the Federal State of Berlin, marking the acceptance of the social demands by the administration. Since then, the building has become the driver for a new model of co-operative urban development run by the Haus der Statistik Initiative. Among the self-defined objectives for the model project are ‘the common and mutual responsibility, which continues into use; the obligation to integrate the broad involvement of the urban society in the process . . . [and] the creation of own sustainability standards.’³⁹ Their formulation sets out the basis for the long-term development, ending in 2029, of a lively neighbourhood in the area oriented towards the common good.

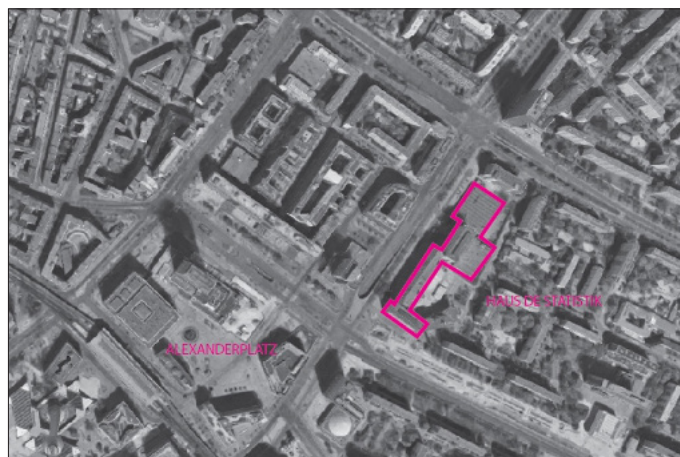


Figure 5. Haus der Statistik Berlin—location. (Source: N. Ruiz.)

Participatory Engagement

Haus der Statistik today comprises a group of politicians, activists, architects, artists, social, and cultural institutions, foundations, local associations, and public companies. Furthermore, every individual interested in taking part in the process is welcome to contribute, which may be done at different levels. The formal structures defining the local administration and public authorities collaborate with an informal network of professionals in a shared responsibility for the development of the place. From the beginning, back in 2015, the project was organized as an open and collaborative process. Informing the public and inviting them to participate in the decision-making process is part of the implementation strategy. Network meetings are organized to tell about the current status of the initiative and collectively discuss its key aspects.

Relational Network

Today, the project achieved an extraordinary complexity, being developed at several scales, with a strategic plan that operates within different timespans and the involvement of many stakeholders organized around the Koop 5. This new entity encompasses the five main cooperating partners: the Senate Department for Urban Development and Housing, the District Office Berlin-Mitte, the state-owned companies WBM Wohnungsbaugesellschaft Berlin-Mitte mbH and BIM Berliner Immobilienmanagement GmbH, and ZUSAMMENKUNFT Berlin eG. The most recent plans for the complex include around 65,000 square metres of new spaces for art, culture, social affairs, education, affordable housing, refugee accommodation, and administrative uses, and a new city hall for the district of Berlin-Mitte.



Figure 6. Haus der Statistik Berlin—participatory engagement. (Source: N. Ruiz.)

One of the most interesting stages of the long-term development is based on the idea of 'pioneer use'. This consists of reactivating the ground floors of the entire building for a diversity of uses with the cooperative participation of society. The underlying purpose of this prototype program is to showcase at ground level the strategy to be applied in the whole complex. Pioneer uses are intended to be active during the planning and construction works in the rest of the building. Even though each use has its own time horizon, depending on its own characteristics, the overall construction planning, and seasonal conditions, all of them respond to a three-phase structure: activate, build, and consolidate.

Besides the intricate partnership that runs the project, a small information and participation centre attached to Haus der Statistik has been created in the ground-level construction work. The shift in scales between the colossal dimensions of the building and the tiny pavilion could be interpreted as a metaphor for the contrast between the enormous operating partners and the few people that are running this urban endeavour on a daily basis. The place, a former workshop, keeps its original name, Werkstatt, to refer to the work-in-progress nature of the project. It operates as an open window to the city and a mediating space where weekly events are organized, some of them related to the dissemination strategy of the project, which is developed in many ways and formats.



Figure 7. Haus der Statistik and Werkstatt. (Source: U. Kozminska.)

Learnings

Even though it is in a preliminary state, and most of its stages are still to be developed, Haus der Statistik, represents a desirable future for the commoning and co-evolutionary planning processes where private and public agents collaborate with social networks and individuals in an equal, transparent, and inclusive project. It bridges the gap between top-down and bottom-up processes by assembling the involved actors in an original initiative that operates both ways. The commitment of the administration from the beginning is paramount, to ensure organizational and economic resources when the project aims to be relevant in scale, impact, and visibility. In this case, a new local community is envisioned behind the walls of the building, while at the same time, the whole community of Berliners benefits from the expected new social facilities at Alexanderplatz. The project also shows that gentrification can be resisted, even in the very core of the metropolis, without compromising the city's economic activity. The societal and economic aspects of every process can be equally considered when aiming for a sustainable future.

Rundhøj Turning Point, Aarhus

Heterotopic Context

Danish urban planning and architecture, supported by the welfare system and overall social equality, has a long tradition of promoting social engagement. However, even if compared with the global context, social standards in Denmark are high, social and economic challenges are present, and inequalities in income, access to public life, and education exist. It is visible in the areas classified as particularly vulnerable public housing areas on the list of ghetto areas (*ghettolisten*) introduced in 2010. Those neighbourhoods are claimed to be characterized by higher unemployment rates and crime records, lower income and educational levels, and a significant element of 'non-Western' ethnicities. Rundhøj in Aarhus does not qualify as a ghetto area due to its size, being below 1,000 inhabitants—currently, there are 800 residents. However, social issues exist and are visible in the urban domain.

In 2016, Rundhøj Turning Point, a community-building project, was self-initiated by Kondens Arkitektur, with the intention of revitalizing dysfunctional urban space in Aarhus. Rundhøjtorvet (Rundhøj Square) occupies the site of a former petrol station, demolished twenty years ago, located between two contrasting housing typologies that epitomize existing socio-economic discrepancies—privately owned single-family houses surrounding

Rundhøj Turning Point was developed as a ‘series of civic spaces’,⁴² initially planned in four phases two of them built using shipping containers, fibre insulation, and timber; those were the meeting point and the facility house, with a workshop and public restrooms finished in June 2018. The temporary building activates discarded urban space, and illumination at night improves the safety of the area. Moreover, the architects reached out to a diverse group of citizens, including participants from ethnic minorities, which resulted in an inclusive and heterogenic spatial intervention that provides an opportunity to address the needs of marginalized social groups.

Participatory Engagement

The project strove to engage the representatives of diverse groups of users within the local community, existing services, and businesses. The involved group consisted mainly of ethnic minorities, women, and youth from a nearby school. The participatory engagement centred on the constant presence of the architect on-site during the project development and construction, and every Monday afternoon after completion. The collaboration unfolded through informal meetings, shared daily activities, co-designing, and co-construction. The local library contributed resources to create a common bookshelf in the community point. Citizen Service provided Wi-Fi connection. Moreover, the municipality subsidized the project with funding and consulting, and established a temporary, two-day, on-site office to meet local citizens. Furthermore, an anthropologist, an educationalist, and a cultural consultant were hired to support the community in the post-occupancy phase.



Figure 9. Rundhøj Turning Point and the Kitchen. (Source: S. Schmidt.)

Relational Network

The design process started with the constant on-site presence of the architect to understand and develop a relationship with the local community. This form of continuous engagement developed via various workshops, informal meetings, and shared activities (including discussions, cooking, and eating together). Those everyday undertakings provided knowledge concerning the needs of the local community and created interest that later led to a participatory engagement. Rundhøj Turning Point was developed as a 1:1 participatory architectural project which included co-design and co-construction. A longer (one-year) duration of the project allowed the actors to gain the mutual trust and understanding necessary to develop an accurate and engaging meeting space. The actors were approached organically and gradually, primarily via the physical presence of the designer in their daily space. Initially, the architect was joined by two local actors who helped in construction work carried out in the first months of the process. Later on, when the neighbouring school opened after the summer, they were joined by local youth, and this subsequently resulted in the interest of their parents. This gradual process of joining resulted in the progressive clarification of the local community's needs, which were addressed in later phases of the project. The architect acted as an 'initiator, moderator, facilitator, designer, organizer of the process, instructor, and co-builder'.⁴³ Moreover, he acted as a link between the local community and the municipality, relaying information about the needs, securing funding, and negotiating the terms of involvement. The municipality endorsed the architect's request for the temporary lease of the site belonging to the supermarket. What is more, the concept of enga-

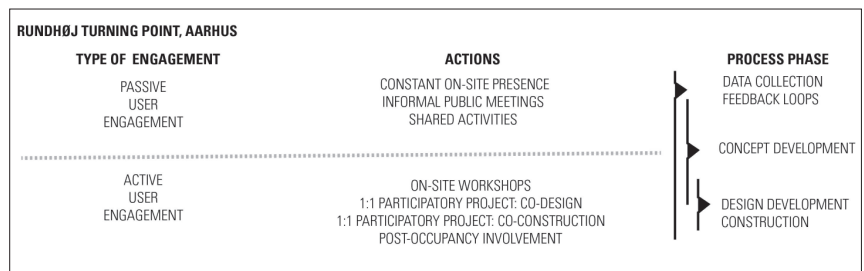


Figure 10. Rundhøj Turning Point, Aarhus—participatory engagement. (Source: U. Kozminska.)

gement went beyond the design and construction phase—the architect, the municipality, and other experts were present on-site in the post-occupancy phase—to maintain and foster newly established commoning initiatives.

Learnings

The project proves that an extended development phase is necessary to create a relationship with the local community and to gain their trust and engagement. It also shows that, in a seemingly challenging urban context, continuous presence, shared daily activities, common decision-making, co-designing, and co-constructing may create a sense of community and belonging. However, a certain flexibility in planning, scheduling, and performing activities is needed to navigate within the unpredictable dynamics of the participatory process. What is more, ensuring managerial, and financial support from the decision-makers is crucial for the security and efficiency of the collaborative design trajectory. Follow-up activities in the post-occupancy phase help maintain and foster established relations.

Finally, the temporary character of the project, which arose out of a long-lasting urban vacuum situation, helped to convince the municipality to support the architect's initiative. Rundhøj Turning Point, initially planned for two years, has been operating for four years, highlighting the need for certain common functions in this urban area. Hopefully, these needs and engagement can inform the future local development plan for Rundhøj.

DISCUSSION

Despite their diverse locations—Detroit, Berlin, and Aarhus—the analysed case studies exemplify community engagement in a participatory design process inspired by a long-term vision and a particular spatial challenge in diverse heterotopic contexts. Regardless of the dissimilarities of the investigated grassroots and temporary projects, they all provide evidence that existing needs can be acknowledged and used in participatory design processes. Moreover, some general reflections tend to reappear.

First of all, involvement is a mutual learning process, and the exchange of experience, perspectives, and skills creates space for unexpected outcomes. However, this requires an open agenda to the design process as well as avoiding predefined outcomes. In Detroit, the creativity of the local community sparked the interest of neighbours and brought institutional support that allowed the small initiative to expand beyond the initially envisaged objec-

tives involving defensive tactics. In Berlin, interdependencies appearing among existing and joining stakeholders, supported by the inclusive strategic plan, resulted in a complex programme of intertwined functions that develop from dynamically evolving initiatives. In Aarhus, the architect's engagement in the daily routines of the locals allowed the definition of fitting and engaging programmes for designed community buildings.

The investigated examples show also that interested stakeholders are best engaged early in the design process, and that the openness of the design brief requires a certain flexibility in planning, scheduling, and performing activities. The postulated flexibility and time needed to develop relationships with relevant actors often results in a longer conceptual design phase, but it eases the process of users' voluntary involvement. Powerhouse in Detroit exemplifies the benefit of having an open agenda and adapting the calendar and scale of the transformations to the budget, resources, and workforce available at each stage. Haus der Statistik in Berlin is a good example of how a very complex planning development can involve citizens' participation by introducing it as a core element in the brief. The initial stage, basically framed around conceptual discussion and programming, is planned to extend over several years. Its long-term development ensures people's engagement and influential contribution. In Aarhus, the architect's continuous on-site presence from the start of the project, plus the lack of a detailed schedule, resulted in organically forming relationships with members of the local community, which later led to their participation in co-designing and co-building the public space. However, these projects show also that the certain flexibility needed in the design trajectory has to be understood by supporting actors too, for example, the municipality.

The analysis of participatory processes shows that passive and active user engagement methods and tools are applied in different stages of the design and construction process to allow for the number and continuous and varying character of users' contributions, resulting in comprehensive design parameters. The study highlights the importance of communication, finding common, approachable language and attitudes. Powerhouse and Haus der Statistik possibly represent two opposite ways of addressing participatory engagement. Whereas in Detroit, it seems to be based on the same conditions that define the everyday life of a neighbourhood, being unstructured, casual, and adaptable, the very complex agenda and network of Haus der Statistik requires detailed programming of the participatory process itself, filled with

meetings, colloquiums, workshops, and presentations. The case of Rundhøj Turning Point showed that physical presence, informal engagement, and a focus on collective making (e.g. with the architect involved in co-construction) create an understanding of the needs of daily users of transformed space and allow for meaningful intervention.

Additionally, investigated design trajectories reveal that managerial and financial support from the decision-makers and collaborating entities should be ensured in the initial stages of the involvement. Mixed fundraising from external parties also proves helpful in covering costs during the development of an open-ended process. Sometimes the funds can be used more efficiently when they are governed directly by the local communities. Both Powerhouse and Haus der Statistik suggest that financial support might also extend beyond the initial phase and be considered in each of the stages that structure the process.

Lastly, community-building projects do not end when the building is finished. Follow up activities, on-site support, organizational help, and new customs and traditions are necessary to maintain established relations. As seen in Powerhouse, and planned in Haus der Statistik, the actors involved in the initiative are expected to become stable members of the community. Their long-lasting commitment demonstrates that community-building is an ongoing process. In Aarhus, the architect returned to the co-created community on a weekly basis after construction finished, while the municipality workforce was present on-site to support daily activities.

The case studies exemplify self-initiated inclusive design initiatives appearing in vulnerable contexts or urban voids characterized by the lack of activity, interest, or vision for development. But sometimes participatory practices are used in co-evolutionary planning activities begun by the municipalities, as happened in the case of Co-creative Urban Lab in Asnæs, in Denmark. Arki_lab, a Copenhagen-based architectural practice, was approached by the Odsherred municipality to develop an urban strategy for a small town of 3,000 inhabitants—Asnæs (2016–19). The aim of the project was to create more liveable and user-centred urban spaces by identifying, strengthening, and redefining the existing community, its needs, and qualities. This was done by finding a key stakeholder (local youth) and a participatory transformation of existing urban spaces that accommodate the public staircase to be used as an outdoor classroom and playground, and the park in front of a

library. Currently, these places serve as meeting points for the local community, which is developing around newly established common traditions.

Similarly to analysed case studies, the community engagement concept included the combination of a number of passive and active user engagement strategies, involving, for example, local educational institutions, businesses, the municipality, and politicians. The designers had significant agency in the process of organization and development. They could define the location, scale, and character of interventions, as well as applied participatory methods. Firstly, the user involvement was directed to map the local community, through a series of open exhibitions, public, and informal meetings and interactive signposts to collect data and opinions. Consultations involved group interviews with the steering group, drawing live sessions, or *arki_nopoly*, an urban design game developed by the architects. Moreover, an Urban Lab, a physical platform at the train station, served as a space to share project development outcomes and collect feedback through exhibitions, community meetings, and workshops.

The example of the Co-Creative Urban Lab seems to confirm the learnings from Detroit, Berlin, and Aarhus. In this project, inclusive physical and non-physical platforms, and analogue and digital tools, act as initial meeting points, modes to gather information, consult, make decisions, co-design, and collectively transform urban space. Moreover, it shows that well organized participatory collaboration with the local decision-makers, involving openness, mutual understanding, and flexibility, creates fruitful participatory engagement, and has the power to build new communities.

CONCLUSION

The inclusive design practices enrich urban transformation processes. They allow existing social relations to be acknowledged, dispersed stakeholders to be connected, and new communities to be built. The architects acquire the role of mediators and interpreters,⁴⁴ and construct 'a course of action, a way of thinking, a new interface with a public culture'.⁴⁵ They participate in the initiative from the beginning, perform as negotiators during the process, and contribute with their creativity in the design and construction stage. Sometimes, they even become part of the community.

Selection of the stakeholders participating in the transformation process relates to the discussion of power selected participants are not only sources

of information, but they become responsible for decisions made during the design and construction phase. The participatory design process is characterized by shared cycles of design experiment and evaluation, which may be encouraged by bottom-up initiatives and the democratic architectural studio approach. The established interactions are bidirectional and the design trajectory unfolds in a continuous, mutual, and unpredictable sequence of actions. Openness, flexibility, and suitable participatory mechanisms facilitate the process of engagement. Combining the actions of telling, making, and enacting, these tools help designers synthesize. They help designers negotiate between the diverse needs of involved stakeholders to create a brief, and satisfactory-for-all construction, which considers the social fabric of its environment. The participatory process addresses a specific audience, and particular issues and intentions within the given context and scale.⁴⁶ It changes both the social and the physical realm. If handled with attention and care, urban transformations have the potential to preserve existing social relations, enhance them, and build new communities that give a sense of identity and belonging to previously disconnected urban actors.

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TYOLOGIES OF SHAREDNESS: FROM UTILITY TO SPATIALIZED FOCAL PRACTICES AND EXCHANGE

Rosana Rubio Hernández and Fernando Nieto Fernández

ABSTRACT

This article seeks to examine how novel architectural types meet changing needs where motives for sharing spaces and resources in urban areas have changed from modern utilitarian and affordability concerns to a balanced fulfilment of personal and communal interests that adds in contemporary socio-cultural needs. The driver of this transformation has been overcoming excessive individualism, in order to address personal and community values based on daily life with a spatial dimension. First, this article tackles the contextual factors against which these patterns of transformation emerge. Second, it sets out a theoretical framework, based on Albert Borgmann's concept of *focal practices*, to explain how shared spaces potentially ease bridging the individual and communal realms, as we move towards maintaining sustainable lifestyles and overcoming social isolation, while enhancing *community value*. Based on a case-study methodology, this article traces a typological analysis and identifies three contemporary representative types—*Placemaking*, *Uprooting*, and *Structured Sharedness*—that reformulate *constellations* of previous communal residential structures via several strategies related to space usability and promoting human encounters. The article presents the results of a sub-study of broader interdisciplinary research on the new urban development of Hiedanranta, in Tampere, Finland.

KEYWORDS

Sharedness, focal practices, exchange, architectural typologies

INTRODUCTION

This article traces a typological analysis of living environments that incorporate shared spaces, whether intended for a local community's exclusive use or for general public use. It draws on the hypothesis that motivations for sharing spaces and communal resources in urban areas have changed from modern utilitarian and affordability concerns towards a balanced approach, incorporating contemporary needs and desires to overcome excessive individualism, and to fulfil personal and collective goals. This includes the idea of experiencing daily life with a spatial dimension, which links back to the notion of place-based community.

Defining the concept of *community* is the subject of a continuing theoretical debate in community studies. It starts with the sociologist Ferdinand Tönnies's classic and seminal dichotomy between the ideal types of *Gemeinschaft* (community) and *Gesellschaft* (society). These entangle different sets of rules and levels of interaction that condition how a group's members were/are linked by common characteristics or interests, in the past and in modern times respectively. The discussion also covers whether the notion of social interaction should be linked to the notion of a place, or whether geographical locality is excluded from the definition. Scholars argue that, for the concept of community to remain useful, social relations should be unlinked from the notion of place, since the processes of modernization that spark societal changes—including increased mobility and information and communication technologies that facilitate distant and virtual encounters—favour the formation of delocalized communities.¹ This article embraces this contemporary approach to the concept of community, while acknowledging the shift to an overlapping social trend. On one hand, this trend recovers spatial-temporal experiences that are instrumental in generating social links. On the other hand, it revisits the classical notion of *Gemeinschaft* as a group based on mutual bonds and feelings of *togetherness*, having the *ideal villa* of pre-modern times as a historical reference.

Thus, framed in a disciplinary context where questions related to the idea of togetherness have recently been brought to the forefront,² the main question addressed in this article is how architectural types can fulfil the needs brought about by these new motivations. We also examine how architects can provide the conditions for realizing the possibilities of sharedness, both

functional and experiential, and therefore discover the spatial consequences of these dimensions.

Given that the reasons for this change arise out of the contemporary context of the welfare state and the need to balance individualism and collectivism in society, this research is a sub-study, based on the case-study methodology used in the interdisciplinary research project called ‘Intelligent Social Technologies Enhancing Community Interaction and Sustainable Use of Shared Living Spaces in Superblocks’ (SocialBlock).³

First, this article tackles the background against which these patterns of transformation or change emerge. Then, it sets out a theoretical framework for addressing the topic. Finally, it identifies a series of typologies based on the case studies analysed, ultimately leading to a set of conclusions that respond to the research questions.

PATTERNS OF TRANSFORMATION IN SHAREDNESS

Historically, there have been various models for living environments with shared services, motivated sometimes by socio-political visions, at other times by practical solutions for navigating daily life.⁴ Today, people’s needs and lifestyles, and their socio-economic, cultural, and political circumstances differ from those of the promoters of earlier manifestations of community and public-oriented spaces in living environments. The many interrelated circumstances underlying the re-emergence of sharedness in contemporary discourses and realities include increasingly varied lifestyles—that is, the transformation of the nuclear family to single-parent families or childless ones, new and extended families, or socially emancipated individuals who choose housing as a service, rather than seeking home ownership. This last example also relates to the rise of the zero marginal cost society paradigm, with the attendant networked commons and emphasis on use value, replacing the previous focus on exchange value in the marketplace. Throughout this process, identity is tied to what is shared, rather than to what is owned. Hence, in this case, technological advancements and digitalization blur and mix the working and the living spheres, which makes changes in the job market influential too. Similarly, technology affects the tendency towards decentralization of health and caregiving services, which speaks to an increasingly aging population, as well as to the functionally diverse. Global

migrations pose challenges of housing affordability and social inclusion. As a result, real-estate pressures drive new patterns of householding—such as co-ownership, renting, and lending—while also serving to strengthen the sharing economy. Overall, these circumstances drive people towards sharing tangible and intangible resources or commons, posing new challenges to urban and architectural design practices.

The new approaches have evolved from the ideologies that underlined previous utopian experiments, characterized by hierarchical organizations and paternalist mottos, and from the socio-economic incentives that triggered the gathering of people in the past.⁵ Today, there has been a paradigm shift in certain socio-economic contexts that adds motivations to those of previous models, including utilitarian and affordability purposes, towards increasing desires for self-customized, *elevated* and *committed* lifestyles.

People are currently brought together around global concerns like climate change, over-consumption of natural resources, the search for resource-sensitive solutions, and the desire for ecologically sustainable lifestyles generally. Furthermore, although the individualism of late Western societies has the advantage of enabling self-expression, self-determination, and solitude, it also corrodes social resources,⁶ leading to the paradox stated by one of sociology's architects Émile Durkheim: when individuals become more autonomous, they become more dependent on society.⁷ To accommodate this paradox, the political agendas of welfare states emphasize social sustainability; the rise of social, human, and cultural capital; and equal citizenship and gender. However, since the late twentieth century there has been a worldwide parallel and informal trend towards people supporting themselves in reaction to neoliberal conceptions, such as real estate speculation. It is possible that shared spaces in living environments—which exist at the convergence of both formal and informal means of bridging the individual and the collective spheres—have the potential to support *a rich individuality*⁸ and *idiorrhhythmia*: that is, communities where everyone would follow his or her own rhythms.⁹ They do so by providing examples and means for individuals to be involved in their communities as they seek togetherness, mutual support, and general enjoyment of life.

Multiple factors influence sharedness in environments, which makes the importance of design factors both relative and at the same time fundamen-

tal. Many other agents are also involved besides architects, including civil society itself, governmental policies, institutional frameworks, and housing services and management providers. However, this article concentrates mainly on the factors that compete with the architectural design field and the implications of urban design and planning for it. In terms of the latter, contemporary planning trends, including the traditional neighbourhood design, transit-oriented development, the fifteen-minute city, superblocks or smart cities, all seem attuned to the decentralization of formal or informal public-oriented services, which could be supported by an increase in shared spaces in community areas. In terms of architecture, novel research and practices around co-housing and co-living developments have advanced promising outcomes.¹⁰ Likewise, trends such as agile design, architecture as a service, and space as a process all seem to be strategies that respond to the implicit need for flexibility, adaptability, and resiliency in common and public-oriented spaces. Similarly, new trends in the management realm, such as the participatory design processes and cooperative and non-profit housing development, can facilitate residents' involvement in co-design projects and enhance access to affordable living environments, together with innovative tenure types, which allow adaptability and flexible self-organizing of space. Overall, it seems that at present there is fertile ground for developing approaches to the contemporary reformulation of sharedness in living environments.

FOCAL THINGS AND PRACTICES, EXCHANGE AND COMMUNITY VALUE

To address the issue of sharedness in this scenario of transformation, this article's conceptual framework builds on Albert Borgmann's concepts,¹¹ which reveal how shared spaces could help to bridge individual and communal realms and address contemporary goals of maintaining sustainable lifestyles while overcoming isolation and ultimately enhancing *community values*.

For Borgmann, technology development of any kind should bear in mind the humanist approach of things—including architectural things—around which focal practices are generated. Focal practices are 'human activities that demand skill, patience and attentiveness, and are worthwhile in themselves, not merely in what they produce'.¹² Borgmann differentiates between devices and things when discussing technological developments with a humanistic approach.¹³ The practices he refers to are habits, which 'intertwine with the

physical place or space we occupy',¹⁴ and rituals around which community is generated.¹⁵ This relates to the socio-psychological concepts of the sense of belonging and lifestyle and to the architectural notions of placemaking.

If there is an exchange while engaging in these focal practices (which, in principle, could be individual activities), then value is created, as noted by Simmel.¹⁶ For example, this could occur during activities and work events that combine a practical goal with a sense of satisfaction in seeing the tangible results of one's labour combined with socializing. A variety of interrelated immanent values are generated through exchange via focal practices: improvement of the community's ability to cope with its daily needs, as well as the creation of feelings of tolerance, altruism, and security (social value); exchange of knowledge and skills, enhancing individual competencies (human value); cultivation of both tangible and intangible heritage of the community (cultural value); and caring for the natural and the built environment where the community is settled (environmental and structural value). Architectural quality contributes to this value creation by adequately shaping the place where the social exchange occurs, as well as conveying the symbolic meanings that are representative of such values.¹⁷

This study identifies six focal practices for contemporary shared spaces, which can potentially generate community value through exchange and sharing at various levels:

1. *Building as focal practice.* Building as a grassroots action in a community includes planning, organization, and manual labour, and it can occur throughout the life cycle of the built structures. Novel co-creation methods in design-process and building technologies support this focal practice in contemporary projects. Through this practice, communities recover a foundational step of dwelling, as opposed to the more typical notion of commodification or, stated another way, through this action, inhabitants become *prosumers*, i.e. consumers and producers at once.
2. *Food-related activity as focal practice.* Research supports the idea that activities related to food are vectors of social bonding, triggered directly by actions such as farming, shopping, cooking, and dining.¹⁸ Additionally, food indirectly entails multiple bonding values attuned to contemporary sensitivities, such as relying on proximity logistics networks, responsible consumption, and healthy lifestyles. Allotment gardens and kitchens have long traditions of sharedness that are loaded

with socio-political and cultural values. New programmes, such as co-operative markets, urban farms, and permaculture practices, represent potential sites and activities for reinforcing community habits and rituals around food.

3. *Mobility as focal practice.* Energy consumption and global warming concerns have called into question individual vehicles as means of transportation. Public transport and mobility hubs that promote multimodal means of transport (including micro-mobility devices and sharing arrangements) are technological and architectural alternatives from which further focal practices can be generated. For instance, cycling technologies have the potential to enhance community values in all their dimensions, as they generate a culture around the *things* themselves and the values they convey about healthy habits and environmental concerns.
4. *Doing and making as focal practice.* Changing work patterns, as well as technological developments, such as digital technologies, information and communication technologies, and do-it-yourself (DIY) devices, are blurring the boundaries between work, living, and recreational environments. As a result, new spaces for co-working and for makers have emerged in recent years.
5. *Cultivating the body and the mind as focal practice.* Healthy routines, leisure, culture, information exchange, continuous education, and skill upgrading are also vectors for social bonding. These practices imply habits and rituals that are currently blended with living and working routines, triggering new hybrid programmes that involve novel spaces in which to share in these practices.
6. *Caregiving as focal practice.* Current trends towards the decentralization of health and caregiving services, if balanced with public sources of budget and personnel, create opportunities for people to express empathy and solidarity in daily life. Caregiving activities demand proper spaces for doing so, in living environments where nursing and childcare facilities intermingle with other programmes that support a variety of daily routines.

All these practices have the potential to reinforce the various vectors that comprise community values. All are focal practices, as they can be characterized as processes that are developed in a certain space, span time, involve active and attentive engagement of people, and generate well-rounded experiences. All demand architectural solutions that can enhance and enable their

functioning, as they require people to be physically present simultaneously in a place.

TYPOLOGIES OF SHAREDNESS

Through a case-study analysis of contemporary trends of sharedness in living environments, this investigation has identified three architectural types that totally or partially incorporate the above-described focal practices in their programmes. All three are variations of the co-housing and co-living modalities of collective housing,¹⁹ that have some functional and formal characteristics answering the specific needs of their inhabitants, which makes them stand-alone types.

Thus, the types correspond to three kinds of present-day dwellers, as they embody some of the socio-economic transformations mentioned above. The first type, *Placemaking Sharedness*, comprises urban co-housing initiatives promoted by contemporary cooperatives that include the aim of placemaking in their agendas. The second, *Uprooted Sharedness*, is a kind of co-living that fulfils the needs and the vision of an emerging group of people, *global nomads*. The third type, *Structured Sharedness*, fits neither in the co-housing nor in the co-living category although it embodies some of their characteristics and responds to another contemporary human type, the *creative dweller*. All three share the bringing of focal practices to the fore in their programmes, but, because they are shaped to respond to the needs of a specific type of resident, they constitute different types. However, what they have in common relates to the creation of community value through transformation of the existing models to produce new types of sharing spaces.

This typological analysis might not provide a comprehensive view of the contemporary scene and the variety of sharing modalities in living contexts, but the synthesis it shows does represent novel and key approaches to sharedness in the context of transformation. The criterion for inclusion in the case studies is narrowed to the last ten years. However, no geographical limits have been set because, local contingencies notwithstanding, there is evidence of the global extent of this trend. The cases included come mainly from countries where co-housing is active and that have long traditions of similar initiatives (e.g. Central Europe and Denmark),²⁰ or else from areas where co-living modalities are settling rapidly due to the sharing economy's evident impact on real estate (e.g. Asia and the USA).

Since one of the purposes of this architectural sub-study is to inform the broader investigation mentioned above, selection is also conditioned by the goals and aspirations of the developers of the area (e.g. basing new building on cutting-edge design solutions that help enhance social cohesion in the area). Hence, the architectural quality of the case studies and the purposeful value of their underlying ideas are part of the inclusion criteria. Likewise, the selection is conditioned by the characteristics of the Hiedanranta new development (e.g. the socio-economic and political circumstances of the place) and the kind of urban setting and urban planning features of the area, which include a fixed share of communal spaces as an integral part of the housing blocks. In this respect, the selection of the cases builds partly on the work of scholars who have identified certain representative case studies.²¹ To these previous investigations, this article adds the analysis of the case studies from the perspective of its own theoretical framework (Chart 1).²²

Placemaking Sharedness

[This type is exemplified by case studies 1–7 in Table 1.]

The Placemaking Sharedness type is characterized as the result of initiatives promoted by cooperative members. Cooperatives have re-emerged in the 2000s, bringing together middle-class people who have become impoverished by the economic crisis and have suffered from the shortage of affordable housing in cities. People have grouped together around growing environmental concerns as well.²³ This identified pattern of transformation, reflecting the early twentieth century's cooperative initiatives, which brought together lower socio-economic classes or people with other kinds of binding reasons, is also reflected in these dwelling initiatives' capacity for *placemaking*.

In many cases, the ideas for cooperative housing are developed through dialogues among city stakeholders, citizens, knowledgeable cooperatives, planners, and designers. Subsequently, the projects are developed through urban-planning and architecture competitions. Once the development is completed, the co-creation process continues with the community taking decisions, including those related to the built environment. This entire process constitutes the background of building as a focal practice.

Table 1. Data on Selected Projects.

Project Type	Location	Year	Authors	Community spaces (commons) programme	Public-oriented spaces program	Tenancy and social aspects	No. of inhabitants or living units	Total	Commons %
Mehr als wohnen Hunziker Areal ⁴⁹ (1)	Zurich, Switzerland	2015	Duplex Arch. Miroslav Šik Müller Sigrüst Arch. Futurafrosch Pool Arch.	800 m ² indoors administration with reception, mobility station, laundries, workshops and makers' spaces, cheap spaces for neighbourhood uses	6,000 m ² retail 1,400 m ² other facilities: kindergartens, workspaces, pop-up spaces, and 25 extra rental rooms	Cooperative 10% assigned to institutions 45% are people from outside Switzerland	1,400 inhabitants, in 13 blocks	40,000	2.5
Kalkbreite ⁵⁰ (2)	Zurich, Switzerland	2014	Müller Arch.	630 m ² coffee shop, library, laundry room, service point for tenants and guests, mobility services and material recycling and multipurpose rooms, kitchen, a sauna and a music room Other: bike storage and lockers	4,200 m ² retail 310 m ² kindergarden 260 m ² guest house	Cooperative	97 units 9 satellite rooms	13,200	8.1
Spreefeld Coop Housing ⁵¹ (3)	Berlin, Germany	2014	Silvia Carpaneto fatkoehl arch. BARArch.	300 m ² indoors gym, music room, salon and laundry room 420 m ² terraces	385 m ² 3 extra rental rooms	Cooperative	64 units	6,200	5.5
Wohnzimmer Sonn- wendviertel ⁵² (4)	Vienna, Austria	2014	Studio Vlay Streeruwitz Riepl Kaufmann Bammer Arch. Klaus Kada	Basement: storage, bike parking and repair Courtyard level: youth space, theatre, library Different floors: play area for infants, vertical play area with indoor slide, billiard room, winter garden and climbing room Terraces.	1,000 m ² spa shared kitchen, music training room, girls' room and mini cinema	Cooperative	427 units	50,770	

Project /Type	Location	Year	Authors	Community spaces (commons) programme	Public-oriented spaces program	Tenancy and social aspects	No. of inhabitants or living units	Total	Commons %
Gleis 21 ⁵³ (5)	Vienna, Austria	2018	Einszueins Arch.	Terrace: Community kitchen, Sauna, yoga	Ground floor: Music school, multifunctional cultural room, media workshop, bistro Terrace: guest garden, library,	Cooperative	45 residents	3,886	
La Borda ⁵⁴ (6)	Barcelona, Spain	2018	Lacol	280 m ² Shared rooms, shared kitchen, laundry room, central courtyard, Greenhouse/multi-purpose space	Co-op market	Cooperative	28 units	2,950	9.5
Ich-Du-Wir-plus ⁵⁵ (7)	Vienna, Austria	2017	Treibersburg & Partner Arch.	225 m ² Ground floor club and play area, laundry room and fitness room, yoga room, communal meeting room and quiet room	170 m ² Satellite rooms and office spaces	Cooperative	35 units	2,460	9.1
1215 Fulton Street co-housing ⁵⁶ (8)	New York, USA	In progress	Sou Fujimoto (for The Collective)	Theatre, performances, exhibitions, co-working, a restaurant, a rooftop bar and an interior courtyard		Global nomads (including artists and bohemians)	440 units	22,296	Approx. 10
Qianhai Leju Guwan Talents' Apartments ⁵⁷ (9)	Shenzhen, China	2020 (project)	Foster and Partners	One shared kitchen, dining area and a tree-lined deck per cluster of 12 apartments	residents' club-house, wellness and spa centre, residents' town hall and co-working spaces sit within the sky gardens	Global nomads (Single professionals)	Not available		Approx. 10
Treehouse ⁵⁸ (10)	Seoul, South Korea	2018	studio Bo-DAA (for Commonlife)	Parking and storage, central interior garden, shared kitchen, co-working facilities, laundry, spots for relaxation and a communal pet-bath		Global nomads (Single millennials with a pet)	72 units	4,800	Approx. 10
The Urban Village Project ⁵⁹ (11)	Concept project	2019	EFFEKT Architects / SPACE 10	Urban farms, shared kitchens, communal dinners, e-bike stations and shared transportation hubs, co-working and makers' space areas, sensory gardens, fitness areas, health clinics, shared living rooms, playscapes, event spaces, shared day-cares, and retail		Creative dwellers			High rate

To begin the placemaking process, some cooperatives take ownership of the land from the moment the design process begins. For instance, gardening is one of the focal practices utilized for this purpose. Gardening fulfils a threefold goal: to gain attention for the cooperative's activities in the area of development; to generate links between the future inhabitants and existing neighbouring areas, both enhancing social values; and to create knowledge about cultivation in the living community—all things that have the potential to enhance the human, cultural, and environmental values of the community.²⁴ Other cooperatives take more audacious actions to initiate the placemaking process, such as occupying land.²⁵

Governance systems constitute another instance of the civilized and productive *intangible sharing* of ideas during the entire lifecycles of cooperative projects and buildings. An example is the so-called *sociocracy* system, or dynamic governance, which is characterized by the use of *consent* rather than democratic voting.²⁶ These idea-sharing and decision-making strategies extend over time and consolidate social engagement, which are integral to placemaking processes.²⁷

Another feature that characterizes this type is that the architecture is rooted in the place through programmatic, formal, and topological strategies. Given the cooperatives' implication for the common good, architecture programmes are designed to share and exchange practices in a given community, as well as with neighbouring areas, and then with the nearby major city. Likewise, the relation between a building and the city structures is carefully arranged. For example, to generate adequate gradation between the private and the common or public spaces, allowing the fluid interchange between life in the premises and among buildings, threshold programmes should be allocated between private and public life. Of major importance for this are: the ground floors of buildings, which are in direct physical contact with the city structure; the rooftops of buildings (in direct visual contact with the cityscape); the space between the ground and the rooftops (to generate a fluid and full involvement of the building with city life—i.e. a sort of *promenade architecturale* of sharedness); and the internal design of the shared spaces that enable the focal practices to occur.

The programming and formal arrangements of buildings' ground floors are crucial. They contain a mixture of shared spaces for neighbourhood use, as

well as other public-oriented spaces that are the infrastructure for residents to enact focal practices. In terms of management, there is a balanced combination of shared facilities included in the residents' rent or offered at a low cost to residents and other businesses. The latter are sources of services and of income for the community (procuring economic value), and the former offer high-standard facilities for local people (procuring social, human, and cultural values).

There is a combination of spatial qualities in these shared spaces, ranging from neutral to highly specialized. The former allows flexible use and occupancy, and so the interior design is characterized by large structural spans, implying generosity of space and flexibility of use. As for the character of the space, the material choices and raw appearance, like the spatial openness and amplitude, resemble those of workshops or warehouses and imply the possibility of undertaking actions that typically are not possible in domestic spaces. The highly specialized spaces, on the other hand, are designed for specific activities (e.g. mobility, education, arts, sports, gardening, crafts).²⁸ Both types of shared spaces enable various focal practices (i.e. food-related activity, mobility, doing and making, cultivating the body and mind, and caregiving) and are included in the layout of this Placemaking Sharedness type as means to build the community's social, human, and cultural values.

Three-dimensional collective indoor and outdoor circuits make the shared spaces of this type better connected and more visible. Different programmes are thus pulled together to enhance spatial usability and the potential for social encounters, taking advantage of the dwellers' varied trajectories through this space: necessary or alternative crossings, or those made with socializing in mind. Soft dividers, such as furniture or architectural elements (e.g. staircases and columns), are used to articulate these different and connected uses, delimiting areas but maintaining visual and physical connectivity between them.²⁹ Central patios, distribution galleries, stairwells, and bridges are among the building elements used to achieve chains of common-use areas, which might include circuits for the use of the general public or just for the community. This implies that the distribution of different degrees of public and common use of shared spaces does not always correspond strictly to the usual arrangement of the lower floors being publicly oriented. In this type, the degrees of privacy and accessibility of the shared spaces depend on the level of openness of the promenade that connects them.

The last feature that characterizes the Placemaking Sharedness type is the variety of living units it incorporates. The purposes of this partly address the growing variety of ways of living and earning, as well as responding to special housing needs of the inhabitants. Altogether, these elements ensure a good social diversity within the group. Furthermore, variety increases the potential for people to stay longer in the area and the community by being able to move on to different living units as their life conditions change, ensuring the resilience of the collective. This relates to Peter Ebner's concept of *integrated housing*, which may include diversity of age, functions, cultural groups, family forms, and lifestyles, as well as mixing of different housing development and management ways. In Ebner's view, resident-oriented solutions and incorporating the facilities shared by the residents are essential for the community to profit from the interactions among residents and from the reciprocal exchange of needs and resources. Thus, the various focal practices programmed in the shared facilities are instrumental in strengthening the human, social, and cultural values of the group.³⁰

Among the diverse domestic offerings that include different housing units, an alternative living arrangement is the cluster apartment, which introduces the idea of commons at the scale of the living unit, where focal practices might be undertaken within the smaller-scale group living in the cluster (e.g. food practices, doing and making, caregiving).³¹ The levels of conviviality, solidarity, communality, and social engagement are then greater than those provided by the housing units designed for regular families. Typically, cluster apartments consist of living units that combine *en suite* apartments (bedrooms, bathrooms and kitchenettes) and shared living spaces. The layout of these communal spaces is also instrumental for enhancing the experiences of the practices enacted in them. As at the scale of the building, interconnectivity, visibility, and grouping together of these small-scale shared spaces are constants in this type.³²

The *satellite room* is also a shared space, an extra room that provides different opportunities for occupancy by residents and visitors, as well as for carrying out focal practices.³³ This kind of room also provides the possibility for private units to expand or contract by adding or detaching it, depending on the residents' needs.

Uprooting Sharedness

[This type is exemplified by case studies 8–10 in Table 1.]

The Uprooting Sharedness type of sharing fulfils the needs of an emerging group of inhabitants who could be termed *global nomads*. A range of people fit into this broad group, but they have in common a lifestyle that blurs the boundaries between work, leisure, and travel, as well as their particular social spheres. They may also share the life goal of attaining self-actualization in preference to owning a house, espousing the idea of a *hunter-gatherer* pattern of creating, profiting from, and enjoying clusters of resources in the places where they temporarily live.³⁴ These major characteristics make them like-minded individuals, which strengthens their co-living ability.

‘Work anywhere, live differently.’ This is the motto of one of many recently emerging multinational co-housing developers and operators³⁵ who react to a property sector that is outdated in an increasingly mobile and global society by offering this type of residential space as a service for global nomads. Developments are mainly located in vibrant global cities, although some enterprises also operate in rural and wildlife enclaves. The developers cover the design of spaces and services and offer the long-term operation of the premises, paid in all-inclusive rental bills by the users. Mobility is enabled through flexible lease options. The minimum age of the residents is the legal adult age of the country where the space is located; the maximum age is not established, but inhabitants are generally in their thirties. Nomads can move into this kind of space for a few nights or for months. Some developers set a minimum period of occupancy, with the average duration of residence generally being less than one year.

The architectural type does not correspond exactly to those of hotels or of hostels or dormitories, nor is it the same as post-tourist industry models, such as *Airbnb* or *Couchsurfing*. Rather, it is a combination of those types and similar to self-managed co-housing models. Its model has been adapted to the necessities of the target group, ruled by top-down design and management; in this case, therefore, building is not a focal practice that intervenes in the creation of community value.

Developments consist of fully furnished private living units and a series of upgraded shared premises. The latter are programmed and designed to cover all the focal practices identified, with an emphasis on those related to food (including preparation and consumption), making and doing, and body-soul cultivation. Wi-Fi connection—a fundamental service provided—facilitates people’s interactions and exchanges, aided by online members’ hubs,

webpages, and networks. Some activities and skills shared by the residents are based on their initiatives, and some are facilitated by professional *community makers*. The goal of dwelling in this situation is to form new relationships with people, expand personal and professional networks, experience novel things, and learn new skills, thus enhancing the human, social, and cultural values of the collective. The spaces designed for these purposes have ‘personality and flair’ to ‘elevate the stay’.³⁶ Thus, the spatial experience provided by this type of dwelling is fundamental for those individuals exemplifying nowadays placeless communities by gathering in specific locations, and by doing so they somehow bridge the *Gesellschaft/Gemeinschaft* dichotomy.

Despite the different cultural backgrounds and nationalities of community dwellers like these, they are like-minded individuals with shared interests. This conditions the programming and design of the shared spaces that are customized for the specific interests of the inhabitants.³⁷

The private rooms and apartments are generally equipped with the same basic facilities, although a variety of layouts and atmospheres are offered. There is an emphasis on the quality of the space itself and the furniture in it, which is inventively designed within the spatial constraints. The bed has become a central piece in each private room, given that most of the activities undertaken by the nomads can be done in bed: teleworking, online amusement and virtual social contact.

The shared facilities, accounting for around 10 per cent of the area devoted to private spaces, are generally reserved for the residents and occasionally open to visitors. Sometimes the premises also include spaces fully accessible to the general public, which satisfy the nomads’ desire to merge with local communities. Large developments offer diversity in their shared spaces, for instance, workspaces that range from private offices and hot desks to flexible spaces that can accommodate event celebrations.

As in the Placemaking type, access to and visibility of shared spaces are also crucial, to enhance usability and social interaction. However, both visual and physical connection circuits are more restricted to public use than in the previous type.³⁸ The buildings’ morphology reinforces the self-centred nature of this type.³⁹ Such programmatic and formal features bring the spatial aspects of the Uprooting Sharedness type close to what are referred to as ‘gated communities.’

Structured Sharedness

[This type is exemplified by the case study numbered 11 in Table 1.]

The Structured Sharedness type fulfils the aspiration and vision not of a *passive* nor a *reactive* inhabitant,⁴⁰ but of a *creative dweller* with an approach that suits the *prosumer* culture. The design project incorporates *co-creation*, not necessarily only in its design and production phases, but also in its life cycle—a continuous process of transformation of the system and its occupation that is self-managed by the community. Thus, although all focal practices are included in the functional programme of this type, building is the major focal practice in play. The architectural project sets the rules of engagement so that people can intervene and act on the space. Architects and urban planners make direct preliminary decisions regarding structuring and modularizing the space to anticipate the possibility of the community acting on and adjusting to the unpredictable, uncertain, and unknown, thus allowing emergence to occur.

First, the projects privilege the procedural characteristics of the architecture rather than its outcome as an object. Second, they are conceived as a system that relates to the larger system of the city. Third, they establish a hierarchical division of the module that constitutes the basic unit of the system: its load-bearing structure (the support) being the static and enduring part of the module, and the infill comprising the changeable elements. Power is distributed according to the level of intervention, for example, the *city structure*, the *city tissue* (or *urban fabric*), the *support structure* and the *infill*. The residents' status grants them the ability to directly intervene at the lowest level (the infill) and, as a community, to indirectly affect the city structure. This level of sharedness includes the residents' decisions to establish, along with the existing neighbourhood, active involvement in the formation of a semi-public space. The spaces are loaded with a strong character that inspires and engages the users' imaginations to creatively occupy the space in multiple ways. Private and shared spaces can change to reflect the amount of space needed by the transient residents. The project is conceived as a *pool of space* that can be adapted, owned, and occupied flexibly over time; it is changeable, alterable, and expandable. This self-managed process suggests a sense of community generated around collective compromises and decision-making in relation to the common good—the pool of space.

This type of adaptability and flexibility resonates with theoretical paradigms of the 1960s, including Dutch structuralism. Its similarities with N. John Habraken's *open building* concept are the most evident,⁴¹ together with Herman Hertzberger's idea of building *polyvalence* stemming from the character of a space:⁴² that is, inspiring and engaging the users' imaginations to creatively occupy the space.⁴³ In addition, the Structured Sharedness type entails a revival of Cedric Price's idea of *calculated uncertainty*⁴⁴ and Stewart Brand's concept of *scenario planning*.⁴⁵

CONCLUSION

This article presents a typological analysis of a selection of architectural examples that respond to the issue of sharedness in living environments, a field in continual transformation due to various interrelated and contemporary socio-economic, political, technological, and cultural factors.

The three types identified employ different architectural strategies to comply with the needs of contemporary citizens and residents (cooperative members, global nomads or creative dwellers) for focal practices around daily-life habits and community rituals, as well as exchange opportunities. All these meaningful practices (activities around building, food, mobility, making and doing, body and mind, and caregiving) enable the attainment of full individuality and *idiorrhythmia*, and enhance the multilevel aspects of community value. This value that architecture brings to the community is important here, because the sense of space and of place is crucial for the formation of these living communities. In a context where unlocated and placeless communities of many kinds also exist, they reclaim and reinforce social ties in different degrees through physical involvement in situated spatial-temporal activities. Thus, the *Placemaking Sharedness* type contributes to sustainable urban development by rooting the human settlement in the place where it is built and in its existing extended community. In other words, ephemeral actions and instruments enable the intangible sharing of ideas and decision making. It also involves programmatic and formal solutions, which include topological arrangements to gradually articulate the urban structure with buildings' communal and public-use spaces, as well as private ones. In this regard, the spatial configuration could be considered centrifugal as the morphology of the building and its circuits of circulations extend towards the place where they settle. Moreover, examples categorized under this type trace different scalar levels of sharedness (i.e. living unit, building, and neighbourhood),

implying that the type relates to the concept of integrated housing that serves a mix of lifestyles and diverse types of dwellers, and where the shared spaces perform the key role of facilitating social integration. The neutral character of certain shared spaces in this type plays a key role in terms of flexibility of use, and thus serves to integrate different social groups. These raw spaces coexist with other highly specialized ones to make possible the strategic focal practices of the community. All the identified focal practices shape the programme of the shared spaces in this type, including the building practice—which implies the involvement of the architect, who thus becomes an active member of the living community through participative and co-design processes (Figure 1).

The strategies of the *Uprooting Sharedness* type work the opposite way; they are self-centred and focused on capitalizing on the place where communities periodically settle. In this way, they seek to enable potential social encounters that are ephemeral and intermittent but are also accumulative and greater in number than in the Placemaking type. Buildings are configured more like gated communities, with limited degrees of programmatic and formal openness to the place. The spatial configuration could thus be regarded as centripetal, which contrasts with the Placemaking type spatiality. Also, this type puts more emphasis on programmatically and formally customizing and thematising spaces towards fulfilling specific lifestyles than does the inclusive Placemaking type. In terms of design, the character of the space is sublimated in response to the global nomad's *fulfilling experiences* and consumption demands. In this type, all focal practices are represented except the building practice; thus, the architect plays no active role in the living community (Figure. 2).

These two types are, respectively, UpToDate co-housing and co-living types, transformed due to contemporary circumstances, which have altered them formally and functionally to the extent of making them stand-alone types. Despite the differences between them, the shared spaces they incorporate have similar programmatic and formal characteristics, which include the following: hybridized focal practice programmes; upgraded, super-specialized, and customized facilities; shared spaces that are articulated with circulation elements; and visual and varying degrees of physical connectivity between the shared spaces themselves and the surrounding private spaces and public structures. All strategies aim to intensify the usability of the space

and to enhance the possibility for human encounters, as well as to express the community values and design that inspire users. Material choices and architectural elements also contribute to this overall aim.

If the previous two types can be regarded as evolutions of previous convivial housing models, the *Structured Sharedness* type implies a further conceptual transformation of such models, due to its approach to sharedness of space as a common good. Thus, building as focal practice becomes the overarching binding activity of the living community. This is achieved by structuring the system and its modularity beforehand so as to empower the inhabitants to act on the space, and allows flexibility and life-long adaptability of the available pool of space. In this type, the architect plays a key role as the planner of the rules that enable space shaping and sharing, and over time, as the manager of the superstructure that frames the elements where the creative dwellers can intervene. Rather than having a certain spatial configuration, like the previous types, this one is characterized by being a system that enables the spatial arrangement to emerge through the aggregation of programmed modules (Figure 3).

Overall, the identified instances show a shift in the intentions of sharedness. Current drives are added to the utilitarian and affordability motivations of the past. These present forces are derived from a diversity of lifestyles and values and mainly from the need to overcome social isolation, as well as to enhance and maintain the multilevel values of place-based living communities. This is done through the exaltation of physical space that enables the dwellers' engagement in focal practices, in addition to other communal practices such as the physical encounters outside the dwelling and the virtual ones.

This study also concludes that the three identified types are not entirely novel. On the contrary, they respond to the scenario of transformation, where they are framed by the assimilation and transformation of previous architectural types or *constellations* of types.⁴⁶ Either drawing on communes and cooperatives of the past, adapted to novel social demands, or on Dutch structuralism, adapted to novel prefabrication and information technologies, the identified types are novel instances of architectural experiences that take on non-temporal dimensions based on no canonical relations between individualism and communality.

Durkheim's paradox,⁴⁷ mentioned in the beginning of this article, has been confirmed by rich empirical research in the social sciences;⁴⁸ however, it continues to pose social, economic, and environmental sustainability challenges to welfare systems. This article presents a sub-study that has aimed at compiling relevant case studies to feed a broader study on residential solutions that address this conflict in the context of Finland. Furthermore, based on the analysis, the article provides a synthesis, in the form of a theoretical framework that contributes a vision to overcome the challenges that Durkheim's paradox poses to architecture.

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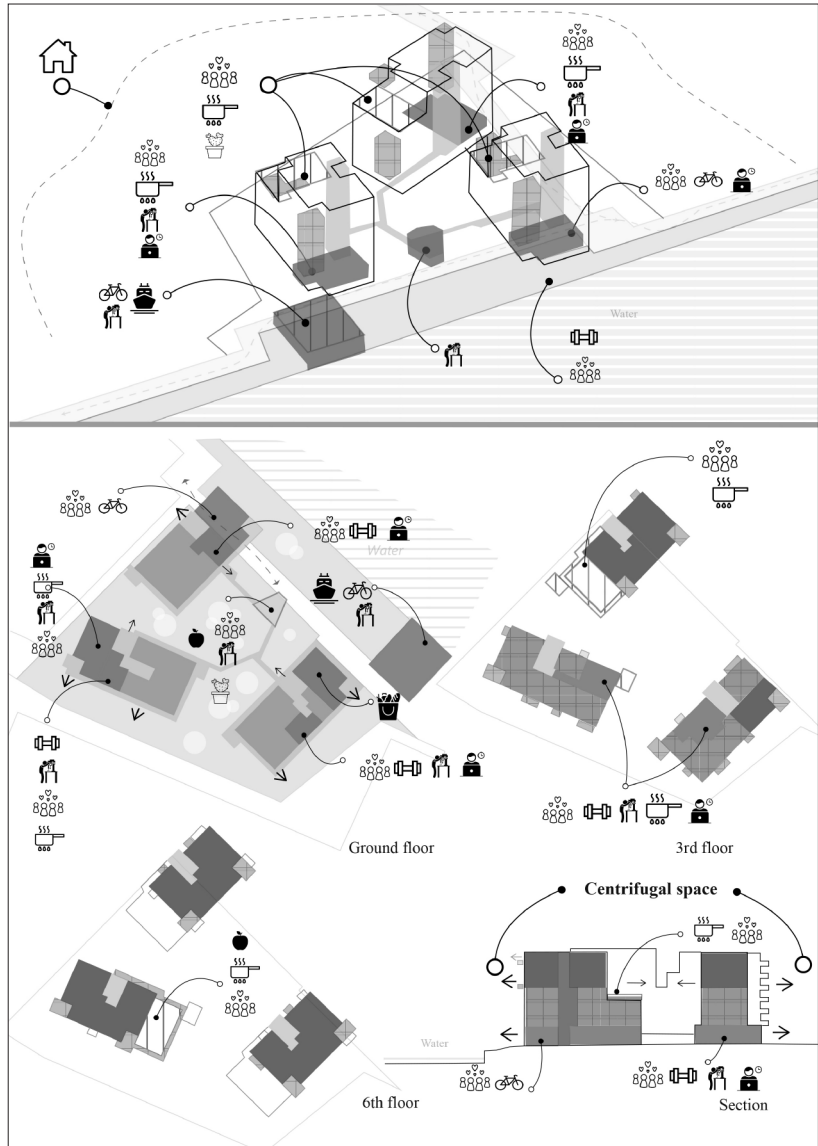


Figure 1. Example of Placemaking Sharedness. Speerfeld Co-op Housing, Berlin, Germany, 2014. Image by the authors, elaborated from the project documentation. Source: ArchDaily, 'Coop Housing at River Spreefeld / Carpaneto Architekten + Fatkoehl Architekten + BARarchitekten', <https://www.archdaily.com/587590/coop-housing-project-at-the-river-speerfeld-carpaneto-architekten-fatkoehl-architekten-bararchitekten>.

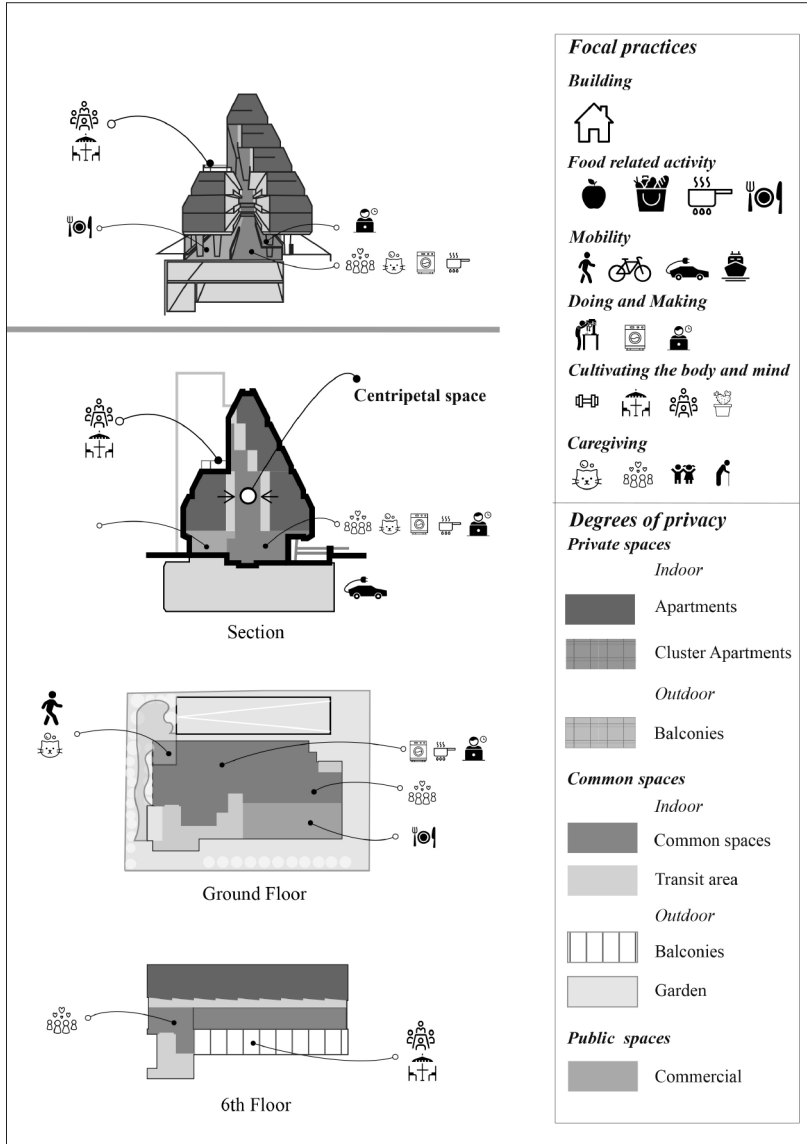


Figure 2. Example of Uprooting Sharedness. The Treehouse, Seoul, South Korea, 2018. Image by the authors, elaborated from the project documentation. Source: BO-DAA. Bo-DAA, Treehouse, Seoul, <https://www.bo-daa.com/en/residential>.

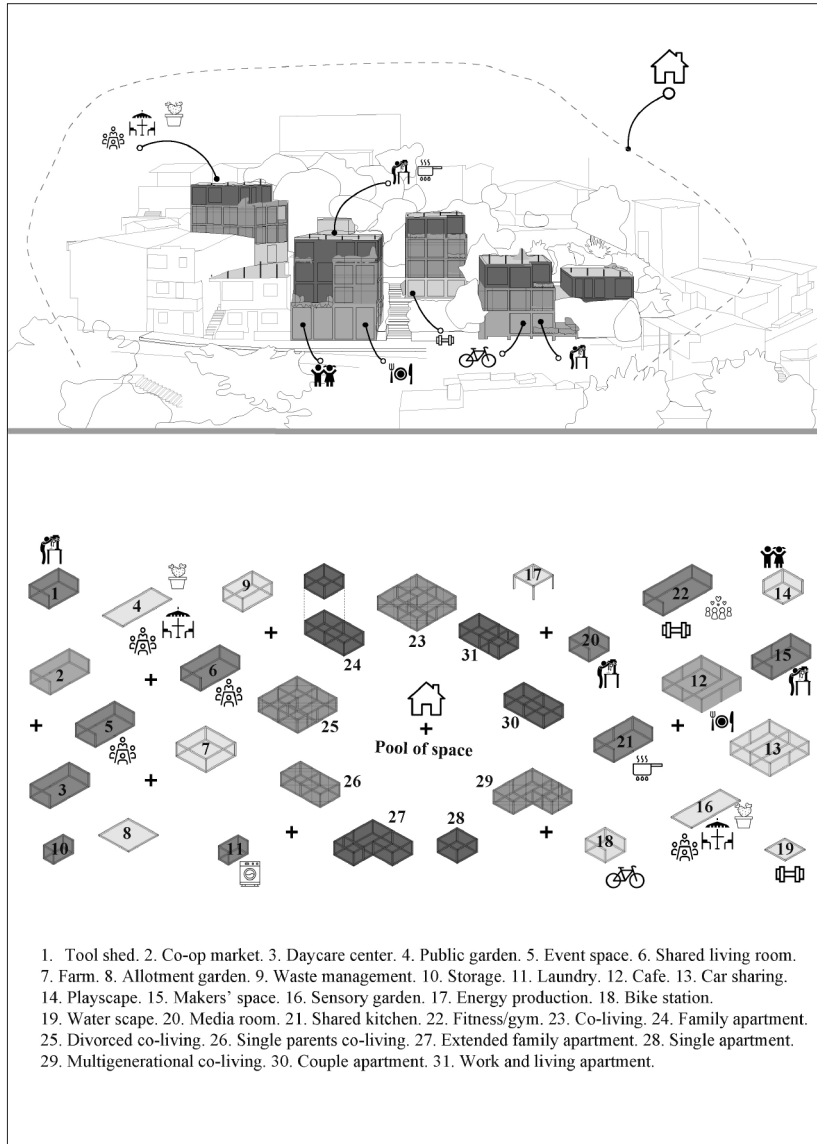


Figure 3. Example of Structured Sharedness. The Urban Village Project (concept project), 2019. Image by the authors, elaborated from the project documentation. Source: EFFEKT Architects. The Urban Village, <https://www.urbanvillageproject.com>.

NOTES

¹ Ferdinand Tönnies, *Community and Society* (Mineola, NY: Dover, 2002).

² Ted K. Bardshaw, 'The Post-Place Community: Contributions to the Debate about the Definition of Community', *Journal of the Community Development Society* 39, no. 1 (2008), p. 6.

³ Some examples pointing to the topicality of this theme include the Venice Biennale 2021, 'How will we live together?'; the 2018 project 'Welcome to one shared house 2030' by Space 10; and the exhibition promoted by Vitra in 2017 called 'Together! The New Architecture of the Collective.' These examples are especially relevant, given the ongoing debates about the ways that the coronavirus pandemic has impacted social interaction and thus shared spaces. Regarding the specific case of co-housing research, Tummers has reported that, since 2000, when Vestbro wrote a comprehensive literature review on the topic, research has intensified. See Lidewij Tummers, 'The Re-Emergence of Self-Managed Co-Housing in Europe: A Critical Review of Co-Housing Research', *Urban Studies* 53, no. 10 (2016), p. 2026.

⁴ The goal of SocialBlock is to explore how a combination of intelligent technologies and spatial innovations can enhance community interaction and motivate residents to share spaces to advance sustainable communities in urban areas. This is done in the context of a Nordic Superblock, a planning strategy applied in the new urban development of Hiedanranta in Tampere, Finland, which consists of urban units spanning various city blocks and sharing outdoor and indoor common spaces. For more information about Hiedanranta, see the following link: <https://hiedanranta.fi/> (all URLs accessed in September 2023). For more information about SocialBlock, see <https://projects.tuni.fi/socialblock/>.

⁵ Dick U. Vestbro, 'History of Cohousing, Internationally and in Sweden', in *Living Together: Cohousing Ideas and Realities Around the World*, proceedings from the International Collaborative Housing Conference in Stockholm 5–9 May 2010, edited by Dick U. Vestbro (Stockholm: Royal Institute of Technology, 2010), pp. 42–56.

⁶ Dick U. Vestbro and Liisa Horelli, 'Design for Gender Equality: The History of Co-Housing Ideas and Realities', *Built Environment* 38, no. 3 (2012), p. 331.

⁷ Robert D. Putnam, *Bowling Alone: The Collapse and Revival of American Community* (New York: Simon & Schuster, 2000).

⁸ Émile Durkheim, *The Division of Labour in Society* (London: MacMillan, 1983).

⁹ Pekka Kosotieti, 'From Collectivity to Individualism in the Welfare State?', *Acta Sociologica* 30, nos. 3–4 (1987), pp. 281–93.

¹⁰ Barthes introduced the concept of *idiorrhythmia* to vindicate a non-alienating coexistence in the seminar 'How to live together?', held at the Collège de France in 1977. At that time, he was already enquiring into issues of the expansion of capitalism and its devastating effects on collective life. Roland Barthes, *How to Live Together: Novelistic Simulations of Some Everyday Spaces* (New York: Columbia University Press, 2012). For further elaboration on facing neoliberal individuality and imagining other horizons for collective existence, see André Lepecki, *Idioritmia o en l'esdeveniment d'una trobada* (Barcelona: Arcadia, 2018).

¹¹ See, for example:

Anna Falkenstjerne, 'What is Co-Housing? Developing a Conceptual Framework from the Studies of Danish Intergenerational Co-Housing. Housing', *Theory and Society* 37, no. 1 (2020), pp. 40–64.

Charlotte and Peter Fiell, *Radical Housing: Designing multi-generational and co-living housing for all* (London: Riba, 2020).

Charlotte and Peter Fiell, *Together! The new architecture of the collective* (Weil am Rhein: Vitra Design Museum, 2017).

Lidewij Tummens, *Learning from co-housing initiatives: Between Passivhaus engineers and active inhabitants* (Delft: Delft University of Technology, 2017).

Dick Urban Vestbro, ed., *Living together: Cohousing ideas and realities around the world*, proceedings from the international collaborative housing conference in Stockholm, 5–9 May 2010 (Stockholm: Division of Urban and Regional Studies, 2010).

¹¹ Albert Borgmann, *Technology and the Character of Contemporary Life: A Philosophical Inquiry* (Chicago: University of Chicago Press, 1984), pp. 41 and 47.

¹² Ibid.

¹³ For Borgmann, a *thing* is ‘inescapable from its context, namely, its world, and from our commerce with the thing and its world, namely, engagement’, as opposed to a *device*, which implies that ‘the relatedness to the world is replaced by machinery, but the machinery is concealed, and the commodities, which are made available by a device, are enjoyed without the encumbrance of or the engagement with a context’. He gives the example of central heating as a device, which, while making warmth easily available, destroys the activities that enabled the social interaction and engagement procured by the traditional hearth. Borgmann, *Technology and the Character of Contemporary Life* (ibid.).

¹⁴ ‘The English words *habit* (custom) and *inhabit* (dwell) share an etymological origin: *habere* (to have). The frequentative of *habere* is *habitare*. Frequentative means that the action occurs repeatedly; so, *habit* and *inhabit* can be read as *having repeatedly*; for example, the routine that you frequently have is your *habit*, or the physical place that you have continuously is the place that you *inhabit*. Language reveals how our recurring acts of everyday life, the *typical human situations*, as Dalibor Vesely puts it, intertwine with the physical place or space we occupy. They are originally ‘attuned’, using Alberto Pérez-Gómez’s term. Architecture’s fundamental role is to mediate in such a tuning so as to enable a meaningful existence.’ Quoted from: Fernando Nieto and Rosana Rubio, eds., *Loneliness and the Built Environment* (Tampere: Tampere University Press, 2021), p. 117.

¹⁵ According to the philosopher Byung-Chul Han, *rituals* are symbolic actions that create a ‘community without communication’, since they are established as signifiers that, without transmitting anything, allow a community to recognize their signs of identity in them. However, what predominates today is ‘communication without community’, since there has been a loss of social rituals. On this, see Byung-Chul Han, *The Disappearance of Rituals: A Topology of the Present* (Cambridge: Polity Press, 2020).

¹⁶ George Simmel, *On Individuality and Social Forms* (Chicago: University of Chicago Press, 1971).

¹⁷ While focal practices are worthwhile in themselves, they also possess a latent productive potential, that is, the conversion of the values they entail into capital, which could redound to an increase in the community’s resilience and sustainability. For the definitions of social and cultural capital and an elaboration on the conditions under which they are converted into economic capital, see Pierre Bourdieu, ‘The Forms of Capital’, in *Handbook of Theory and Research for the Sociology of Education*, edited by John G. Richardson (Westport, CT: Greenwood, 1986), p. 22.

¹⁸ UNESCO, ‘Being Together: Food as Social Bond’, <https://www.chaireunesco-adm.com/2021-Being-Together-Food-as-a-social-bond>.

¹⁹ While both co-housing and co-living modalities share the characteristic of being housing arrangements that comprise both private living units and shared spaces as the physical architecture that supports the ‘social architecture’ of intentional communities, some nuances

distinguish them. Such nuances could be summarized as relating co-living with the concept of 'space as a service' (on-demand residential spaces), while co-housing still entails connotations of the traditional notion of what one's own home means.

²⁰ These places have established shares for the non-profit sector and for subsidised flats, have limited the selling of land, and have leasing periods, which facilitate access to land. All this implies the existence of established financial instruments, as well as long-term organizations and structures for knowledge exchange.

²¹ Some of the case studies included in this article have previously been identified in the following studies: Katja Maununaho, *Ihmisen näkökulma integroidun asumisen jaetuissa tiloissa* [The Human Perspective on Integrated Living in Shared Spaces], <https://www.yss.fi/journal/ihmisen-nakokulma-integroidun-asumisen-jaetuissa-tiloissa/>; Tampere University, *Ketterä* (The Housing Cookbook), an application developed for the research project *Dwellers in Agile Cities*, <https://housingcookbook.com>.

²² Each cited case study includes the consulted sources of information and the origins of the images that illustrate it.

²³ Cooperatives provide housing through social mobilization, removing land and property from speculation. People join cooperatives based on a range of ideological principles, and they pool resources to obtain affordable accommodations. Currently, there is a wide variety of forms of cooperatives, from *bottom-up* to *top-down* initiatives. Most of them are democratic, although they have different social connotations (i.e. degrees of sociability and mutual help). Likewise, they have different relations with institutions, from management cooperation to financial agreements and land cessions. They also have different roots in socio-political activism, private co-ownership, and self-help organizations. All of them share the attributes of being generous with the public sector and favourable to the public good.

²⁴ The cooperative *Mehr als wohnen* (More than Housing) established an urban farm for children in the Hunziker Areal neighbourhood as the first step in adopting the new urban-development plan in collaboration with the Institute of Natural Resource Sciences. The project ran from 2011 (six years after the project development began) to 2014, when building was completed in the area. Margrit Hugentobler, Andreas Hofer, and Pia Simmendinger, eds., *More than Housing Cooperative Planning: A Case Study in Zürich* (Zurich: Birkhäuser, 2015), p. 157.

²⁵ The Can Batlló project in Barcelona, Spain, aimed to renovate an old factory complex from the late nineteenth century. Since 1976, the area had been categorized in the *Plan General* of Barcelona as one to be allocated facilities, social housing, and green spaces. Given the inaction of the authorities, the site was occupied in 2011, and a participative process was initiated. The space is currently self-managed (*espacio autogestionado*), including the cooperative housing project, La Borda, included as a case study in this article. For more information about Can Batlló, see <https://canbatllo.org>.

²⁶ For more information about the use of sociocratic methods in the housing project *Wohnprojekt* at Krakauer Strasse 19, see Katharina Bayer: *Wohnprojekt Wien: Potentials of Building and Living Together* [video], YouTube, <https://www.youtube.com/watch?v=TeXLUaBiDZA>.

²⁷ For instance, people in the cooperative *Mehr als wohnen* are organized in living quarters, each with a virtual space in the cooperative digital platform for management and information sharing and exchange. Residents also hold regular meetings and focal practice events to reinforce togetherness in the community. Hugentobler et al., *More than Housing Cooperative Planning*, p. 157.

²⁸ For instance, in relation to mobility as a focal practice, both Kalkbreite and Wohnzimmer Sonnwendviertel incorporate specialized bike-parking and maintenance rooms in their programmes, while Spreefeld Coop Housing, given its location by the Spree River, incorporates a

communal boat house to facilitate fluvial mobility, as well as the practice of nautical sports. As for cultivating the body and the mind, Hunziker Areal includes high-quality soundproofed music rooms, and Wohnzimmer Sonnenterrasse features a spa area. Gleis 21 has specialized its spaces for educational courses on online/digital, audio, and visual technologies, a programme that can also be related to caregiving practices since the aim of these premises is to facilitate the integration of immigrants and asylum seekers into the country.

²⁹ For a detailed study of the role played by communication spaces and ‘soft edges’ in residential buildings in terms of enhancing the usability of spaces and thus their potential for social engagement, see the already mentioned work of Katja Maunula.

³⁰ Peter Ebner, ‘Integrated Living’, in *Housing for People of all Ages: Flexible, Unrestricted, Senior-Friendly*, edited by Christian Schittich (Basel: Birkhäuser, 2007), pp. 11–12.

³¹ In relation to caregiving practices at the scale of the cluster unit, for instance in Hunziker Areal, a share of these cluster apartments is assigned to institutions that care for people who cannot live on their own, including people with disabilities. Thus, they are designed for this purpose.

³² Two housing blocks in Hunziker Areal that are dedicated to cluster apartments include a shared, continuous space that *meanders* through the individual units. Different room parts are configured as wide *backwaters* in this fluid single space. These units have two access doors, which increase this sense of fluidity of movement and dynamic occupancy of space. The shared spaces also face different orientations through the exterior facade and the interior one, which is opposite the vertical communication core. This design feature responds to the lighting, ventilation, and vista requirements of these spaces, while contributing to visually conveying a sense of community, as the floor-to-ceiling windows show the most convivial activities taking place in the stacked clustered apartments. Each floor also has two to three shared balconies, another way to be a part of the neighbourhood scape—a kind of collective visual appropriation of space, which is also integral to the rest of the case studies included in this type.

³³ In the Ich-Du-Wir-plus building, for instance, which is intended for young single parents, the shared space within the clusters and the satellite rooms are aimed (among other functions) at hosting caregiving focal practices, so that young single parents living together can help one another take care of their children using these shared spaces out of the most private rooms of the building.

³⁴ Greg Richards, ‘The New Global Nomads: Youth Travel in Globalizing World’, *Tourism Recreation Research* 40, no. 3 (2015), pp. 340–52.

³⁵ Outsite is a co-living developer with properties in the United States, Europe, and Bali. For more information, see: <https://www.outsite.co>.

³⁶ The Collective, <https://www.thecollective.com>.

³⁷ In the 1215 Fulton Street building, the art-oriented main programme of the shared facilities includes art studios and an art gallery. These incentives for the community of nomads interested in art would likely catalyse other informal exchanges and encounters, which might increase the socio-cultural and human values of this community. In the case of the Talents’ Apartments, the main spatial element designed for exchange in this space is a luxury, triple-high shared kitchen and dining area, with access to a communal tree-lined deck for every cluster apartment into which the building is divided. As for The Treehouse, the shared spaces are specialized for pet caring and cooking, which facilitate informal communication among residents through food-related activities and caregiving as focal practices. The building also includes co-working areas, which offer the possibility for skill exchange and networking through making and doing focal practices.

³⁸ The 1215 Fulton Street building is the more permeable example among the case studies of this type. The interior courtyard, around which the building is laid out, is open to the public, who can use the facilities and pass through the property as a shortcut that connects two streets. The way that the publicly oriented shared spaces stand out from the surroundings, given the contrasting materiality of their glass facade, and break up the massive brick construction, expresses public access. In contrast, in the Talents' Apartments, a group of exclusive shared spaces for the residents, located at the rooftop level, occasionally host programmed and curated events that are open to the public. Finally, The Treehouse lacks any area that is explicitly accessible to those outside the community.

³⁹ The 1215 Fulton Street building revolves around an internal courtyard. The Talents' Apartments building wraps around itself, allowing crossed internal views among the different stacked clusters and communal decks, which support the visibility of all communal areas. The Treehouse's stacked private units are connected through an open gallery, arranged vertically around a covered central interior garden, where the shared spaces are laid out, morphological-ly resembling the Familistère Guise by Godin.

⁴⁰ Jonathan Hill, *Actions of Architecture: Architects and Creative Users* (London: Routledge, 2003).

⁴¹ John Habraken, *Supports: An Alternative to Mass Housing* (London: The Architectural Press, 1972).

⁴² Herman Hertzberger, 'Flexibiliteit en polyvalentie', *Forum van architectuur en daarmee verbonden kunten* 3 (1962), pp. 115–21.

⁴³ The Urban Village project is presented as a catalogue of modular living units and shared spaces, aimed to enable focal practices, which can be aggregated and combined creatively by the inhabitants, who are led by the rules set by the structure and inspired by the character and quality of the space. This is suggested in one of the renderings of the project that shows a hybridization of some programmes in a single multipurpose space. Such a hybrid space could consist of an urban farm with a retail space, a communal dining room and a living room (combining food-related practices and cultivating the body and mind focal practices). All of these components would coexist in a double-height space with an open plan, which is physically and visually accessible from the street. This permeability and the morphology of the space, as well as the furniture design, including large tables and bars, benches and sofas, suggest possibilities for the community of residents and citizens to engage in lively interactions on a daily basis. Additionally, the material qualities of such a space, its porous appearance, and its generous dimensions have the potential for new uses envisioned by the inhabitants, which relates back to Hertzberger's concept of the users' engagement, triggered by the character of the space (i.e. the community's involvement in building as a focal practice). See Hertzberger, 'Flexibiliteit en polyvalentie'.

⁴⁴ *Calculated uncertainty*, in Price's discourse, conveys the idea of an architectural practice that establishes the necessary premises to define a built environment whose *raison d'être* is its capacity to be changed by different parties. On this, see Stanley Mathews, *From Agit-Prop to Free Space: The Architecture of Cedric Price* (London: Black Dog Publishing Limited, 2007), pp. 63–113.

⁴⁵ *Scenario planning*, according to Brand, leads to versatile buildings, achieved by taking advantage of the information developed through programming and by treating the building as a strategy rather than as a defined plan. See Stewart Brand, *How Buildings Learn: What Happens After They Are Built* (New York: Penguin Books, 1994), pp. 181–88.

⁴⁶ The term *constellations* is understood here in the sense outlined by Benjamin and Adorno. The term allows a depiction of the relation between an accumulation of present and former ideas that give individual ones their autonomy, but in relation to and with a specific location in

time and its contingent circumstances. They also carry their embedded history, traditions, and myths, similar to the actual names given to the constellations.

See *Oxford Reference*, 'Constellation', <https://www.oxfordreference.com/view/10.1093/oi/authority.20110803095633862>.

There is also an atemporal and enduring feeling regarding constellations, as they transcend the scale of human time, similar to the architectural ideas behind each precedent architectural type. For instance, Iñaki Ábalos refers to structures that are 'out of time or transcend it', precisely regarding communal residential structures. Iñaki Ábalos, *Palacios comunales atemporales: Genealogía y anatomía* (Barcelona: Puente Editores, 2020).

⁴⁷ Émile Durkheim, *The Division of Labour in Society* (London: MacMillan, 1983).

⁴⁸ See, for example, Jüri Allik and Anu Realo, 'Individualism-Collectivism and Social Capital', *Journal of Cross-Cultural Psychology* 35, no. 1 (2014), pp. 29–49. Geert Hofstede, *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations* (Beverly Hills, CA: Sage, 2001).

⁴⁹ For more information, see: <https://www.mehrswohnen.ch>.

⁵⁰ For more information, see: <https://www.kalkbreite.net/en/kalkbreite/>.

⁵¹ For more information, see: <https://spreefeld.org>.

⁵² For more information, see: <https://www.win4wien.at/sonnwendviertel>.

⁵³ For more information, see: <https://gleis21.wien>.

⁵⁴ For more information, see: <http://www.laborda.coop/es/>.

⁵⁵ For more information, see: <https://www.treberspurg.com/projekt/viehtrifftgasse/>.

⁵⁶ For more information about The Collective and its premises, see: <https://www.thecollective.com>. For more information about the 1215 Fulton Street building, see the *Dezeen* article 'Sou Fujimoto's First New York Project Will Be a Co-Living Complex', <https://www.dezeen.com/2019/09/25/the-collective-commissions-sou-fujimoto/>.

⁵⁷ For more information about the Qianhai Leju Guiwan Talents' Apartments, see the *Dezeen* article 'Foster + Partners Reveals Visuals of Co-Living Apartment Block in China', <https://www.dezeen.com/2020/02/17/foster-partners-qianhai-talents-co-living-apartments-shenzhen-architecture/>.

⁵⁸ For more information about Commontown and its premises, see: <https://www.commontown.co/en/Commontown>. For more information about the Treehouse, see: <https://www.archdaily.com/932735/treehouse-apartment-building-bo-daa> and <https://www.bo-daa.com/en/residential>.

⁵⁹ For more information about The Urban Village project, see: <https://www.urbanvillageproject.com>.

TOWARDS A METABOLISM OF THE (IM)MATERIAL: TRANSFORMATIONS OF AN URBAN SINK

Kemo Usto, Marie Frier Hvejsel, and Camilla Brunsgaard

ABSTRACT

To minimize the negative effects of the built environment on nature, circularity has become an important path forward, calling upon us to narrow, slow, and close material flows. In a Danish context, an increasing number of examples of reuse and upcycling in architecture are currently seen. However, due to challenges of warranty, building law, and public awareness, along with the issue of finding buyers of waste materials, there are major constraints. Furthermore, we have been limited to thinking of applying waste materials to new buildings. Introducing the notion of the ‘urban sink’, referring to the notion of ‘safe’ sink in chemical engineering, this article explores ways to allow larger volumes of construction asking what role urban spaces could play to ‘circumvent’ some of the challenges that make it difficult to reuse construction waste.

The article takes up the notion of an urban sink and tests it in a design scenario by way of research by design, applying theory and developing design ‘rules.’ The study uses chemical engineering concepts and combines them with tectonic architectural theory in order to address and juxtapose *material* and *immaterial* metabolic dimensions in the conceptualization of the urban sink.

The article shows that the concept of an urban sink holds potential to increase the reuse of waste materials in construction — by linking the material realities of physio chemical processes to the immaterial qualities of space as engaging narrative in a social context. While the potential exists to apply waste material as urban space, still more research will be needed to refine steps and design ‘rules’, to create more awareness, and to find buyers, all of which would increase reuse.

KEYWORDS

Metabolism, tectonics, urban sink, industrial ecology

INTRODUCTION

Material consumption in the contemporary building industry causes large amounts of carbon release¹ into the atmosphere, resulting in grave environmental effects. Instrumental in this is the building stock, how it is manufactured, and its lifespan, whereby the material/structural soundness and the spatial, useful, and phenomenological qualities play into it as well.² As we have seen, buildings have varied lifetime spans—some buildings have stood for centuries and longer—but what happens to the materials when buildings are demolished?

The anthropogenic material flows globally have surpassed natural material flows,³ and, in addition, scientific literature on how those material flows move and propagate⁴ indicates that the amount of reused (recycled) material is a small fraction of the total material flow, which is largely still linear. In a Danish context, the Ministry of Environment puts forth that it is also the case that circularity is small fraction of material flows, and it shows that a large amount of materials not only become waste, but this waste is transported internationally.⁵ A recent example of this is the demolition of the Brøndby Stand high-rises which were transported to the Netherlands.⁶ Since material scarcity will become a more and more pressing issue, it would be relevant to redesign not only life cycles but whole material flows (metabolisms), so as to find ways to reappropriate materials and keep them within national or regional boundaries. In addition, chemical engineering literature on material flow methodology insists on the need for ‘metabolic designers’ in the future. Building waste adds up to approximately 5 million tons in Denmark, of which 7 per cent is incinerated, 36 per cent is reused, and 52 per cent is used ‘otherwise’, meaning that it is crushed for roads, et cetera.⁷

While it can be conceived that the crushing of elements is a type of reuse (downcycling),⁸ this study considers that some value could remain if the elements were allowed to circulate and be useful rather than being crushed.⁹ While there are example of reuse in building stock, some current challenges are related to warranty and product security. Another important challenge is that of volume of waste and how to find ways of applying these waste materials other than as building stock. Circularity in design is becoming more prevalent and focuses on design for disassembly¹⁰ for newly created buildings, but the hypothesis is that chemical engineering can provide some of the crucial concepts for considering material flows within the building industry, because

the field is working with empirically mapping the materials flows (metabolic transformation) within society—thus holding potential for architecture.

While there are many different definitions of circularity,¹¹ the chemical engineering field of industrial ecology or material flow analysis (MFA)—sometimes called (societal) metabolism—works critically and empirically with how materials move between nature and society. For this reason, chemical engineering holds crucial potential for architecture by approaching design and analysis from a material perspective. This article thus considers the possibility that a bringing together of materials tectonically (considerations of material elements and their impact on nature) and immaterial concerns (dealing with recreative/functional, phenomenological and narrative aspects) in relation to the great amount of material waste can increase the recycling of building materials, while providing meaningful recreation possibilities for the city. The article asks: What are the potentials of using tectonic design theory for applying building waste materials as an urban sink, in which material concerns and immaterial qualities are aligned to minimize the generation of waste? Furthermore, the article intends to elaborate on the current challenges facing the urban sink, whether material, structural, logistical, or cultural and phenomenological.

Concepts such as ‘slowing’, ‘narrowing’, and ‘closing’ the material flows warrant consideration—these terms, originating from chemical engineering, respectively mean higher quality, more flexibility, and the ability to repurpose, as ways to minimize the extraction of virgin materials, and thus to lower the carbon footprint through a higher-value built environment. Furthermore, state-of-the-art chemical engineering literature highlights that ‘safe sinks’ can and should be ‘designed’ but require collaboration with architects, urbanists, et cetera¹²—a potential that this article explores. We have already seen examples of practitioners and scholars developing knowledge and practice in terms of the reuse of materials,¹³ and many of them provide methods to apply waste materials in new buildings. However, this entails many challenges, among them the issue of warranty, finding buyers of waste materials, obtaining certificates of elements,¹⁴ a lack of awareness in society,¹⁵ all of which impede reuse. At the same time, practitioners and scholars are not considering the potential of applying waste materials in urban spaces which could ‘circumvent’ the issue of product warranty and the challenges of building law pertaining to waste materials (because it can generally be said

that there is a 'looser' building legislation for outdoor structures such as playgrounds and art installations, etc.), while providing engaging urban spaces which potentially make people consider how we consume materials. It can be argued that there are examples of quasi-metabolic (in circular approaches) thinking relevant to this study,¹⁶ and lessons can be taken from them, but they still miss the larger challenges of material flows (of minimizing material consumption) as conceived in the chemical engineering approach. Likewise, there is literature on design education and metabolic thinking in methodology and approaches,¹⁷ but challenges remain as to exploring how the practical application of such a metabolic approach can manifest in architectural and urban design terms, specifically in relation to the large amounts of building waste generated and the challenges of appropriating those large volumes.

There are obviously many types of urban spaces, some central and used frequently, while others act as 'between' spaces. Concerning environmental challenges, much focus is on the capacity of urban spaces to contain rainwater/flooding,¹⁸ though a safe storage place for waste materials is not currently a design parameter. For the purpose of this study, a site was chosen and it was considered how a tectonic design approach can provide spatial quality while storing the materials. Thus, how can we conceive of a 'sink' (with material and phenomenological [immaterial] qualities) in tectonic terms in an urban context as a meaningful spatial typology of transformation, an urban sink?

The important contribution from chemical engineering to architecture is the notion of the 'safe sink', which is defined as a safe process of the 'storage'

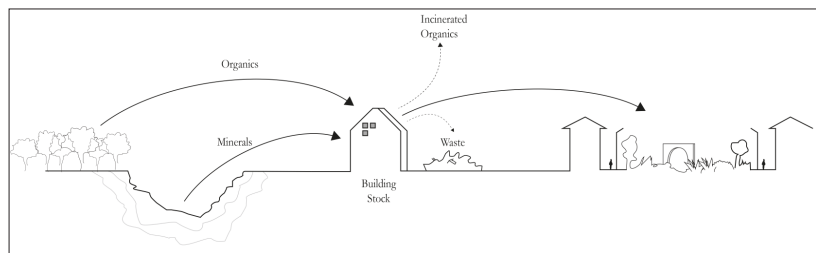


Figure 1. Urban sink: from extraction, to building stock, to urban space as safe sink? Sources: Kemo Usto.

of materials. Through the concept of the urban sink, this article intends to examine how urban space can contribute the function of storing materials and elements while providing relevant outdoor possibilities for use and recreation. As architecture deals with both material and immaterial concerns, the study explores five key *constructs* and how they relate in an urban metabolic approach to challenges of material flows.

The study has an impetus in real-life conditions (site in Aalborg) of construction waste (municipal list of addresses approved for demolition) but aims to extract general design ‘rules’ with the urban sink as the key typology towards the building and testing of a theory of (im)material metabolism.

METHODOLOGY

This article is part of an ongoing doctoral study which is concerned with the theory of building metabolic thinking in architectural design. The theory development is an ongoing endeavour, inspired by an earlier speculative iteration,¹⁹ and it has had one prior application in an analytic capacity.²⁰ The development of theory is confined to the doctoral monograph, and this article focuses on testing the theory in its design capacities. The focus of the article is thus to explore the notion of the urban sink through the methodology of Research by Design (RbD), supplemented by additional methodic approaches aiming to support, guide, and qualify the experiment and its exploration.

According to the scientific literature on theory development, a theory is usually constructed from four main elements:

1. constructs (‘concepts’ or the ‘what’)²¹
2. propositions (relation between constructs, the ‘how’)
3. logic (why relations are like that)
4. boundary conditions (material and metaphysical assumptions and boundaries)²²

While the full development of a theory is a lengthy process, this study is an initial probe into the urban sink, exploring its constituent constructs and their relations. Further, a ‘new’ theoretical take on metabolic thinking in architecture could potentially have large social, temporal, and spatial *boundaries*—this exploration, on the other hand, is limited to examining the potentials of the *constructs* and how they relate (*proposition*) so as to discuss and build upon the *logics* and *boundaries* of the metabolic later in the ongoing testing and building of the theory.

In proceeding to test the theory, the study designs a scenario as an explorative study of the spatial potentials of the urban sink, as a way to slow, narrow, and close material flows (metabolism). This article refers to the architectural theoretician Jørgen Hauberg, who elaborates on Research by Design in relation to architectural research—and aims to use the method for conducting an explorative design scenario describing steps (design ‘rules’) to investigate the potentials/challenges of an urban sink. Furthermore, Hauberg elaborates that RbD goes ‘in a somewhat opposite direction’—in which you first have the design and afterwards explore the system and method for a rationalization or generalization by ‘extracting the rules’ of the object—also called nomothetic research.²³ Accordingly, Hauberg elaborates on how RbD differs from regular architectural production by being subject to methodology and systemic procedure—and further highlights that RbD is in search of general and normative design ‘rules.’ Furthermore, this article uses the variant ‘research *into* design’, because it conducts a design scenario which reports on systemic steps of method to describe ‘rules and procedures’²⁴—acting as normative design ‘rules’ (or guidelines).

Methods and Steps

To proceed, the design scenario applies five key ‘constructs’ from ongoing theory development on metabolism. These key *constructs* are applied as subsequent steps in the procedure of the research, steps which methodically deal with the spectrum of material and immaterial concerns of the urban sink.

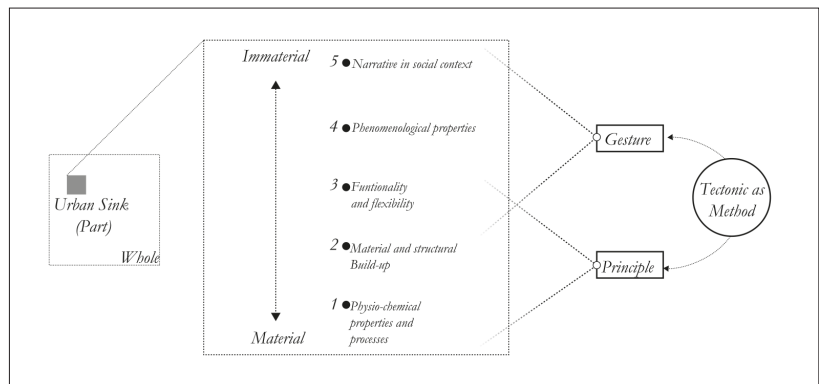


Figure 2. The design method: five levels of the (im)material metabolism. Sources: Kemo Usto.

At the ‘lowest’ material level, there are the chemical engineering concepts of how material flows²⁵ (1). Second, the structural and transformational principles describing the ontic build-up of a design as seen in the combined thinking of tectonics and engineering²⁶ (2). In the middle is use (3), which is a combination of the *material* and *immaterial* needs (to sit and to experience enclosure—or shelter and an experience) using the notion of ‘affordance’ as a way to conceptualize functionality.²⁷ Fourth, there are the phenomenological characteristics using phenomenology to describe gestures. Tectonic theory often uses Martin Heidegger’s phenomenological elaborations, referencing in particular his immediate experience of phenomena²⁸ (4). Fifth, the theory considers the role of narratives (5) as the last *immaterial* aspect. Here Slavoj Žižek’s notion of ‘objet a’ is to be considered such a narrative which provides a surplus value.²⁹ This ties in well with how Marco Frascari emphasizes the tectonic ability of detail to tell stories which are a surplus value in themselves, beyond the phenomenological experience of the design. These five constructs of the theory set forth in this article are intended to be ‘open’ to different methodologies and empirical inquiries, and to the above-mentioned methods for each construct, which are considered relevant for this study’s Research by Design scenario. Furthermore, throughout in this study, tectonics as a method of gesture and principle³⁰ is applied as way to architecturally consider the single design steps and to ultimately synthesize/link or render the steps as architecturally interconnected—for this would also permit the development and discussion of ‘rules’ extracted from the process.

1. *Physio-chemical properties and processes*—using metabolic (industrial ecology, MFA) for insight into the challenges of material flows (on account of data on construction waste and renovations) and integrating the notion of the ‘safe sink’ and the ‘slowing, narrowing, and closing’ from chemical engineering as design ‘rules’.
2. *Material and structural build-up*—(deals with the engineering principles; structural systems, indoor climate and other ontic conditions which constitute the spatial setup of an architecture).
3. *Functionality and flexibility in use* (programmatic design of plans and how they change over time).
4. *Phenomenological properties*—(using a phenomenological method to design spatial gestures).
5. *Narrative in social context*—(arranging the tectonic potentials of spatial quality and material concerns to create awareness in the public realm regarding consumption behavior).

The urban sink as a part/detail consists of five 'levels' of material and immaterial constructs—all of which individually interrelate but also constitute a whole. The above five levels (each containing a method) are to be considered as design constructs, and instead of entirely inventing design 'rules' from 'nothing,' the study bases the design 'rules' on the aforementioned constructs.

The experiment procedure of the design scenario is initiated by starting from level 1 to 5, thus initiating the thought process of material concerns, through functional up to narrative aspects. Initially, the experiment explores as a 'linear' process but also becomes iterative in order to analyse how the immaterial can inform decisions made with regard to material concerns. The study is an iterative process between developing the 'rules' and, at the same time, testing them for theory-building potential. Furthermore, the study employs key principles derived from the chemical engineering method of material flow analysis; namely the notion of the 'safe sink'; and it also employs the method of tectonics as a way to deal material and immaterial concerns in analysing how both could contribute to effecting material flows in positive ways.

The design scenario (which is a desk study) uses sketching and 3D modelling throughout an iterative process and also acquires municipal archival data via Weblager.dk.

Thus, the procedure of the design scenario is to explore how to conceive a circulating urban metabolism and how its subsequent steps can contribute to slowing, narrowing, and closing the material input from nature to society. What considerations will this prompt and, consequently, what design 'rules' should be considered if slow, narrow, and sustainable urban metabolisms are to be designed in future?

Findings: Design Scenario

Although this study proceeds by iteratively designing the scenario while developing the design 'steps,' this section will start by presenting the main findings, including the design and the design 'rules,' and conclude with the potentials and challenges.

The Overall Metabolic Scheme

The design scenario can thus be conceptualized using tectonic elaborations from Frascari with details in relation to wholes. It becomes evident that this

dialectical thinking can further thinking in design terms and method when it comes to applying building waste. The site becomes a detail within a detail (urban sink) which is or could be in constant transformation by allowing materials to be stored or passed on (Figure 3) and can either act as storage for certain material temporarily or indefinitely while applied in spatially meaningful ways. And hypothetically, even if some of the materials never get

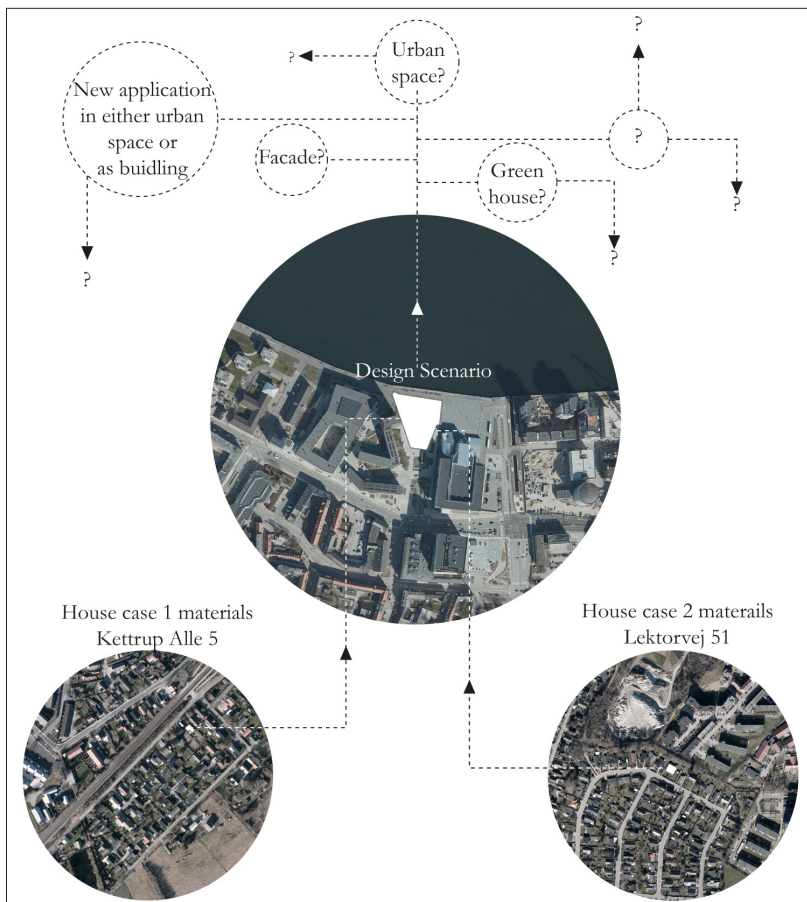


Figure 3. Urban sink as the detail; the design site shows itself as an important juncture of the urban sink towards slowing, narrowing, and closing material flows by allowing the storage and circulation of elements. Photos: Skråfoto.kortforsyning.dk: courtesy of Styrelsen for Dataforsyning og Effektivisering (SDFE). Sources: Kemo Usto.

repurposed later on beyond this, then the immanent material and immaterial properties would allow them to provide recreative possibilities in their current locations.

But the design scenario of this study indicates that it could be possible to apply those waste materials—either for a prolonged period of time or once the issue of warranty is solved and using waste materials becomes more desired due to the over-extraction of virgin materials. The urban sink could thus act as safe storage for the materials while providing meaningful spatial quality. In this sense, the materials remain within building stock, and they keep ‘circulating’ instead of being crushed. But if these materials in a later stage become resources again, and thus require less extraction of virgin materials, they would both slow and narrow the material flows. ‘Closing’ the circle may be a problematic aspect³¹ in the building industry, while a circulation of elements would slow and narrow the input of newly extracted materials. The very concept of the ‘sink’ indicates that materials cannot move in a fully closed circle.

The design scenario site is a therefore a juncture within the urban sink, through which materials move, transform, or are stored. But as a detail it also has *material* and *immaterial* aspects in a spatial, urban constellation (Figure 5). These required much consideration, and on account of the tentative theory applied for design purposes (Figure 2), the study develops corresponding ‘design rules’ and considerations.

Procedure of the Design Scenario

This article presents the design scenario of the urban sink (Figure 5) which describes five main design ‘steps’ based on the five constructs in the design approach (Figure 2), how the study worked with them, what considerations it brought forth, and the resulting design choices. The study uses the constructs (Figure 3) and describes what consequences they have for each other. Although the design process occurred iteratively between developing the design, the theory, and extracting the ‘rules’, the following paragraphs describe the design ‘steps’, followed by considerations in the study of the design scenario in a more comprehensible ‘linear’ fashion.

Design ‘Step’ 1 Physio-Chemical Flows: Context and Material Flows

When having to design at a particular site, it is useful to conceive of ‘context’ in a slightly more extended sense. Surely, the immediate site and its

surroundings are to be considered in the conventional contextual analysis. The materials can be seen as already part of the extended context. One is at the same time to design *with* and *within* the context, where the material flows from one place, to and through the urban sink, to other places (Figure 3).

Design 'Step' 1 in the Scenario

The first step was to choose a site, since the study wanted to explore the tectonic potentials of reclaimed materials in an urban space, and particularly in a dense city area. The site has no name currently but has the following coordinates 57°02'54.3"N 9°55'55.4"E. This study is an inquiry into a tectonic application of waste materials in an outdoor space, though, at this point, not a research endeavour into urbanism and landscape architecture at that chosen site; it only uses the real-life conditions of the site (noise, wind, etc.) as inspiration for the testing of the design application.

Next, materials for reuse had to be found. As chemical engineering literature has already indicated, the old building stock will one day become an important source.³² Initially, there was no sense of understanding how much building material waste can even be applied to a site of the chosen size. Further, it was necessary to determine a proper way of finding buildings earmarked for demolition. Thus, a list of buildings set for demotion was provided by municipal officials.³³ After the initial overview of the buildings on the list, with special interest placed on parcel houses (single-family homes in the suburbs), more data on addresses was gathered from the archives of Weblager.dk. Furthermore, to demonstrate some variation, the study chose buildings which had a varied material build-up: red brick, yellow brick, concrete, wooden rafters, and wooden beams. On account of the above, the choice was narrowed down to two addresses: Lektorvej 51³⁴ and Kettrup Alle 5 in Aalborg.³⁵

The buildings were constituted of many different types of materials, some of which are more straightforward (brick, wood, etc.), whereas others were composite materials that are chemically difficult to reuse and are thus not included in this study because they are either metals which are handled separately, complex composite materials, plastics which pose a chemical challenge, or materials that have little to no potential for architectural application. There are many challenges with foundations in terms of reuse, and thus they will not be considered in this explorative study. Further, given that post-war buildings are involved, the design analysis proceeds under the premise that

the binders in brick walls are cement-based, and that brick cannot be dismantled into singular bricks as in older brick buildings (due to the mortar). The study confines itself to the use of the materials illustrated in Figure 4, in the modelled amounts in the 3D environment where the design process mainly takes place.

Design ‘Step’ 2. Structural and Material Constitution: Materials, Geometry, and Transformation

Given the available materials, it is useful to segment them into organic-based and mineral-based groups because they hold different potentials and challenges in terms of transportation, transformation, and design application. Organic-based materials are easier to cut into small elements and can be used for furniture or pavilion structures, while the mineral-based materials should be cut into larger elements and can be used as spatial enclosing elements or

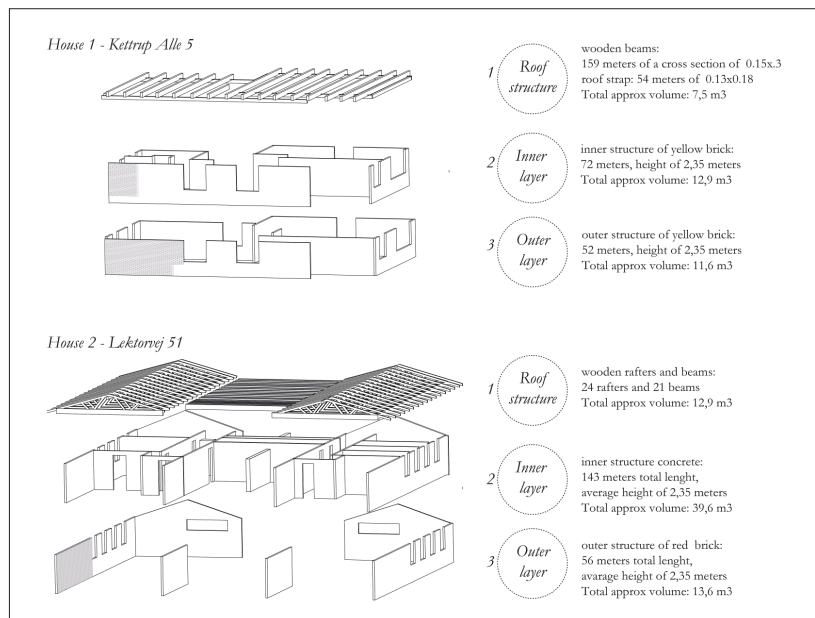


Figure 4. The chosen collection of materials to design with. Although there are variations in the building stock build-up, one can conceive a typical build-up of many cases of such building stock as having an inner layer and outer layer which are either brick or concrete—and an organic-based roof structure. Sources: Kemo Usto.

pavement. The materials need to be cut in such a way that they do not lose value for future reuse, so as to allow for smoother circulation.

Design 'Step' 2 in the Scenario

When the buildings are chosen, they still stand at their site, and the design process already starts there because the materials need to be disassembled and made manageable (transformed) before they can be transported. Furthermore, depending on the circumstances, the materials are perhaps not always directly driven to their new site, and the mediator location may come into play for practical, logistical, and cleaning reasons.³⁶ There would be different degrees of further transformation of the materials so that they can be put into place. While designers may choose the level of creative freedom in this regard (deciding to cut, determining the different shapes, etc.), they must also keep in mind that the mineral-based element could at a later point be repurposed again—where cutting shapes out or perforating in artistic ways could squander the value, depending on the material. Then, throughout the whole process, the limits and potentials of the available materials were questioned. Depending on the given challenges of the chosen site, it may have involved creating noise or wind barriers, pavilion structures, bike parking, or the like. And the challenge is to iteratively go back and forth between what is possible due to material constraints and what is to be designed given the task at hand.

After initial challenges in design, the study developed two categories: organic-based and mineral-based. They posed two different challenges and potentials: the heavy mineral category, and the lighter carbon category. Observing the wooden materials and their geometry, the study analysed the potential of the beam elements for pavilion-like structures. The heavy mineral-based geometries initially posed the challenge of being cut in geometries which can be transported in conventional ways. In the end, most of the mineral-based elements were cut into 1-meter-long segments (1 by 2.35 meters). This would keep the full floor height of the element for future potential uses but also allow for cutting into smaller patches similar to the Resource Rows by Lendager Group. This transformation was a way to simplify a number of geometry types, and at the same time it allowed for differentiated applicability in the urban space. The mineral-based elements can be applied as either pavement or a standing structure. The study chose this measure of cutting, because it is a unique principle for cutting and can be used as folded walls, and as pavement to mimic enlarged tiles. Furthermore, it should be considered to apply

the materials/elements in such a way that more similar materials/elements may arrive and be accommodated in the future (e.g. pavement in Figure 5 '1. Patch Work')—which means that the application principle should have an unfinished character allowing a growing amount of materials at the particular site instead of an finished design/object. For this reason it is important to conceive of 'principles' in 'transitional' or transformational ways—both for the organic-based and mineral-based materials, so as to allow for a future circulation and safe storage of the elements. The remainder are used in two different ways; the organic remainder is to be chipped (cut in wood chipper machines) and used on soil. And the left-over concrete is to be used as a 'foundation' for the upright brick and concrete elements (see Figure 5 for amounts and descriptions).

Design 'Step' 3. Functionality and Flexibility in Use: Transformational Functionality

It is important to conceive of functionality as transformational, with regard to material flows and the function of the site in architectural terms. The lowest level of function is the ability of an urban sink to store the elements and materials, but this hinges on the recreative application use value of the design. However, on account of the material transformation (Design 'Step' 2), the waste materials have a meaningful use at the site, yet can also be moved to function as something else. And while at the site, the materials should allow for a varied type of function to be appropriated by the user in a variety of ways.

Design 'Step' 3 in the Scenario

Firstly, when perceiving the urban space, there are some challenges. Although it is right at the harbor front of Aalborg, this space is not often used and many people pass by on the promenade. Another conditions to address is that the large scale of the surrounding buildings amplifies the wind effects in the already quite windy environment of North Jutland. For this reason, the study will apply the cut wall elements not only as pavement but also as a standing structure which can provide some retreat from the challenges mentioned above. Furthermore, to the south of the site there is busy road, and the design attempts to shield itself visually and audibly to create more intimacy on the site. Throughout the research design process of this scenario, it became evident that 'function' should not only be confined to the conventional way of thinking about utility in architecture and design. Indeed, the very aspect

of a space acting as 'storage' for certain materials is also an important 'function' of the space. This in itself can be 'useless' in architectural terms, but it is up to the designer to provide meaningful composition and articulation of the available materials for outdoor recreative purposes. The design provides bicycle parking, pavilions for seating, a biodiversity tower, and considers functionality for other 'agents' than only humans.³⁷ The design composes wall elements towards the south to shield the site from car noise and to create a visual barrier for emphasizing the orientation towards the harbor front. The design exploration also attempts to compose the materials and elements in ways where different types of events could take place. The design can also change over time if materials are moved or if the context requires change.

Design 'Step' 4. Phenomenological Characteristics: Transformational Gesture

Depending on the type of urban space, and how people move in it, the space should provide varied phenomenological gestures where the repurposed materials are laid out flat for people to walk on or fold and enclose, in order to provide sensorial and spatial qualities which allow for haptic engagement with waste materials.

Design 'Step' 4 in the Scenario

Considering some of the challenging conditions of the site (wind and scale), the study aimed at providing some retreat but also a possibility for activity. The study was exploring how the application of materials can facilitate spatial gestures within the design. The way that this occurs in relation to the mineral-based elements is that they transform from a horizontal application to a vertical one by way of 'folding' or creating folds to enclose and define more intimate spaces as a contrast to the surrounding buildings. In particular, they are composed in a way which is 'knitting-on'³⁸ to create a shielded pocket.³⁹ While on a technical, principal level this allows for future transformations, phenomenologically the design emits phenomenological qualities of compounding 'elements' which interfere and transform. This encloses and creates moments of intimacy in contrast to the large scale of the site, while also encouraging bodily activity, such as jumping and walking on the pavement elements, climbing on the pavilion, et cetera. The organic-based elements are to be used for creating lightweight pavilion structures, climbing or playground structures, as well as a biodiversity tower to house plants and insect life.

Design ‘Step’ 5. Social Narrative: Transformational Concepts and Narratives – Gestures and Principles Aligned

The overall narrative is that of composing material to didactically indicate and narrativize a transformative dialectic where, in one and the same, the act of storing the material provides recreative opportunities. Although it may not be immediately visible and discernable, some users of the space may initially be engaging the opportunities the space allows but at the same time be puzzled by the composition of materials and shapes. The tale to tell is of a detail, an urban sink, from the gathering of the material to its transformation, use, phenomenological qualities, thus making the user aware of how materials flow in society and how they will continue to flow. The intention is that this *un-finished* metabolism and transformational tectonic narrative could provide—beyond immediate phenomenological qualities and opportunities—an awareness in the users and passersby about their own behavior regarding consumption and the consequent effect of their material flows (of the societal metabolism) by seeing and engaging with waste materials towards a slow, narrow, and appreciative understanding of materials in society.

Design ‘Step’ 5 in the Scenario

During the process of the study, there was an ongoing effort to align the design, its material, functional, and immaterial measures, with an overall narrative and way of understanding the potential and significance.

Given the challenges of designing in the urban sink, it is important to have some idea of how to rationalize one’s approach. To do this, it is useful to employ notions of unfinishedness and transformation as being principle and gesture simultaneously. This is seen in projects such as the Kolumba Museum by Peter Zumthor and described by scholars such as Ákos Moravanszky in reference to Gottfried Semper’s notion of ‘knitting-on’⁴⁰ or Ulrik Stylsvig Madsen’s elaboration on tectonic discourse and assemblages.⁴¹ But very often this dialectic is ‘sublimated’ as an appearance of the finished built work—whereas this study argues for a different complexity to the notion, where both the immaterial and material dimensions are combined in the transformational conceptual thinking. And in this sense, the gesture and principle of the design are brought together within the notion of transformation. A surplus to be extracted from the reuse is the value of history—when we concern ourselves with the repurposing of materials beyond embodied carbon, the elements and materials also have an embedded history, with embodied carbon being a part of that history. Much like with the architec-

ture of Wang Shu, who plays on the narrative of historical memory such as with his Ningbo History Museum⁴² (roof tiles, bricks, etc.), similarly, this

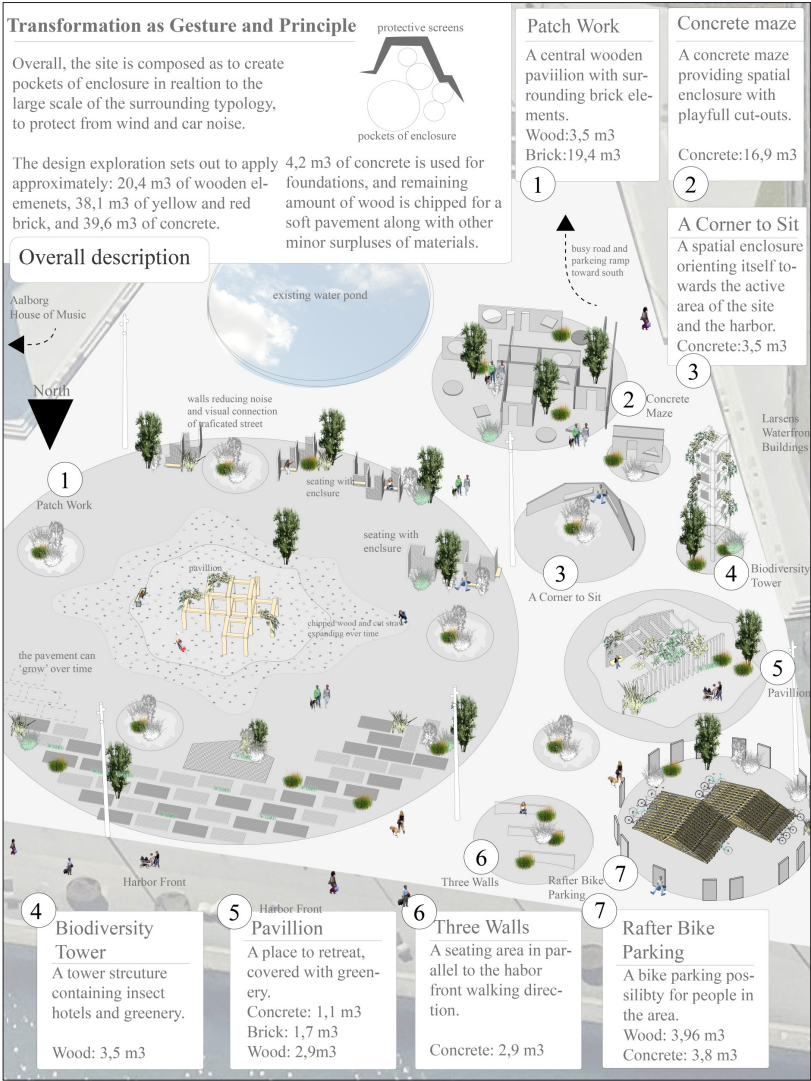


Figure 5. Urban sink: the spatial possibilities and variety which hold material principles and immaterial gestures, showing how the waste-material volumes are arranged, which can be stored or moved elsewhere. Sources: Kerno Usto.

design scenario can also tap into such narratives of allowing the elements to have both a past history and a future history in the making. Thus, the main principle is comparable to the historical architectural phenomenon of *spolia*⁴³ (architectural spoils)—where elements are given and allowed a life beyond their initial application, and thus the element is assigned importance beyond the initial design. Historically, the best-known examples of *spolia* often have an inherent aesthetic and ornamental value, but today challenges require a slight shift in this principle of *spolia* so as to accommodate material concerns via a spatial application with contemporary materials which can be of lesser aesthetic character.

By bringing the waste materials forth as part of everyday life, as users of that space we are faced with the challenges of increasing material consumption, and we simply cannot keep the problem ‘out of sight, out of mind’. By acknowledging the spatial potential of waste materials, we will hopefully gain awareness of and be critical towards how we consume materials so as to potentially slow and narrow the overall material flows.

SUMMARY OF FINDINGS

This paragraph presents the concluding remarks regarding the findings, the potentials of the urban sink, its challenges, and the opportunities for theory development.

Design Rules

An overall potential of the design scheme could prove fruitful if some initial considerations were turned into rule or normative design parameters, potentially as a way to guarantee sound approaches when having to design metabolisms in urban contexts. Throughout the design process, it was extrapolated that the function of safe storage of materials/elements is crucial for minimizing material input from nature to society. This ‘lowest’ level of function, which is in no way phenomenologically accessible and experienceable directly, could perhaps be described as being a ‘zero-level function’ of architecture. In the chemical engineering approach of material flow analysis, this storage process is tangible and discernable (as building stock). From an architectural and design point of view, it is crucial that we consider architectural measures (material and immaterial), which contribute to the well-being of the designs in order to act as safe storage and thus minimize the need for virgin material input.

The rules range from more overall considerations to more specific considerations.

Rules:

- Keep the materials
- Transform as little as possible
- Bottom-up approach (first find materials, then narrative and other constructs)
- Metabolism should be slow: circulating through pragmatic transformation

The first rule is considered with the fact in mind that material scarcity will both increase and minimize virgin material input. Currently, large quantities of materials are sent and sold internationally—and it would be preferable to find ways to appropriate such materials so as to keep them within the boundary of national borders. Eventually, this boundary could be made more ambitious and design metabolisms for regions or municipalities with the aim of minimizing transportation and so forth.

The second rule is concerned with allowing materials/elements to maintain value and multiplicity of applicability for as long as possible. While singular and unique experiments (where elements are transformed and cut) can also help to generate awareness in public, it is preferable to consider scenarios of the future application of elements.

The third rule simply deals with taking the task of dealing with large quantities of construction waste head-on. Some elements and materials are perhaps easier to apply, so one can already have a narrative and concept in mind and locate the needed waste materials accordingly.

The fourth rule involves the aspect of circulation of the urban metabolism. It is important to consider that we shouldn't only design for circulation, because a poetic conceptualizing of the notion of metabolism (manifested as a circulation of elements) could also increase material consumption. Circulation should be a partial measure within metabolic thinking, which is mainly concerned with slowing and narrowing material flows by way of cleverly and beautifully placing materials/elements which can remain in their (storage) place indefinitely (because they provide meaningful and useful opportunities in their particular context).

Potentials of the Urban Sink

By approaching the challenges of having to slow down material flows - from a tectonic and chemical engineering perspective, new insights can be discerned. While one might have originally been skeptical about what tectonics and chemical engineering can reciprocally provide, by focusing on the notion of the 'safe sink', which manifests itself as a safe storage process of materials and elements, the architectural discipline can supplement this 'basic' function of storage by allowing or bringing forth phenomenological and functional affordances to people in the relevant contexts.

The study shows that by introducing meaningful functionality along with meaningful phenomenological qualities that tell stories of material memory through the repurposed building waste materials, the tectonic method can provide recreative possibilities and aid in slowing, narrowing, and closing material flows. The function of storing the elements while providing meaningful recreative possibilities allows the materials to become a future resource where storage and recreative opportunity overlap as one. While the current percentage of reused materials is at 36 per cent, the urban sink could help to lower the amount of crushed materials (concrete, brick, stone, etc.) and increase reuse. If we consider only one site in the urban sink, then the materials used would not have an immediate impact on the 36 per cent, whereas a strategic and inter- and multidisciplinary collaboration and systemic implementation of the urban sink as a network of sites in several cities could increase reuse both now and in the future, when cultural, social, and economic conditions shift towards more acceptance of reuse of materials. For these very reasons, the urban sink is not only the outdoor space but also the extended metabolism which can contain waste materials in a useful manner. While the presented design scenario has potential, giving an estimate of how much more waste material it could recirculate would need to be done in close dialogue with the municipality in view of finding and allocating sites for such a network—thus, any estimation of how much waste (in tons) could be either too optimistic or too conservative at this point. On a principal level, the scenario holds potential for large amounts of material—but product warranty remains an issue.

The most-known attempts in state-of-the-art contexts involve applying waste materials in new buildings, but this study opens up possibilities for more volumes of reuse due to different building regulations when it comes

to outdoor structures. Though there are also important contributions from disciplines of urbanism and landscape design being made, a more large-scale and strategy-metabolic approach is needed. By way of telling stories (design 'rule' 5), the urban sink could create more awareness of material flows as chemical engineering literature highlights.

The aesthetics of the design scenario could be considered à la 'bricolage', with perhaps a rough-looking, experimental aesthetic, and could for this reason perhaps be better suited to a setting outside of the central city areas in relation to highways and other infrastructure. At the same time, the scenario shows that there is also potential to locate sites (of the urban sink) in the city, because it can provide meaningful recreative possibilities. The qualities of the scenario show that such a space could indeed be placed in a dense city, and not only outside of town—while the municipality and broader public would also have to weigh in on this for it to become a reality. This further shows that developed theory (Figure 3) holds potential for design purposes. Although more testing and design exploration are needed for use in cities, other areas which can easily 'store' the waste materials—and, through collaboration with architects and artists, enable a creative application of the material—are able to provide phenomenological and visual experiences. Examples could be next to highways as a noise screen, in the middle of roundabouts as art installations, in- and outside of cities in relation to infrastructure, et cetera. Thus, a more large-scale system of thinking (of material availability and site potential) could be nurtured towards handling the great amounts of building waste in meaningful ways.

Challenges of the Urban Sink

One of the immediate challenges of the scenario is the design process, which was in a way 'reverse' because the material and their geometries were already given—making it challenging to develop concepts. Influencing this are the types of collaborations (with demolitions companies, etc.) which allow architects to be a part of the process prior to demolition or enable them to acquire materials from an available library.⁴⁴ Furthermore, there is much more experimental research to be done (more desk studies and 1:1 tests, etc.) which would provide new insights on how to apply elements outdoors. However, to bring this up to date in any meaningful way, it would be crucial to engage in a dialogue with the municipality, because planning laws can be written in a way that makes it difficult to implement the urban sink, affecting types of

structures, materials, et cetera, not only for new buildings, but for outdoor areas as well. Furthermore, it would also be necessary to engage in a dialogue with the municipality and private owners of real estate, because they could be potential buyers and collaborators in this endeavour to allocate outdoor spaces for the urban sink. At this point, it is important to mention that one of the current challenges is to find buyers of waste material stock,⁴⁵ which is tied to the issue of product warranty; also, culturally, people still have a reluctance to use waste materials generally within society.⁴⁶

DISCUSSION

This article tests the theory for design purposes by using RbD, using the variant ‘research into design’ which focus on extracting guidelines and ‘rules’ and ‘procedures’. Another variant could be ‘research through design’ where the focus is more on the empirical data extracted from a ‘material-based’ experiment. This could also hold great potential for further theoretical development because there are more challenges for the urban sink, and perhaps with different locations (and site conditions) it could help to refine design ‘rules’, for example by bringing to light challenges and potentials of both material and immaterial nature. While the concept of the urban sink does hold potential for theory building, more research is needed to fine-tune the combined theory of chemical engineering and architecture.

Conventionally, a designer proposes a design on account of user needs, site conditions, et cetera, which includes a proposal for materials in desired geometries—but in this case an extra layer is added to the design process; the materials and amount are already given. During the design process, this study found that one of the key challenges was the creative process of developing concepts with an already given set of materials. It was a kind of ‘reverse’ way of thinking creatively, and in the future further research could be done to develop this part of the design methodology with more testing and building theory using other means: experiments, simulations, et cetera, especially regarding design ‘rule’ 2 on how to transform elements.

An important thing to note as well is that the design scenario is a principal exploration for mapping challenges and potentials and proposing design ‘rules’. Each of the designed structures, pavilions, et cetera, would be a lengthy design assignment on its own and would require collaboration with structural engineers, urban designers, landscape architects, among others, who of

course would influence the final designs. Furthermore, while the study is an attempt to apply waste materials, in a 1:1 built version additional materials would be needed (bolts, etc.), and not everything could be made only from the given materials—and further research could be done, specifically at this level, on how to minimize additional materials (perhaps through interlocking systems, etc.). Furthermore, the urban sink is challenged by chemical compounds (PCB), the cutting and treating of elements, and transportation, yet perhaps the greater issue is public awareness and the cultural situation, where there is reluctance to use waste materials, so it would then require dialogue with interdisciplinary teams of architects, urban designers, planners, chemical engineers, politicians, demolition experts, potential buyers, current real-estate owners (municipality and private owners) in order to mobilize the notion of the urban sink at a more serious scale than merely one outdoor space. More research at these levels in the future would provide theory building opportunities for both the material and immaterial aspects, particularly the immaterial side in terms of social and economic factors.

With regard to the rules, it has proved difficult to create rules regarding aesthetics—but perhaps it is not necessary at this initiating level. Nevertheless, it is architectural quality and a meaningful application of elements/materials that potentially grants structures long lifespans, otherwise they would be demolished. What rules can be developed hinges on the willingness of municipalities (local planning law and more) to decide how this concept could be applied. Thus, it is difficult to propose/develop rules about amounts or locations at this point in time. If the notion of the urban sink can help to create dialogue with the municipality and other actors, then it could become a different task to develop new and more precise ‘rules’ and perhaps even local planning laws and legislation regarding metabolic thinking in urban contexts.

In the future, the study would also benefit from a thorough material flow analysis. This would require collaboration with planners, chemical engineers, municipalities, et cetera, to properly map the potential benefits and legitimize and propose more realistically who the potential buyers might be and what they stand to gain, apart from value signaling sustainability.⁴⁷ Another step would be to engage in a workshop with urban designers and landscape architects, students and practitioners, to further test and apply both the steps and the ‘design rules’ and to explore more variants of the urban sink.

CONCLUSION

This article combines chemical engineering and architecture by means of tectonic theory to form an understanding of a (revised) metabolism of material and immaterial aspects—with the urban sink as the central *detail*. The article tests the theory by applying it for design purposes and gathering data via a design scenario by way of RbD. The design scenario conceives of an urban sink which can circulate materials with the help of an outdoor urban space. The scenario findings show that through a tectonic method of thinking, a metabolic transformation of material and immaterial aspects, the design holds spatial, recreative possibilities which can help to potentially increase the amount of reused materials and help to slow and narrow material flows—thus overlapping the act of storage with recreative use, providing an alternative to material libraries in larger warehouses, et cetera. The design scenario also demonstrated that the urban sink as such is not only the outdoor space, but a larger metabolism (of which the site is a subpart) which allows the city to contain/circulate materials for current and future uses. The scenario does this by designing and didactically composing material and immaterial dimensions to create narratives of history and memory of materials which can potentially increase awareness.

Consequently, the article elaborates on the design ‘steps’ which are as follows: 1. Context and material flows, 2. Materials, geometry, and transformation principles, 3. Transformational functionality, 4. Transformational gesture, and 5. Transformational concepts and narratives. Building upon the procedural steps, four key design ‘rules’ are proposed: keep the materials, transform as little as possible, bottom-up approach (first find materials, then narrative), and metabolism should be slow: circulating through pragmatic transformation. While these ‘rules’ do hold potential, their efficacy hinges on dialogue and cooperation with the municipality, landowners, and other actors and will need refinement accordingly. But challenges remain: designing with pre-given materials; social behavior; and finding buyers of waste elements intended for reuse.

This first probe into the urban sink and its design scenario findings and its normative design ‘rules’ (guidelines) thus show that there are grounds for potential in the theory and that more research could be done regarding the urban sink (Part) in the form of experiments and simulations, et cetera, to provide more empirical data to test and build theory for the purpose of situ-

ating the urban sink within planetary boundaries and sustainable resource consumption (the *Whole*).

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Also, the researchers would like to thank Hans Ulrik Møller from Titan Nedbrydning, who provided important insights, feedback, knowledge, and considerations on challenges and opportunities related to the urban sink, which was critical for this exploration and for future studies.

NOTES

¹ IPCC Working Group, *Climate Change 2021*, https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf (all URLs accessed in September 2023).

² IRP, UN Environmental Programme, *Resource Efficiency and Climate Change*, 2020, <https://wedocs.unep.org/bitstream/handle/20.500.11822/31715/RECC.pdf?sequence=1&isAllowed=y>.

³ Emily Elhacham, Liad Ben-Uri, Jonathan Grozovski, Yinon M. Bar-On, and Ron Milo, 'Global Human-Made Mass Exceeds All Living Biomass', *Nature* 588 (2020), pp. 442–44.

⁴ Willi Haas, Fridolin Krausmann, Dominik Wiedenhofer, Christian Lauk, and Andreas Mayer, 'Spaceship Earth's Odyssey to a Circular Economy: A Century-Long Perspective', *Resources, Conservation and Recycling* 163 (2020), 105076.

⁵ Miljøministeriet, July 2021, 'Handlingsplan for cirkulær økonomi', Miljøministeriet, Denmark, p. 11.

⁶ Building-Supply, 2021, 'Kæmpe nedrivning i gang: Brøndby skyline forandres et betonelement ad gangen', Building Supply, https://www.building-supply.dk/article/view/805861/kaempe_nedrivning_i_gang_brondbys_skyline_forandres_et_betonelement_ad_gangen.

⁷ Miljøstyrelsen, *Affaldsstatistik 2019* (December 2020), p. 42, <https://www2.mst.dk/Udgiv/publikationer/2020/12/978-87-7038-249-6.pdf>.

⁸ Here, the Ministry of Environment only differentiates reuse and 'other' reuse, with reuse denoting all types of recycling and upcycling, while 'other' reuse is downcycling like crushing (see note 3).

⁹ Examples of this are the Lendager Group project, Resource Rows, and Nord Architects conservatory in collaboration with Titan Nedbrydning, a demolition company.

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¹¹ Julian Kirchherr, Denise Reike, and Marko Hekkert, 'Conceptualizing the circular economy: An analysis of 114 definitions', *Resources, conservation and recycling* (2017), pp. 221–32.

¹² Paul Brunner and Helmut Rechberger, *Handbook of Material Flow Analysis* (Boca Raton, FL: CRC Press, 2017), p. 393.

¹³ Kunstakademiets Arkitektskole København, *Genbygge Studier*, 2015; KADK/Cinark/InnoByg, *Idekatalog over designstrategier for genanvendelse*, 2016.

¹⁴ For erecting new buildings, the building law has the same demands for materials if they are waste. There is a need for a circular economy stamp. See 'Sådan er reglerne for genbrug og genanvendelse', Innobyg, 6 December 2017, <https://www.innobyg.dk/nyheder/seneste-nyheder/saadan-er-reglerne-for-genbrug-og-genanvendelse/>.

¹⁵ Brunner and Rechberger, *Handbook of Material Flow Analysis*, p. 392.

¹⁶ Danske Landskabsarkitekter, *Cirkulær Økonomi i Landskabsarkitekturen*, 2020, <https://issuu.com/danskelandskabsarkitekter/docs/cirkulaer-okonomi-i-landskabsarkitekturen>.

¹⁷ Libera Amenta and Lei Qu, 'Experimenting with Circularity When Designing Contemporary Regions: Adaptation Strategies for More Resilient and Regenerative Metropolitan Areas of Amsterdam and Naples Developed in University Studio Settings', *Sustainability* 12, no. 11 (2020),

4549; Mohit Arora, Felix Raspall, Lynette Cheah, and Arlindo Silva, 'Buildings and the Circular Economy: Estimating Urban Mining, Recovery and Reuse Potential of Building Components', *Resources, Conservation and Recycling* 154 (2020), 104581.

¹⁸ One of many examples of climate adaptations in urban design is the urban design in Klokkeadal. See Dansk Beton, *Klimatilpasning Klokkeadal* 7, <https://www.danskbeton.dk/klimatilpasning/klimatilpasning-kokkedal/>.

¹⁹ Kemo Usto, 'Real Architecture: The Object (Cause) of Desire', in *Real and Fake in Architecture*, edited by Anne-Catrin Schultz (Stuttgart: Axel Menges, 2020), pp. 202–14.

²⁰ Kemo Usto, Marie Frier Hvejsel, and Camilla Brunsgaard, 'An Urban Sink: Case Study of an (Im)material Metabolism of Buildings', in *Structures and Architecture: A Viable Urban Perspective?*, edited by Marie Frier Hvejsel and Paulo J. S. Cruz, Proceedings of the Fifth International Conference on Structures and Architecture, vol. 2 of *Structures and Architecture* (Boca Raton, FL: CRC Press, 2022).

²¹ An example of a set of constructs could be Gottfried Semper's four elements (roof, wall, mound, hearth). For the sake of comparison, a construct is called a "first principle" of theory by Groat and Wang in their important literature contribution on architectural research methods; see Linda N. Groat and David Wang, *Architectural Research Methods*, 2nd ed. (New York: Wiley, Hoboken, 2013).

²² Anol Bhattacharjee, 'Social Science Research: Principles, Methods, and Practices', *Textbooks Collection: Book 3* (2012), ; Jason A. Colquitt and Cindy P. Zapata-Phelan, 'Trends in Theory Building and Theory Testing: Five-decade Study of the Academy of Management Journal', *Academy of Management Journal* 50, no. 6 (2007), pp. 1281–1303. DOI: 10.5465/AMJ.2007.28165855

²³ Jørgen Hauberg, 'Research By Design', disseminated at the Third International Conference on Architectural Research, Lisbon, 2011.

²⁴ Ibid.

²⁵ See note 12.

²⁶ Here we have seen literature of structural engineering and tectonics: Chad Schwartz, *Introducing Architectural Tectonics: Exploring the Intersection of Design and Construction* (New York: Routledge, 2016).

²⁷ James J. Gibson, *The Ecological Approach to Visual Perception* (New York: Psychology Press, 2015), p. 34.

²⁸ Adam Sharr, *Heidegger for Architects* (Oxfordshire: Taylor & Francis, 2007), p. 84.

²⁹ Slavoj Žižek, *Absolute Recoil: Towards a New Foundation of Dialectical Materialism* (London: Verso, 2014), p. 114.

³⁰ Marie Frier-Hvejsel, 'Gesture and Principle: Tectonics as a critical method in architecture', in *Reader: Tectonics in Architecture*, edited by Isak Worre Foged and Marie Frier Hvejsel (Aalborg: Aalborg University Press, 2018).

³¹ Creating an entirely closed loop is difficult to accomplish in reality. See Brunner and Rechberger, *Handbook of Material Flow Analysis*, p. 25.

³² Peter Baccini and Paul H. Brunner, *Metabolism of the Anthroposphere* (Cambridge, MA: MIT Press, 2012), p. 97; Brunner and Rechberger, *Handbook of Material Flow Analysis*, p. 37.

³³ For the demolition list, thanks go to Torben Kjeldgaard. Unlike the archival data on Weblager, the list was not publicly available and was acquired by contacting the municipality. The provided list was only a list of buildings approved for demolition in 2021 since the start of the year through August. The list had almost 200 buildings set for demolition, and it became a prolonged task to gain an overview of all of them before choosing, but the aim was to select addresses which represent the current concerns regarding materials flows in the building industry, namely housing.

³⁴ This was originally a house for dwelling, placed in a suburban area, but later made into an institutional program—available on Weblager.dk when searching the particular address.

³⁵ In general, regarding the choice of buildings for the study, one is at the mercy of what is available currently, and there will thus always be a minimal aspect of arbitrariness to the choice, even though this study was intended to reflect on main material flows in the building industry, which is the housing segment.

³⁶ For this, it is important to engage in integrated design processes with a demolition company.

³⁷ Timothy Morton, among others, has developed the need to think in non-anthropocentric ways, where things relate to other agencies, and not only with the humans in his book *HyperObject*, among others. Despite the positive developments regarding biodiversity in cities, there is still long way to go. On this, see Frederik B. Kristensen, *Overraskende konklusion i stort forskningsprojekt: Biodiversitet er i fremgang i byerne*, Bymonitor, 2020, <https://byrummonitor.dk/Nyheder/art7997220/Biodiversiteten-er-i-fremgang-i-byerne>.

³⁸ Ákos Moravánszky, *Metamorphism: Material Change in Architecture* (Basel: Birkhäuser, 2018), p. 15.

³⁹ In particular, the standing elements were inspired by Per Kirkeby's art installations (brick sculptures), an artist who was in turn inspired by the transformation in geology, among other things. On this, see Thomas Bo Jensen, 'The Poetry of Brockwork,' in *Towards an Ecology of Tectonics: The Need for Rethinking Construction in Architecture*, edited by Anne Beim and Ulrik Stylsvig Madsen (Stuttgart: Edition Axel Menges, 2014).

⁴⁰ See note 42.

⁴¹ Ulrik Stylsvig Madsen, 'Constructing Immediacy,' in Beim and Madsen, *Towards an Ecology of Tectonics*, p. 110.

⁴² Anna Tweeddale, interview, 'Wang Shu: "Memory Is Deeper Than Symbols"', *Architectural Review* 127, The Residential Issue (October–November 2012).

⁴³ Definition of 'Spolia' in architecture, Oxford Reference, <https://www.oxfordreference.com/view/10.1093/acref/9780195046526.001.0001/acref-9780195046526-e-5088>.

⁴⁴ Where the design process starts depends on the collaborations. A recent Internet news article indicates that significant steps are being undertaken towards building material 'libraries'; see Redaction, Building Supply, *Lendager sælger materiale-firma*, 2021, https://www.building-supply.dk/article/view/811170/lendager_saelger_materialefirma.

⁴⁵ This was told to us by Hans Ulrik Møller from Titan Nedbrydning and is also available in the publication Værdibyg, *Cirkulær Nedbrydning*, <https://vaerdibyg.dk/vejledning/cirkulaer-nedbrydning-2/>.

⁴⁶ Hans Ulrik Møller from Titan Nedbrydning also considered cultural awareness to be a challenge where people are reluctant to reuse waste materials; on this issue, chemical engineering

literature highlights the need to create more awareness in the public in order to seriously affect current material flows in society; see Brunner and Rechberger, *Handbook of Material Flow Analysis*.

⁴⁷ There were many uncertainties with regard to the current materials stock in this study—given that the buildings were designed under different building legislation, and thus the chemical and hazardous condition (PCB, type of impregnations of wood, etc.) were not mapped, nor did the authors of this study have the time, knowledge, or budget to inquire into this specifically. This would of course influence whether the materials could be used, or if they would need treatment to be used in an urban sink. Furthermore, conducting a 'full' material flow analysis of this metabolism, along with an LCA, would also show what exactly the effect would be, including new transformation of the reclaimed material, such as cutting the brick walls, cutting the wood elements, new transportation routes (not landfill), energy expended on cleaning, mounting, et cetera.

REPRESENTATION OF ARCHITECTURE THROUGH VIRTUAL MEDIA

Anders Hermund

ABSTRACT

How can architects, and architecture in general, benefit from the emerging digital media and tools such as virtual reality, eye tracking, EEG analysis and the new insights gained from neurology in relation to perception in the past decades? This essay will discuss recent research into these fields exemplified in the development of an engaging representational model using a combination of feedback logging mechanisms in virtual reality to indicate the quality of universal design and of architecture. During the last five years, a series of experiments have led us to the prototyping an architectural transformation and design tool, with the intent to extract both the feedback of behaviour and emotion using a digital architectural representational model. Combining digital scans of existing architecture with suggestions of architectural transformations, allows the prototype tool to provide a more informed and detailed basis for decision making. With this ambition of working in the virtual digital realm and at the same time investigate and stress the importance of the human mind engaging with the representation of architecture with all its floors, walls, and atmospheres, it can be a complicated issue to establish a common frame of reference explaining why certain aspects in a representation are preferred and others are not. This use of architectural representational models eventually holds the potential to further improve the experience and quality of architecture and architectural transformation.

KEYWORDS

Digital representation, perception, atmosphere, virtual reality

INTRODUCTION

If architectural space, in Pallasma's words, is lived space rather than physical space, and lived space always transcends geometry and measurability¹, how do we then approach the assessment of architectural quality? This essay argues for, and wants to discuss, how a journey into architecture and the realms of neurology could generate new input to the discussion of representing architecture and possibly to the quality of architecture itself. While the complexity of each of the topics brought together in this essay should under no circumstances be trivialized, certain discretionary limitations must be applied, in order to investigate the possible meaningful coincidences and comparisons, not to mention attempting to reach any sort of conclusion to this vast canvas of human biological perception and idiosyncratic preferences in the world of architectural aesthetic and physical feasibility. That is also the reason why an essayistic form has been chosen for this article, though also many references to scientific work will occur. In addition to this, a definition of the concept of representation in the transformation of architecture will be addressed.

Knowledge about perception of space is crucial to architects, and in the transformation of something into something new, the representation often plays a vital role. While transformations of matter on a smaller scale, i.e. design objects, can be undertaken in 1:1 scale, the nature of buildings and urban transformations require the use of scale models e.g. architectural representational models, that can vary in size and performance and materiality, but almost always operate as a downscaled model, to make it feasible to produce. This ambivalence of an application of architectural representation that is always showing something, but in its nature never everything, is thus in this essay handled as a necessity of the profession, a facilitator for the creation of architecture. A wooden architectural model can be pleasing and aesthetic in itself, but as a tool, it remains a means to approach the vision and accomplishment of the real building. When dealing with digital representations of architecture, there are several other issues at stake. For instance, there is a lack of tactility and a supposed lack of scale.

While the issue of scale is a comprehensive argument on its own, it will suffice here to hypothesize, that a digital model in virtual reality differs from the other digital representations by the fact that the user can immerse himself into a 1:1 scale model of an architectural model. This distinction between different modes of application of digital models are important for

the discussion and argument of this essay. The tactility on the other side, the lack of haptic response from digital images is another issue, but perhaps not so far from the actual lack of tactility in other representational media. This will also be open for discussion later in the essay. However interesting the digital models and the world of virtual reality can be in other contexts, i.e. in the vast world of gaming, the virtual reality models used for architecture are tools to obtain better quality in the transformation of real matter into real buildings, and hence in this essay not viewed, as meaningful worlds detached from this tool-specific architectural purpose. The virtual representational model, as seen in this context, can be a logical addition to the tool palette of the architect, representing a possible next step into the discussion about perception. Learning from the last decades how can we, with the knowledge gained from technological development and neurological insight, establish a use of digital virtual reality representational models in architecture that come close enough to the reality of human perception to make it a useful tool in design and transformation of architectural projects.

Background of a neurological approach to representations of architecture

Already in the early dialectic phenomenology of Maurice Merleau-Ponty the perceptual consciousness is a combination of the physical world and the intentionality of the cultural level of human life that cannot be isolated from either part without losing its inherent meaning.² Attempting to describing the world requires an understanding of the interrelatedness of the physical world, which we humans are essentially part of, with the fundamental mechanics of perception going on in the brain. This relation of body, consciousness, and perception resulting in attempts to define a phenomenological structure of perception has continued to intrigue us pointing to the idea that vision is always pregnant with meaning. A meaning that, to some degree, is unrelated to the perceived. The body is the general instrument of comprehension of the perceived world and the fabric into which all perceived objects are woven.³

Phenomenology, occupied with the phenomenal world, continues from the personal experiences and observations through Pallasmaa's articulations of architectural experiences as framing, relating and giving significance to the life unfolding and his concern with a too limited focus on the sense of vision when working with architectural design and transformation through representations.⁴ Considering the critique that architecture is not merely a series of retinal images but are indeed encounters and confrontations in relation to existing memory, we must incorporate this knowledge in the digital

models, so we can in fact discuss and expand on the usability of digital virtual systems, which are in their primal functionality using sight as a direct link to immersion into the representations of architectural design and transformation. The neurobiologist Semir Zeki has for many years explored the brain in relation to visual art⁵ and many of the neurological findings are becoming important for the understanding of perception. Zeki explains how the major finding, that there are many other visual areas than the primary visual cortex in the brain, changed our concept of vision as a process. This active brain process of discarding, selecting, comparing with already stored information, generates a visual image in the brain. In this way the brain creates the visual world around us as an active process, and not just passively registering a static image of the world that already exists.

Hence a perceived perspective or a perceived object is not describing the situation of a specific location or object, but rather the situation of the spectator. The brain never perceives the objects and surfaces surrounding us from a single point, but from different distances, from different angles and in different lighting conditions – but it even still recognize the objects and surfaces. Even though there exist no colours besides the construction of them in our brain, we still see them as if they were out in the world. The different visual areas in the brain are also perceiving in a temporal hierarchy where colour is perceived before form which is then perceived before motion. The brain will register the colour change first, in an object simultaneously changing both direction and colour. Zeki describes this temporal lag as ‘microconsciousnesses’ all processing the events at slightly different times⁶ which also indicates that we are never really in one common present, in relation to our perceptual understanding of the world.

The understanding of the brain has changed from the old model, which like a computer passively took outer stimuli from the senses, to a much more active model of the brain that confronts what it senses with its own representational models based on experience, and constantly tests and evaluates its hypothesis. This also suggests that the senses are not separate from the brain, and that the old distinction between body and mind are making less sense in a neurological perspective. The neurons in the hands or feet are just as much part of the brain as the neurons in the frontal lobe, the brain is the body.⁷ Several parallel processes are organizing perceptions distributed on fragmented locations in the brain and compared to previous experiences to produce a plausible explanation of the world. The *rapid gist extraction* allows the brain

to create an image from only one fixation of an environment in order to discern what is most important. The rest of the mentally constructed image is filled out with our existing schemas and mental representations.⁸ A level of ambiguity characterizes each perception, as the brain, in its comparison to existing experiences, “guesses” or fills in the missing details, to make sense of the perception. Zeki describes this as many equally plausible interpretations that can each occupy the consciousness. The brain, so to say, holds the possibility to represent several truths with equal validity from a perception. This ambiguity is important to remember later in this essay in the discussion of the level of detail required in an architectural representation.

To turn our focus towards architecture, there are some examples that seem worth mentioning in this short background review. Architecture is activating many different areas of the brain, so the perception of e.g. a building façade, may be mentally processed both as a background and as a configuration of objects, likewise involving different areas of the brain.⁹ But is there a hierarchy in the sensation of form and surfaces on a more tangible macrolevel? Research into how both architects and non-architects react to different geometries have been undertaken to search for a connection between human feeling and architectural space.¹⁰ A continuation of that research topic has recently examined how emotional reactions to architectural space can be empirically measured and quantified using virtual reality representational models of architecture combined with physiological sensors, such as EEG, sweat sensors, and eye-tracking.¹¹ Conclusions from the study point to a measurable neurological influence of architectural scale, proportion, protrusion and curvature to the users’ emotional state. Sarah Goldhagen describes in her work¹² how the perception of form-based cues such as geometrical shapes, their sizes and orientation are located in parts of the brain that presumably does not require referring to the memories of previous encounters with similar forms. She describes how the use of *geons*¹³, as a primal understanding of basic geometrical principles, allows us to understand the physical form as components of recognition in a rapid comprehension of the shapes and forms we experience.

While the perception of shape and form are probably going on without the need to mentally consult the memory of actual experiences of similar forms, the brain behaves differently in relation to understanding surfaces. When making sense of different surface properties such as texture, density, colour or pattern, the brain draws upon memories of prior encounters and experi-

ences with similar surface cues. The perception of surface, in comparison to form, is thus seemingly a more emotionally entangled process that involves a multisensory whole-body sensation to a higher degree than the perception of form. A very roughly textured concrete wall may invoke the sensation of being bruised against it, while a soft chair may invoke relaxation, even without sitting in it. This also becomes important for this essay when deciding and discussing how to apply virtual models in design and transformation processes, with or without textures. In a digital model, as mentioned earlier, the lack of tactility and texture can be an issue seen in this context of the importance of surface quality. However, we might look to another finding in neurology to discover suggestions in overcoming this physical absence in the virtual, at least to some degree.

The *canonical neurons* controlling our motor actions are firing when we perform actions involving movement, but also when we are inspired to perform actions, e.g. by looking at a window and mentally preparing to open it. *Mirror neurons* are also firing when performing or thinking about performing actions, but they also fire when we are just watching another person performing an action. In this way these neurons are said to mirror the actions of what we observe others do. This could suggest that motor system and sensory faculties are two components in the same unified system in the brain.¹⁴ Merely looking at a stairway invoke the sensation of movement, a mental simulation one might say, even before walking the stairs, or even if not walking the stairs at all. This connects to imagination and to the human desire and ability to tell stories. The distributed neural networks that in the human central nervous system are creating narratives are essential for how we as humans define ourselves. Imagination and narration of stories inspired from the environment can take part without activating the motor apparatus, i.e. 'decoupling' from actually moving, in order to allow several narratives to inspire us, also in an artistic manner.¹⁵

The stories we tell are part of the dynamic process in the act of defining ourselves in the world. Architecture plays a role in this narration as focal point for deriving meaning and orientation from our environment and physical surroundings. All architecture contains a possibility to respond and provoke narratives in the people who moves around and dwell in it. When successfully engaging people, architecture can inspire stories, on a neurological level, that enrichen our lives and imagination.¹⁶ Perhaps being aware of the narrative, geometry and surfaces could be as important in the representa-

tional architectural model as in the actual built environment? We know from neuroscience that half of the sensory information going from the human body to the brain is visual¹⁷, but also that these stimuli invoke sensations not limited to the visual aspect of cognition. This neurological connection is probably in line with the assumption many architects develop through the work with representational models. It is fundamental for the work with e.g. scale models, that we can imagine what this space could provide for us in full scale. Another ordinary example of this could be how watching a movie, through vision, can affect our feelings and invoke memories that generate the physical awareness of touch, smell, and bodily presence of. Laura Marks describes, through examples from movies, how images allow viewers to experience cinema with 'haptic visuality' as physical and multi-sensory embodiment.¹⁸ When working with a visual interface such as digital virtual reality, these are important learnings, that must be cleverly applied and balanced in the transformation phases of architectural design, to avoid losing important elements of what architecture holistically is and can.

What has been introduced so far, can hopefully serve as an explanation to some of decisions that has been made in our attempt to create a virtual reality representational system that can assist architects in working with transformation and designing of architecture. A link between the neurology of the brain and the perception of the world as a generative process where vision can play a role of invoking sensations that are not limited to the visual. In the next section we will introduce and look at some cases of research into the applied use of virtual reality in architecture.

Digital representations of architecture

The use of virtual reality has been a topic for many years, and in the last decades, with the introduction of low-cost equipment, the possibilities of application and testing this sort of technology have also become obvious within architecture. While digital 3d models on computer screens have been unavoidable as a part of the 'virtual' working methods for architects for a long time, it is not to be confused with the virtual reality experienced through head mounted displays (HMD), referred to in this essay. This technology is different from working with the traditional digital computational models on a flat screen, since the user is being situated inside the architectural model through a display mounted on their head. The experiences in the virtual reality model can be simulating the real world in a way so the user can look around and move through the architecture in a 1:1 scale. The HMD screen

allows for a sensation of depth and parallax due to a slight correction of the viewpoint for the two eyes, based on the interpupillary distance of the user. That is one of the reasons the essay claims, that the digital representation of architecture is very different seen on a traditional flat two-dimensional screen and experienced through the HMD virtual reality. The sensation of being present or 'immersed' in the model is where the virtual reality model comes closer to reality than working with a traditional computer screen, and in some cases actually so close that it provides a scientific foundation for the study of presence.¹⁹

Research using the 'mental rotation task'²⁰ of geometrical figures performed with both traditional flat computer screens and in virtual reality HMD²¹ shows that the traditional digital desktop graphics are ineffective or even counterproductive in relation to virtual reality 3d immersive environments if the goal is to simulate tasks in the real world. Virtual reality can in this case be said to generate a more 'natural environment' for the brain, than 2d computer screens. This natural environment has from research in the world of gaming suggested that the immersion and enjoyment is higher through virtual reality, but that the gaming performance was better using mouse and keyboard.²² However, the task performance of the world of gaming is of course not directly transferable to architectural experience of spaces, where the 'task' is not so easily defined. But the fact that the mind seems to be very flexible in its definition of a virtual self²³, the possibility of being someone else in virtual reality can prove to be very useful for architects. When designing for disabled people, the elderly, or for children, the opportunity to experience the architecture from the users' point of view, is something that is a unique property of the virtual reality environment.

In another neurology study that compares learning in virtual reality to learning through conventional flat computer screens, the conclusion shows that virtual reality increases both sense of immersion but also the risk of increasing processing demands on working memory, which in turn can lead to a decrease in knowledge acquisition.²⁴ This is also important to remember when discussing how a virtual environment could, as good as possible, provide a platform for architectural work. Again, the level of included detail in the model could be of importance to avoid overinforming the user and keep the detailing to the minimal cues required for understanding of the architectural idea. It has been observed that the realism of the display seems to be far less important, for feeling present in the virtual reality model, than

other parameters, such as head tracking, frame rate, sound and interacting.²⁵ While some of these parameters are easier to accomplish than others in the virtual reality system for architecture, it resonates well with the traditional idea of an architectural representational model that operates on a level of abstraction from the real world, in order to show only what is most important. In a study that focuses on emotion recognition in virtual reality using an architectural representational model²⁶, the potential of *immersive virtual environments*, or IVEs, shows promising results. In the study four alternative virtual rooms were designed, all based on Kazuyo Sejimas 'Villa in the Forest' to elicit four different kinds of experience based on altering of the surface properties, lighting, and geometry of the villa representational model. This branch of research, called *Affective Computing* (AfC), has been applied since the nineties in many fields, but only recently within architecture. Affective computing involves both an emotional classification and the measure of emotional elicitation. To classify and measure the test subjects' emotional response to the IVEs, the research group uses a 'Circumplex Model of Affects' (CMA) based on a Cartesian coordinate system of axes, in two dimensions.

On the two axes the emotional response can be plotted respectively according to the measure of *valence* (the perception of an emotion as either positive or negative) and *arousal* (how strongly the emotional impact is felt). The emotional measurements are then recorded using both wearable brainscanning tools (EEG) and heartbeat sensor (ECG) to register the test subjects' arousal-valence combinations in the four virtual rooms. The study consequently investigated if a specific emotional response could be provoked from the specific design of architecture. The four altered versions of the Sejima project were presented in virtual reality head mounted displays VR HMD as a 360 degrees photo that conveyed the sensation of being placed inside the architecture with the ability to look around. The four virtual reality experiences were designed to each induce a positive or negative valence with respectively high and low arousal. These experiences did elicit emotions in the four categories expected, and the conclusion of the research is that the IVEs of architectural space can actually be used to evoke emotions.

The ability of IVEs to evoke the same emotions as real environments are compared in a next phase of the research as a free exploration of a real art exhibition in a physical museum and a virtual reality simulation of the same experience in a head-mounted display.²⁷ The results suggest that after a period of adaptation, there are no significant differences in navigation between

the physical and virtual museum, supporting the use of immersive virtual environments as tools in behavioural research. This research points to the possibility of using wearable virtual reality and sensor equipment for actual research in architectural spaces. Before we introduce our own research and eventually suggest an experiment to further contribute to the validation of the indicated methods and technology within the field of architecture, let us in the next section for a moment consider another approach to the evaluation of an architectural experience using a virtual simulation.

In the attempt to set up a framework for quantifying the experience of architecture over time, this approach²⁸ is using computational power and algorithmic calculations for a deeper understanding of architecture to discover which visual characteristics of the surrounding environmental setting can trigger unconscious affective responses. The suggested framework consists of one part where acquisition of the desired visual input is generated. In the example, this input comes from a photogrammetric model of the case building. But this could theoretically also be live photos from eye tracking equipment worn by a test person in the architectural case building under transformation or a digitally produced virtual reality representational model of architecture not yet existing. Either way, sequences of 30 images per second of the field of view of the test person is captured along the architectural walk-through and extracted to be computationally analysed in the second part of the system. In this second part the images of what has been inside the field of view of the test person, is analysed based on four algorithms adopted by processing fluency theory²⁹ into a method of measuring antecedents of aesthetic preferences.

The four algorithms used in the architectural context perform four analyses on the visual content of each of the images. The four analyses are registering the images with respect to self-similarity, visual complexity, symmetry, and contrast, in a post process analysis of the image sequences from the walk-through of the case building. The research suggests that data provided via this framework can be combined with physiological data and emotional data about affect, e.g. valence and arousal, to find correlations between the of visual features of the walk-through and emotion and affect responses in architecture. This approach, even though it can be argued that it might be too reductive, is a way of extracting traits of the visual experience of architecture including its temporal aspect. Where other, and more static, analyses of images of architecture are based on far less extensive sequences of renderings or perspective drawings, this method allows for a more elaborate and digi-

tally automatized analysis, that could perhaps be combined with neurological aspects in order to determine the impact of architecture on the human perception. One important addition that this essay intends to bring forth, is how the method tries to address and incorporate the movement over time of a person experiencing architecture. Hence it tries to include a more dynamic way of registering space than static images. Hopefully the idea of measurement of an architectural experience can inspire subsequent discussions in relation the new use of architectural representations.

Virtual Scenario Responder

In our own research on the subject of applied representational tools for transformation and design of architecture we have created several experiments and set-ups to evaluate and develop a functioning virtual reality representational model system that includes useful feedback for architects. Since 2016 this research has evolved around the use of virtual representational technology and various types of data collection methods. The *Virtual Scenario Responder* (VSR) is an attempt to combine the apparent usefulness of representational architectural digital models in virtual reality with some of the new and existing methods for data collection of the user experience. The use of a digital game engine, to enable users to virtually move around in the architectural space, became the starting point of the project. An overall chronological summary of the development of the VSR so far can be found published elsewhere.³⁰ In the following outline, only a few of the most significant studies are briefly introduced, for the sake of the discussion about the applicability, requirements, and adjustments of the VSR system for use in architecture.

A more thorough explanation about methods and test set-ups is available through each of the referenced research papers. One of our first studies of the similarities between the perception of architectural space experienced in physical space conditions and in virtual reality, had the intent to clarify to what extend subjective and objective experiences of architectural space can be conveyed through a direct use of virtual reality. Test persons experienced an architectural space as either a physical or a virtual environment and data from their experiences were compiled through a quantitative/qualitative questionnaire. The overall conclusion from the study was that even a simple representational model can convey rather precise information about both subjective and objective experiences of architectural space using virtual reality.³¹ The further development of the virtual scenario responder with the ambition to develop a prototype tool that could be used as a dialogue

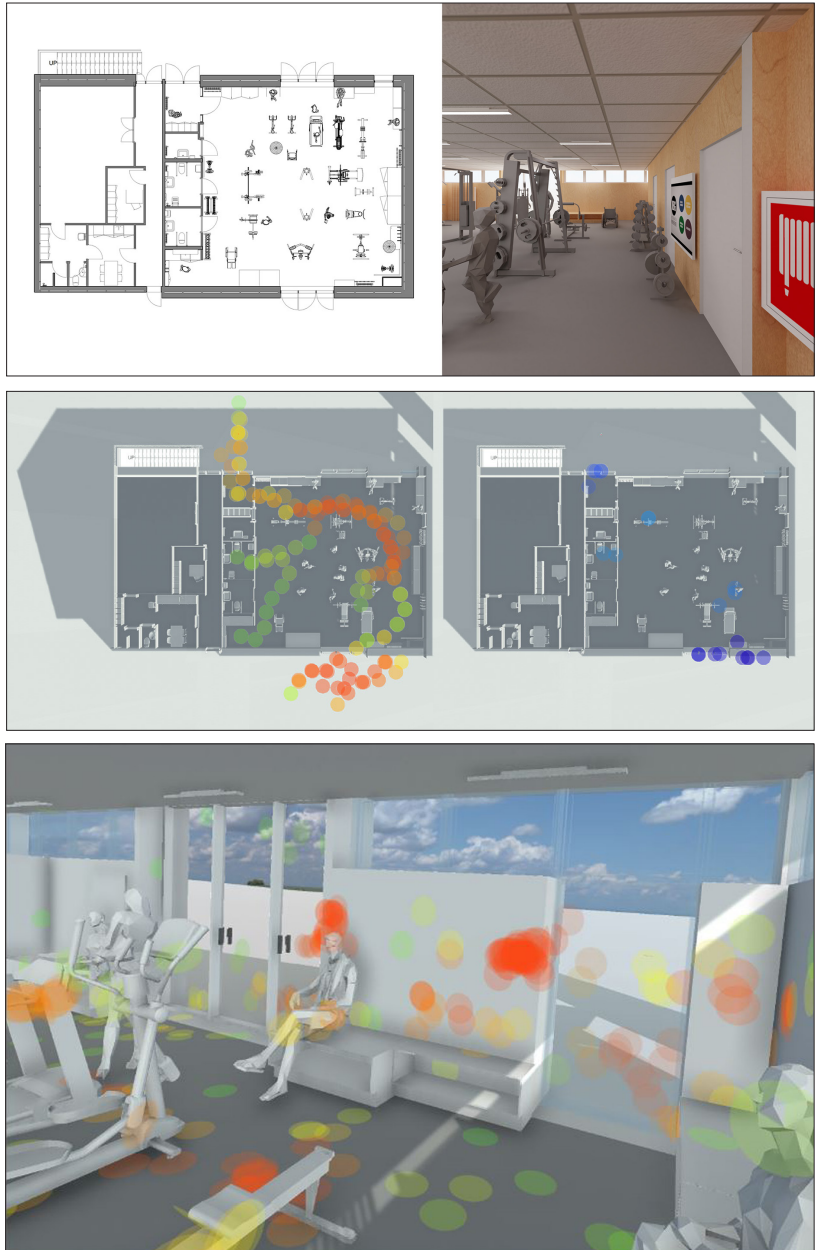


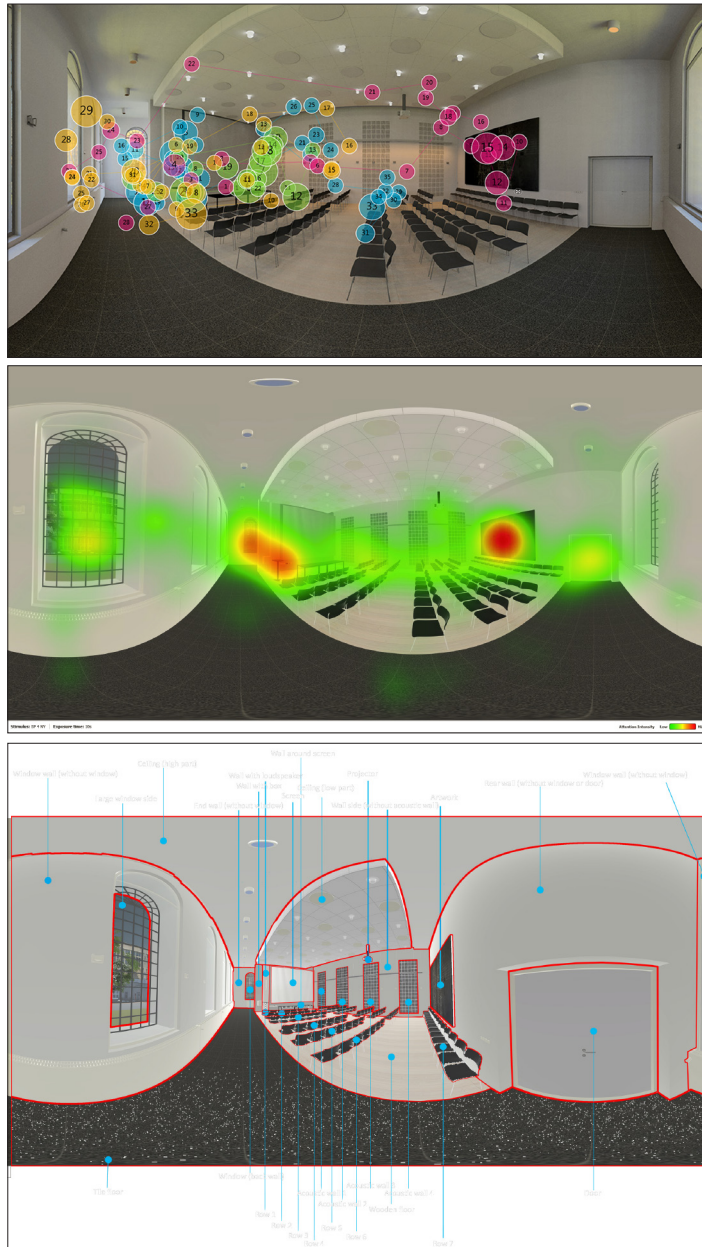
Figure 1. An example of a VSR case study building with its plandrawing, a render from the VR walk-through, and the heatmapping of eg. movement (green-red) and collisions (blue) in plan-view and lastly the recorded VSR gazetracking seen in the 3d model view. Source: The author.

platform in the transformation and design of architecture included both the use of eye tracking equipment and the experimental use EEG neuro scanning tools. Eventually the findings from these studies were sought to be included into the prototype tool.

Testing of the initial set-up was in addition performed as comparative study between a real space in reality, the virtual reality twin of the space, and eventually plan and section drawings of that same space.³² The findings from that particular study made it obvious that the overall divergence from the perception of the physical space was much higher in the plan and section scenario than when perceiving the space using virtual reality. The combination of eye tracking with user interviews of the space allowed to investigate different aspects of the perception of space. Both rigid qualities, such as estimated dimensions of the space, and also soft qualities about lighting and sensations of well-being in the space, could be compiled. The comparative question to investigate was, where people were looking for information in respectively reality, virtual reality, and on plan and section drawings, in order to answer specific questions about the architectural space. We could hence compare both their *actual answers* about dimensions and well-being, but also compare the less conscious act of *where they were looking* for the information to the answers. In short: for our group of test persons virtual reality overall came closer to the perception of reality than plan and section drawings.

Since the test persons in the study were all students in the beginning of the architecture study, selected on purpose to find people without a long architectural education or experience, we also did a cross check using the same test set-up with a small group of professional architects. The indications from this showed, as expected, that professional architects were much better to decode the drawings than first year students.

Since much of the communication of an architectural project, whether transformation of existing designs or designing from scratch, involves users or builders with little prior architectural education, one of the intentions of the VSR system is to be more inclusive and opening up for dialogue of architectural space. Introducing neuro scanning as method of capturing behavioural aspects of the test persons experience became the next step in the attempt to generate feedback that was not based solely on the verbalized comments from the users.³³ Combining the already existing virtual reality model in a game engine with light weight EEG brainwave recorder allowed a pilot test of



selected performance metrics such as excitement, valence, engagement while experiencing the virtual space.

While the pilot study was performed with a small number of test persons, we were aware that we did not have sufficient data for a meaningful quantitative analysis and had to cautiously limit the conclusions to what we could observe individually with each test person. The performance metrics of the eight test subjects were difficult to compare since everybody reacts differently to stimuli. One person might find it interesting to e.g. get lost in the model, while another might find this very stressful. We could use this pilot test as an indication of the feasibility of the method with a larger sample size. It also suggested that we incorporate interactions in the model to achieve immersion, since interactions, i.e. with opening of doors, showed engagement in the behaviour of test persons. Since we are architects, and not neuroscientists, we also learned that a larger study, involving more precise equipment, would necessitate close collaboration with neuroscientists or neuropsychologist to extract and investigate the higher level of detailed feedback from the measurements. In a larger study undertaken with respect to some of the insights and realizations from the pilot study, we decided to build basic behavioural

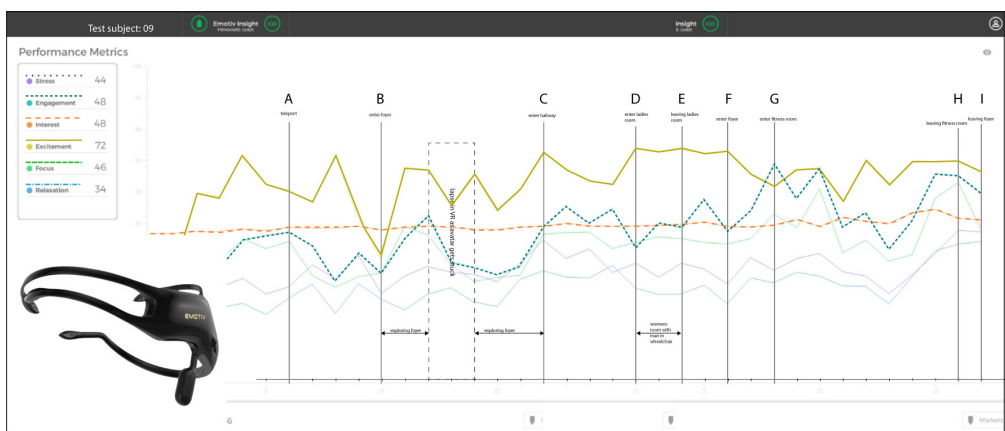


Figure 3. Example of performance metrics from the lightweight brain scanner. The graphs show the fluctuations in the different measures and our preliminary attempt to analyse and map the occurrences from the experience with these metrics. Source: The author.

tracking inside the VSR as part of the game engine mechanics. This study³⁴ included the automatic tracking of user location, user gaze tracking and collision tracking. The gaze tracking (i.e. the midpoint of the direction of the field of view) substitutes actual eye tracking, since the precision for overall perception of architectural space is considered sufficient. In addition, this makes the eventual equipment much cheaper and makes implementation in the building industry more likely. In this way we can streamline our methodology into a lean version based on the location, gaze, collision data obtained automatically, and the questionnaire data from user interviews. In the VSR, location data can be cross-referenced with both the gaze- and collision maps data and the questionnaire in order to evaluate the type of the experience, at any given location the user has occupied. This feedback mechanism can sustain a spatial analysis of potential reasons to a specific type of experience. It could provide insights into what kinds of architectural cues result in pleasant and emancipatory experiences, and what cues result in frustration or confusion.

The VSR tool, though still a prototype, has since been used in architectural projects to generate reports that could send easy feedback to the architects about the sensation of the spaces. In virtual reality, the user can also see the architectural space from another person's point of view. That could be from people with mobility impairments or visual impairments.³⁵ It can also be the eye height of a child if the architectural project is for instance a kindergarten. We have made reports from the wheelchair perspective, in relation to universal design, and general comments from walking persons. The VSR tool is now capable of using digital models in virtual reality and record the experience of the users. The test persons field of view and verbal comments are recorded into a movie file along with heat maps on plan drawings of the space that show both position and collisions. In the digital 3d environment all the gaze point heat maps are likewise recorded and can be extracted on 360 images or viewed within the virtual model. Even though The VSR prototype is not aiming to be a photorealistic representation, we have made it open to customization of materials, backgrounds and made it possible to insert detailed renders, in areas where an architect would require more detailed visual feedback. It is also possible to simulate other kinds of interactive scenes such as a fire scenario with smoke accumulation. There can be inserted different models in the same viewer i.e. a laser scanning of the existing building to compare a new transformation project to the existing space. The reports generated so far in the context of building and transforma-

tion of training facilities “Fitness for All”³⁶, have all inflicted actual change in the architecture in the case projects.

All the above-mentioned methods and technologies from affective computing to quantifying the temporal experience and the application of game engines with behavioural feedback mechanisms has led us to the formulation of a next experiment combining neurology and the experience of architectural space in a collaboration with neuroscientists. This next step allows us to further refine the VSR into a tool that can assist the process of architectural design and transformation.

A next phase neurological experiment

During the process of writing this article, our neurological study has been going in a parallel track. This next section provides the initial findings on how to investigate the importance of the level of detail in the virtual reality VSR system. We consider this study highly relevant for a transformation context with an availability of and potential requirements of access to comprehensive material properties in the architectural representation.

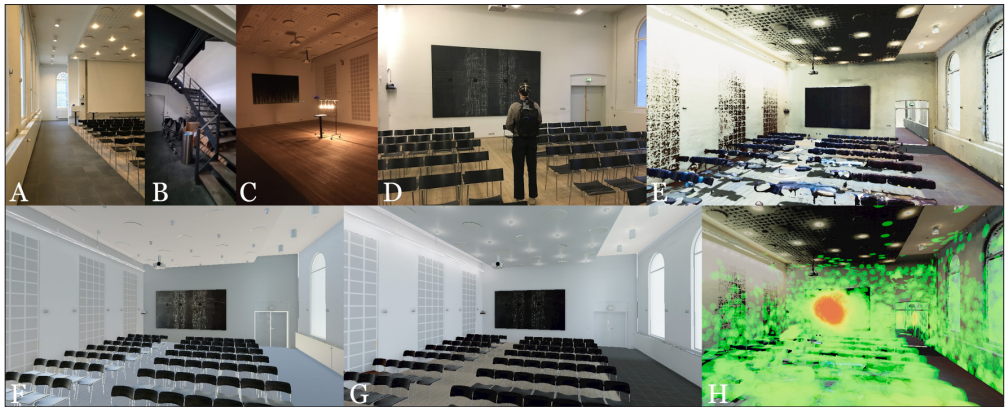


Figure 4. The real-life situation of walking through spaces with different architectural atmosphere (A) an auditorium in daylight, (B) the stairway passage room, (C) an auditorium with a special lighting set-up). (D) shows a test subject wearing the neuro-scanner while commenting on the painting in the real-life scenario. (E) a screenshot the quality of the laser scanned model of the test space. (F) shows the low-detailed VR version and (G) the high-detailed model of the test space. (H) shows the laser scanned model with a recorded gaze tracking heat map shown. Source: The author.

The pilot study proposal 'Understanding the emotional and cognitive response in VR vs. reality' involves capturing emotional and cognitive responses on a walkthrough of architectural space with presumable different architectural atmosphere. The study was performed in a real-life space and in virtual reality models of the same space. In this study, we had three different levels of detail in the virtual reality model (Figure 4). The low detail level geometrical model, a high detail textured model, and a digital scan of the architectural space. What we have been mainly using until now in the VSR is a geometrical relatively low detail model, which can be compared to the white cardboard box model architects traditionally have been using to convey architectural vision to colleagues and the public. The argument for this has previously been, that the level of detail in an early sketching phase of architectural design, contains information of geometry but very little information of materials and textures.

The VSR system collects feedback from the experience of the overall architectural space, and too many details in the virtual reality model can then be confusing, since they are not yet decided by the architects, and will draw too much focus and attention from the overall experience of the dimensions and proportions of space. That has deliberately made us apply a model with no textures and very little colour. However, some projects require specific considerations to selection of materials or atmospheres, which is why the VSR has the option to insert detailed areas in a controlled manner, to get specific feedback. In an architectural transformation project, where an existing framework exists, it is possible to make a digital scan of the existing space and combine the visual representation of existing materiality with the transformative suggestions.

The different approaches to the representational architectural model supposedly have a connection to the neurological perception of geometry and surface, as mentioned in the background chapter of the essay. But how can we find the right level of detail required to convey an architectural vision, idea, and atmosphere? We are interested in understanding whether people can have the same emotional and cognitive experiences in virtual reality as in real life. The purpose of the study is to understand more about how virtual reality can be a new effective solution within architecture and design to drive a more efficient process with higher architectural quality. At the same time as testing whether VR and real life drive similar responses, we are also interested in understanding if the quality of the virtual experience has an

impact on the way people respond emotionally and cognitively. By using three different levels of detail in the virtual reality model and compare this to the real-life experience, we will be able to understand a broad spectrum of experiences within the architectural space. In collaboration with Neurons Inc's³⁷ NeuroLab and EEG procedures, we can understand the emotional and cognitive experience second by second within different qualities of VR and in the real-life experience. In this study, 40 participants from Denmark were invited to take part in either the real-life experience or the virtual experiences. One of the main necessities of the study is to measure to what extent the cognitive and emotional response is comparable from the real-life experience to the variety of virtual experiences. So, the idea is to have three

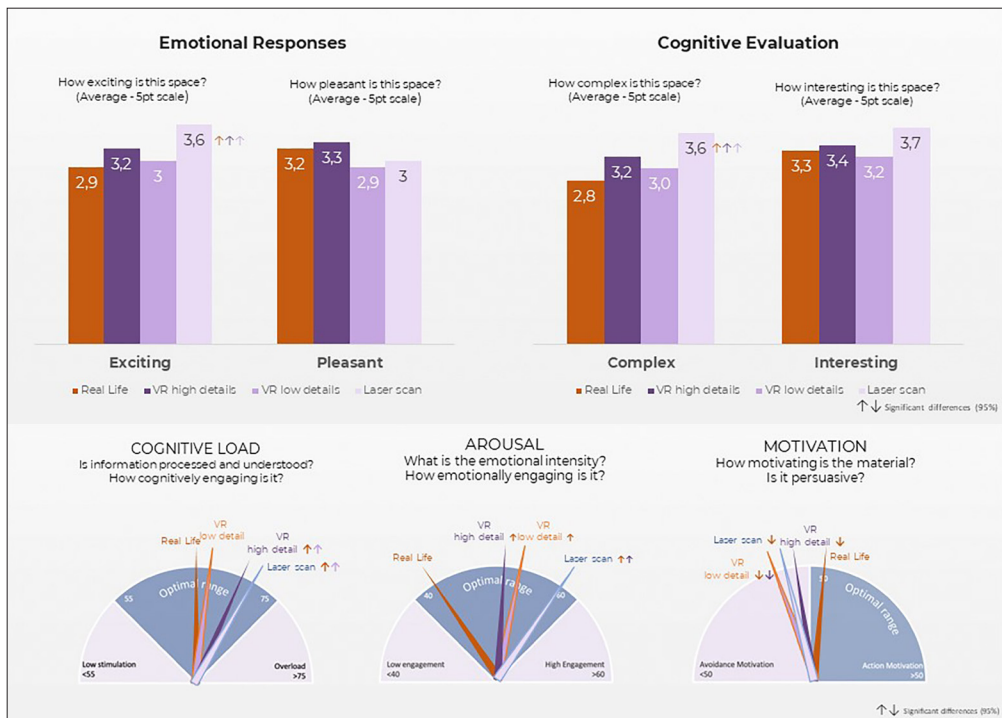


Figure 5. (top) VR setting (except the laser scanning) elicit a similar experience to real life. (bottom) Cognitive load, Arousal, and Motivation throughout the whole experience of the four types of architectural atmosphere in real life, VR high detail, VR low detail, and laser scan. Source: The author.

different main architectural experiences on the walkthrough. We began the study by entering an auditorium with an everyday atmosphere and standard electrical lighting. The test persons then continued through a storage area with more confined proportions and less lighting, and eventually arriving in a auditorium similar to the first one, but this time with different lighting conditions, coming from a few very warm yellow coloured bulbs. During the walkthrough there were small tasks to perform in the different locations, in order to present uniform stimuli to measure the emotional and cognitive impact. These included simple counting of windows or cups in the room, a short reading exercise in each room, and an aesthetic contemplative task commenting on a large painting in the two auditoriums. This was to broaden the spectrum of neuro-stimuli to be successively analysed. During the experience, some questions were also asked to the participant to get stated preferences and feelings. Finally, the participant walked through a post survey to capture additional answers to the experiences. The results from the study are still subject to our analysis, but we can already see that both VR settings high and low detail elicit similar experience to real life, while the laser scanned VR model does not (Figure 5 top). The laser scan is capturing everything with no discrepancy or hierarchy of architectural importance. And at the same time the model appears crude and with strange geometry and holes where the laser could not reach exactly.

This combination of crudeness and capturing many details, but perhaps the wrong and too many details, can be part of an answer to why the laser scan is the least similar to the real-life situation.

These results are already providing insights into whether people have similar emotional responses in the real experience compared to the virtual experiences. We can measure if people have similar cognitive responses in the real experience compared to the virtual, and also how the quality and level of detail of the virtual experience have an impact on these responses. From the preliminary analysis of the findings, it is also possible to see that, in general, real life performs better than all the VR setting on neurometrics (Figure 5 bottom). The potential of cognitive overload is highest in the laser scan model, while the motivation, the persuasiveness of the different tasks and the overall experience are lowest in the low detail and the laser scan model. As this is a general picture, we will of course dive into further analysis of the different tasks that shows a more detailed perspectives when looking at the difference between i.e., reading a text and contemplating a piece of art.

Finally, the collected data of statements from people experiencing the real experience compared to the virtual experience assists in analysing how they perform similar tasks in the different experiences, and these differences affect the performance. In this recently concluded study we have collected a lot of data, that will need to be put into context. I am looking forward to the further dissemination of the findings in future publications.

CONCLUSION AND DISCUSSION

This essay has hopefully been able to provide a sufficient frame of reference for a discussion about the applied use of virtual media as a media for architectural design and transformation. The implications of using a methodology that aims mainly at the human visual perception has been attempted seen in the light of neurological perspectives of how the brain generates models of the world based on stimuli and previous experiences. This is by no means an easy discussion, and I am not trying to oversimplify the complex and multidisciplinary use of representational models in architecture. This should rather be seen as an attempt to critically embrace the newest technology and cognitive insights to expand the potential of architectural representation. The representations of architecture are manifold in each architectural case. It might be relevant to pose the question of what kind of representation, or combination of representations, might convey the idea of the project in the best way. Obviously, architectural projects today are represented through a combination of media ranging from plan, section and façade drawings to physical models, digital renderings & models, and written textual descriptions or specifications. All of these are valid forms of representation with their own limitations and in their own respect. Let us embrace the implications of new media, such as virtual reality, and the possibilities that can be derived from studying and applying these techniques being aware that any form of representation is to some extent a reduction of the actual project.

I do not believe that new technology, and in this context the VSR's virtual logging mechanism, can stand alone as a meaningful representation of architecture. But I simply suggest that architectural projects should also actively investigate the possibilities of any new technology, and pay attention to the development of cognitive neuroscience, to implement all these new findings about perception into the work with architecture and the phenomenology of shaping our houses, cities, and landscapes. Every technology, from producing cardboard models to simulating the potential use of a building in virtual reality, should be applied where it is working, and not as a general principle that

cannot be deviated from. By wanting (and having) this discussion, I hope, in addition to avoiding the oversimplification of the subject with a tendentious debate of simply 'digital versus analogue', to be able to discern the complexity of different (digital) working methods. These digital working methods and tools are now so numerous that they need and should be differentiated correctly. A way of doing so, could very well entail the application of neurology and the understanding of how the human mind works when perceiving the world that surrounds, and penetrates us. A digital 3d 'virtual' model seen on a computer screen is not the same as a virtual reality model experienced in a head mounted display. As is a drawing not the same as a model, and a text is not the same as a photo. And none of the above mentioned is equal to the actual real transformed building or created architecture. But it can potentially all sustain the feeling or atmosphere of the right architectural quality, if applied correctly.

I believe that awareness of what technology can do, and where this specific virtual technology can do its best, is key to improving the significance and quality of using architectural representation as a working method within both design and transformation of architecture. So let us repeal the old-fashioned debate of the analogue versus the digital and include all means of architectural representation in our attempt to better understand how we can create architecture that works.

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REFLECTING SOCIETAL DISCOURSE ON UNDERGROUND STATION TRANSFORMATIONS

Annika Tuominen

ABSTRACT

This study examines the interaction between transformations of underground stations and public discussion of mass transportation. The aim is to reach an understanding of the contextual conditions affecting the transformation of public transportation environments by assuming that common phenomena may have underlain transformations in both the discourse and the station facilities. The research questions are:

1. What are the phases of transformation of the station configuration?
2. Do these phases align with contemporary societal discourse?

The station transformations were examined through a case study of *14th Street–6th Avenue* station complex of the New York City Subway, with special attention paid to how the transformations affected user experience. themes.

This study found that successive transformations created increasingly complex station configurations. During the first four decades of the twentieth century, transformations occurred when new transit lines opened. The last phase of transformation occurred in the late 1970s, when a free transfer corridor between stations was added, further increasing the complexity and volume of the circulation.

This study contributes to the study of transportation facilities by contextualizing the transformation of underground station architecture. Understanding contemporaneous realities as instrumental forces in the formation of transit facilities enables informed assessments of future phases of transformation

KEYWORDS

Mass transit, urban underground space, user experience, societal discourse

INTRODUCTION

Metro stations are spatially complex. The complexities stem from, for example, the tracks dividing the station, which block certain pedestrian paths; the stations' subterranean location, which precludes both outward views and entrances from the same level; and the progression of levels downwards, rather than upwards, which upends the logical spatial arrangement.

These spatial characteristics define the configuration, and hence the user experience, of metro stations. Furthermore, this configuration is bound to be redefined over time. Transportation infrastructure is rarely built all at once, but is rather compiled over time, always answering to a contemporary need regarding connectivity, transit service, or use.

Knowledge of the qualitative factors of public transportation infrastructure and service is becoming continuously more valuable. As we face climate disaster, solving the transportation arrangements of the growing cities sustainably is of the utmost importance. Simultaneously, the global urban population is expected to go on growing; hence, although new infrastructure may be built, the existing and aging transportation networks will be challenged to accommodate more passengers more efficiently, while also having to meet the needs of an aging and more diverse public. In addition to being offered sustainable transit solutions, the public must be motivated to use them. Thus, improvements to the comfort and convenience of the service ought to be viewed as basic features, rather than secondary goals. To assist a successful transition towards more sustainable and efficient transportation environments, it might be helpful to understand the contextual conditions that have shaped the environments hitherto. Learning from the past could bring advisable operational models back to light as well as prevent repeating mistakes.

This article aims to reflect on transformations in station configuration and their relation to discussion of the time, to which they may have been responding. The research questions were: *RQ1 What are the phases of transformation in the station configuration?* and *RQ2 Do these phases align with contemporary societal discourse?* The purpose is not to assume a direct causal relationship between the two, but to explore the underlying phenomena, which are likely to have affected both. The questions are approached as a case study. In the core part of the article, the formation and transformation of the circulation patterns are identified qualitatively through floor-plan annotations based on the applicable archival material found.¹ The study of the circulation pattern change is then

complemented with a systematic review of coeval media content to identify topics of societal discourse at the time. The results aim to examine the dialogue between transformational phases in the infrastructure and the discourse related to the transportation network. The research questions were defined so as to touch on the following key contexts:

- **HOW.** How did infrastructure come to be the way it is today? The public critique of the transportation system suggests that the arrangements are problematic in terms of accessibility and maintenance, but surely there's a reason that the formation is as it is.
- **WHY.** Which societal phenomena have impacted the development of the system? What kind of correlations exist between the past transformations, coeval discourse, and the general economic and political realities?
- **NEXT.** What kind of patterns dictate the formation and re-formation of the urban underground space? A coherent understanding of subway phasing enables informed evaluation of future developments in their societal context.

Case Study: New York City Subway Network

The NYC Subway is the most expansive metro system in the United States with nearly five hundred stations and 1,757 billion passengers annually.² But the system is subject to a large maintenance backlog, which has inspired actors, such as the Center for Independence of the Disabled in New York, the Transit Center, New York City Comptroller Scott Stringer, and President Barack Obama, to call for a fairer, better mass-transit system.³ The Metropolitan Transportation Authority has answered the critique with the *Fast Forward* capital plan program. Along with acquiring more capacity and improving reliability, the goal of the Fast Forward Plan is to improve the safety, accessibility, and general customer experience of the transportation facilities.⁴ As the critical voices in the public discussion are urging the retrofitting of stations to meet contemporary standards, this article takes an interest in the driving forces, which shaped the case study station the way it is.

BRIEF HISTORY OF THE NETWORK

At the turn of the nineteenth and twentieth centuries, the public transportation of New York City was achieved by means of elevated train lines and surface rails. These systems served the dense business districts of lower Manhattan and downtown Brooklyn. At this early stage of development, the transit lines ran mostly north–south, and large parts of Manhattan and its

outer boroughs were left outside the domain of mass transit. Due to the overwhelming denseness of certain areas of Manhattan and the semi-rural and underdeveloped nature of the outer boroughs, City officials and politicians proclaimed an intention to relieve overcrowding in certain areas. A mass transit system already existed in the form of surface and elevated rail links, so decentralization was to be achieved through further expansion and modernization of the infrastructure.⁵

The elevated lines had been built and operated by private transit companies, and the first stages of the Subway were built with similar arrangements. The first parts of the New York City Subway officially opened in 1904, built by the Interborough Rapid Transit Company (IRT).⁶ A competing line, built by the Brooklyn Rapid Transit Company (BRT) followed in 1908. These two companies competed for the customer base until 1913, when the Dual Contracts were signed between the two companies and the City of New York;⁷ the contract divided a larger transit plan of Manhattan and Brooklyn into segments which were leased to the companies.⁸ Although the running of the Subway was financed through fare collection, the City provided funding for the construction of the transit lines.⁹ As established in the Dual Contracts, the City would be allowed to 'recapture' the system after the private operators broke even.¹⁰ Another ramification of the Dual Contracts was the service providers' commitment to the 5-cent upper limit on fares.

The New York City Subway expanded rapidly under the Dual Contracts during the first decades of the twentieth century; however, the privately owned transportation service resulted in similar transportation lines overlapping in the densely populated areas of Manhattan, whereas in the less populated outer boroughs, where the immediate revenue was less, the public was underserved.¹¹ Furthermore, due to the competing lines, there were infrastructural incompatibilities in terms of non-interchangeability of equipment and an absence of easy-to-use pedestrian connections between the stations.¹²

In 1918, John F. Hylan was elected as the Mayor of New York; he aimed to unify the Subway under the public sector. In an effort to provide City-owned public transportation infrastructure, a third, City-owned, transportation company was founded.¹³ Its first line was opened in 1925. Like BRT and IRT, the Independent Subway System (IND) served the densely populated areas in Manhattan via stations located close to its competitors.¹⁴

Throughout the existence of the Dual Contracts, the agreed 5-cent fare was eroded by inflation, which weakened the resources available to the transportation companies. In trying to make their service profitable, the maintenance of facilities and workers' rights were neglected.¹⁵ Furthermore, the effect of inflation on the fare value prevented the companies from sharing profits with the City, which had been agreed in the Dual Contracts.¹⁶

From 1929 the Great Depression reduced public revenue, and the City failed to provide the funds necessary to complete the planned Subway network. The paucity of Subway finances was mitigated by federal New Deal funding, and this set a precedent for more federal and state funding to improve and expand the system.¹⁷ Reintroduced and revised in 1932, the expansion plans were still hampered by insufficient finances and were ultimately abandoned during the war years.¹⁸ This marked the end of the Subway's heyday of expansion.

In 1940 the finances of the Brooklyn–Manhattan Transit Corporation (BMT, the successor of BRT) and IRT had become so weak that the City was able to buy both companies. Thus the unification of the subway system, envisaged by Mayor Hylan in 1918, was finally achieved. However, due to the incompatible infrastructure and facilities, synergy was and remains lacking.¹⁹

After the war, the City's finances were in dire straits, and it followed the precedent of supplementing the Subway's funding externally. The money was borrowed, but this proved problematic, for the State constitution set limits for the acceptable amount of debt.

Considerable debt had already been accumulated during the Great Depression, not only in monetary terms but also in the form of the maintenance backlog. Paradoxically, the post-war economic boom meant further strain on the City finances, as the swelling population of New York demanded new investments in housing and public transfer.²⁰

By the late 1940s, the Subway fare was finally doubled to 10 cents. This was not enough to cover all the costs since Subway usage was declining while the maintenance backlog kept on rising.²¹ At this point, the oldest parts of the network had been in continuous use for almost fifty years, and much backlog dated from the earlier BMT and IRT era. In 1951, the Citizens' Budget Committee estimated that the immediate repair needs totalled \$63 million, whereas more than half

a billion dollars was needed for long-term investment.²² Rapid expansion was no longer possible: the funds were needed for maintenance and modernization.

During the 1960s, there were half-hearted attempts to repair the system, but the City finances were still insufficient for a thorough overhaul. During this period, the authority over the Subway was transferred from the City of New York to the state-controlled Metropolitan Transportation Authority. By the 1970s, the problems had escalated to the point of genuine crisis.²³ The crisis inspired civic actors to demand a fairer and better transit—in the 1980s, among the protesters was the young Barack Obama.

METHODS

This article examines the dialogue between station configuration transformations and changes in public discourse through the real-life framework of the New York City Subway network.

Case study framework was employed in two scopes: the wider scope involves the New York City Subway network as a whole; the tighter scope narrows it down to a specifically chosen station complex within the network. The analysis of the chosen station was informed by a historical review of the entire network. Finding definitive answers to certain design and construction decisions is next to impossible, and that is not the purpose of this article. This study merely tests out a methodological route to explore the cultural and historical context of the choices that have shaped the transportation environment.

The study is threefold; firstly, the formation and transformation of one case station complex are studied to answer *RQ1: What are the phases of transformation in the station configuration?* Secondly, the coeval societal discourse is examined through analysis of news media articles concerning the Subway in relation to its transformations. The media analysis answers *RQ2: Do these phases (of configuration transformation) align with contemporary societal discourse?* Thirdly, conclusions are drawn about the nature of the interaction between configuration transforms and the shifts in societal discourse.

Case Study

It is the author's view, that a study disclosing the relationship between public discourse and underground station transformations cannot be detached from real-world context. The true intrigue of the subject lies in the richness of the case study, rather than in any generalizable theory that may be

deduced from it. This study aimed to tell a story to illuminate the wide range of complexities that shape public infrastructure. Flyvberg characterizes this kind of research approach as ‘the case story is itself the result.’²⁴ The chosen approach was informed especially by the scarcity of peer-reviewed knowledge on the characteristics of underground stations. This study aims to be a paradigmatic case, in that it offers an allegory for the subject the case involves.²⁵ In order, firstly, to identify transformations that may take place in an underground station and, secondly, to detect public views on public transportation environments, examples have to be presented.

In designing the research structure, a choice was made to explore a strictly framed subject in detail, rather than treating the subject of underground station transformations on a more general level through a wide selection of case examples. This choice enabled more laborious methods and in-depth analysis to be employed, which produced richer results. Dissecting one case thoroughly was thought beneficial in exploring *de facto* transformations, rather than imposing views affected by preconceptions. To defend the chosen research design, careful consideration was given to the choosing of the case network and station.

Choosing the Subject

Due to the zoomed-in, detail-oriented case research design, this study employed *information-oriented selection* in sampling, to ensure that the single case would present a wide range of phenomena.²⁶ The New York City Subway network was found ideal for this study because of its prominence and a history of over a century which entails multiple transformational periods. Therefore, it offers vast and varied material in terms of both constructional phases and coeval media coverage, making its evolution well documented in contemporaneous sources. Furthermore, the network is subject to impending transformations, which are hoped to answer twenty-first-century needs; however, the rejuvenation has proved somewhat controversial.

The study was conducted in the context of a particular station complex,²⁷ which includes the interconnected *14th Street–6th Avenue* and *14th Street–7th Avenue* station facilities. This particular station was chosen as a study subject as it is one of the largest junctions in the network, measured by the number of intersecting lines. In terms of underground station configurations, the increasing number of intersecting lines resulted in increasingly complex spatial arrangements. These link facilities on 7th Avenue and 6th Avenue via an underground tunnel, to make one of the most multi-faced junctions in the

system. It is also one of the Metropolitan Transportation Authority's priority stations, earmarked for fast-tracked improvements in the Fast Forward capital planning program.²⁸ *In situ* observations revealed it to be particularly liable to cause problems in terms of usability.

Each of its transformational phases has been carried out under a different service provider, suggesting that the station complex comprises a range of different solutions. The station complex consists of the oldest element, the PATH station, built in 1908;²⁹ the second-oldest, the 7th Avenue–Broadway Line station, dating from 1918;³⁰ the Canarsie Line station, opened in 1924;³¹ and the 6th Avenue Line station that opened in 1940.³² It is noteworthy, however, that the PATH station is not part of the Subway system by definition. As opposed to the other stations in the complex, it is a part of the commuter rail system (Port Authority Trans-Hudson). The newest part of the complex, the underground tunnel connecting the 6th Avenue and 7th Avenue stations, was opened in 1978.³³ The station complex is served by F, M, L, 1, 2, and 3 Trains.

Examination of the Station Transformations

To answer RQ1: *What are the phases of transformation in the station configuration?* the station configuration was analysed qualitatively through *floor plan annotations* on each construction phase.³⁴ Floor plan annotations were made in order to review the station from a user perspective, with special attention to circulation formation. The overall complexity of the station hub was evaluated, taking into account both horizontal and vertical distances. The analysis aimed to shed light on how, why, and when the configuration was initially formed and later transformed.

The primary sources used were archival drawings, collected at the MTA Micro-Film Room, cross-reviewed and complemented with on-site observations. Certain parts of the station complex were insufficiently covered by the archival retrievals; in such instances, the material was complemented with the open geodata of OpenStreetMap.³⁵ The material did not definitively establish the different phases of the architectural transformations; therefore, the transformational phases presented later in this study are assumed, based on the archival retrievals, professional estimations based on structural systems, and on-site observations.

Examination of Contemporaneous Media Content

In the building analysis part of this study, careful attention was paid to the

user experience; the logical counterpart of this building analysis, therefore, was discourse analysis from a user perspective. In exploring the contextual conditions of underground station transformations, the media angle was adopted as the perspective of choice for examining the public view, rather than an insider viewpoint. Since the Subway has been in the public eye throughout its existence, the local news media had documented its expansion as well as the public's thoughts on it. The media analysis aimed to find out how the infrastructure was viewed and how the transformations were received. In addition to giving a voice to the users throughout the history of the Subway, the media review gives us a more detailed understanding of the socio-economic context of the construction and the political decision-making. Furthermore, it is also an interesting subject in itself. Public infrastructure does not develop in a cultural vacuum: trains, in particular, are rich in symbolism and feature prominently in twentieth-century art; for example, *Wikipedia* recognizes the genre of 'train songs' and lists almost nine hundred examples.³⁶ The underground rail network provides the milieu for many novels and films set in New York City; often Subway stations and trains become almost synonymous with the metropolis, serving as the symbolic veins of a giant city, its livelihood, and its decadence.

The transformation of transportation-related societal discourse was studied by systematically reviewing local newspaper articles. Typical themes of critique and debate were charted, and current trends were identified by material-driven *thematic coding*.³⁷ Of each article, one major theme was identified; secondary themes were charted as well. After gathering the data, the thematic variations in the sample sets were compared in relation to each other, and trends were identified. The qualities of the data were then reviewed as to how they related to the infrastructure and case station. The media content was also placed into wider economic and societal contexts, the most important of which are the Great Depression, New Deal policies, World War II, and the post-war economic boom.

Choosing the Articles

The material used to examine the societal discourse consisted of archival articles from *The New York Times*. This database of material was chosen because the newspaper has existed throughout the transformational period of the infrastructure in question; furthermore, *The New York Times* is the local newspaper of the station and infrastructural network in question, and as such has organically reported the construction of the network and the discussion regarding it.

The articles were accessed through *The New York Times* TimesMachine online archive. To narrow down the number of articles reviewed, only articles published within a calendar year of each architectural transformation were analysed. The search words used were 'Subway' and the name of the train line being built. The following exceptions took place in choosing the search words. In the case of the PATH station, 1908, the search words did not include 'Subway,' since the station is not part of the Subway system. Instead 'Hudson Manhattan Railroad' was searched. In gathering material on the transformation carried out in 1924, the overwhelming number of search hits was reduced by including the name of the station among the search words. In the case of the 1978 transformation, no additional line was built; therefore the search word used was the name of the street, which is, consequently, also the name of the station.

Building Analysis

This subsection discusses the effects of each building phase on user experience, and consequently will shed light on how the spatial arrangements came to be as they are today. The phases will be described chronologically.

Phase 1 – The Opening of the PATH Station (1908)

The PATH station is the first formation of the station complex. As such, it is

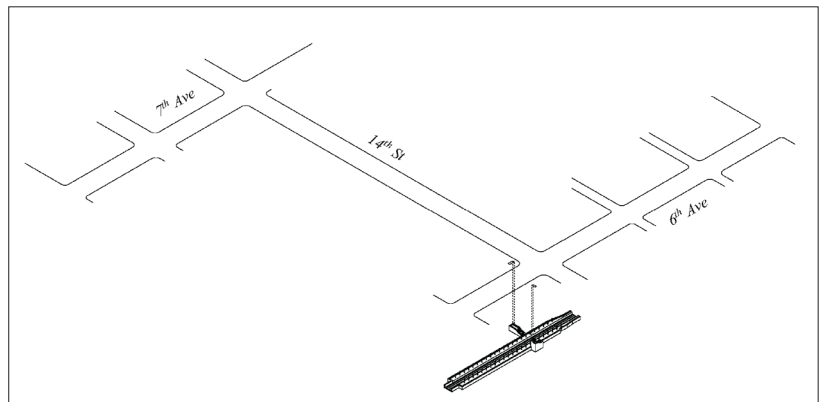


Figure 1. Phase 1 of the Formation. Drawings by the author.

fairly simple in configuration. The station is divided in two by the crossing tracks, and, since there is no connection between the two parts, the pedestrian circulation is also divided in two. Since there is no separate mezzanine space, nor any additional levels, the path remains straightforward, and the vertical distance minimal. The circulation pattern is simple, but, because of the station's dual nature, one entrance fails to provide access to multiple destinations.

Phase 2 – The Opening of the 7th Avenue Line (1918)

Originally built and run by the Interborough Rapid Transit Company, the 7th Avenue Line station is the first element of the Subway hub. While not a part of the very first generation of subway infrastructure of New York City, it is nonetheless one of the earliest. The configuration is typical of the New York City Subway system. The station is accessed through a mezzanine level, which is divided into three mezzanines making the circulation triform from the mezzanine upwards. The vertical distance to be covered is longer than that in the PATH station. However, the mezzanine level enables all destinations to be accessible via each station entrance, which is not the case in the PATH station. It is noteworthy, however, that when exiting the platforms, a correct staircase must be chosen to reach the station exit of one's choice. In this building phase, the PATH station and the 7th Avenue Line station remain detached.

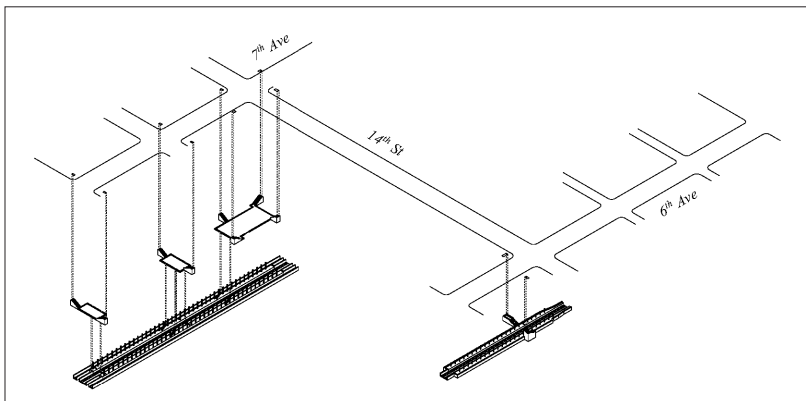


Figure 2. Phase 2 of the Transformation. Drawings by the author.

Phase 3 – The Opening of the Canarsie Line Station (1924)

The Canarsie Line station is the deepest part of what later became the station complex. Therefore, the vertical distance plays a role in the complexity of the pedestrian paths. In this transformational phase, the station is accessed through an intervening mezzanine level.

Further down, between the mezzanine and the platforms, there is a landing. In other words, there are two levels between the street and the platform. This adds vertical stages to the circulation, but the circulation remains fairly simple, since the path does not branch. The Canarsie Line station was operated by Brooklyn–Manhattan Transit Corporation, and therefore, remained detached from the 7th Avenue Line and the PATH stations.

Phase 4 – The Opening of the 6th Avenue Line Station (1940)

In this phase, the Canarsie Line station and the PATH station are linked and incorporated into a new station: the 6th Avenue Line station. The station had been in the making for nearly a decade, and by the time it was finished,

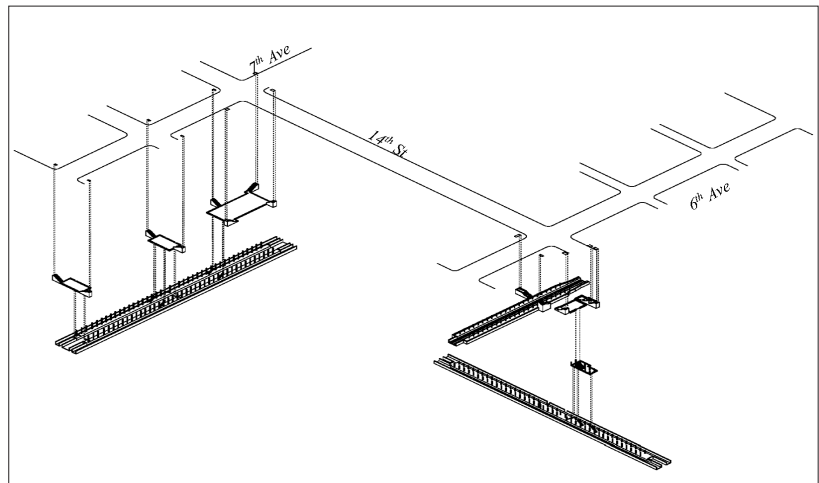


Figure 3. Phase 3 of the Transformation. Drawings by the author.

the Subway system had been unified under public ownership. In addition to subway stops, the new station layout introduced an underground pedestrian transfer point between the lines that had been previously operated by separate transportation providers.

The uppermost level is the newly-built mezzanine of the 6th Avenue Line station. Half a level below lies the PATH platform level, with the 6th Avenue Line platforms another half-level deeper. A full-level deeper one finds the Canarsie Line tracks and their platform. The 6th Avenue Line tracks run parallel to 6th Avenue on the surface, as do the PATH tracks. Canarsie Line runs parallel to 14th Street.

The 6th Avenue Line station and the PATH station therefore partially occupy the same vertical space, with the PATH line dividing the 6th Avenue Line station into two units, making the station circulation dual. This prevents intuitive access from one entrance to all destinations. However, both the 6th Avenue Line platforms are connected to the Canarsie Line below through a staircase.

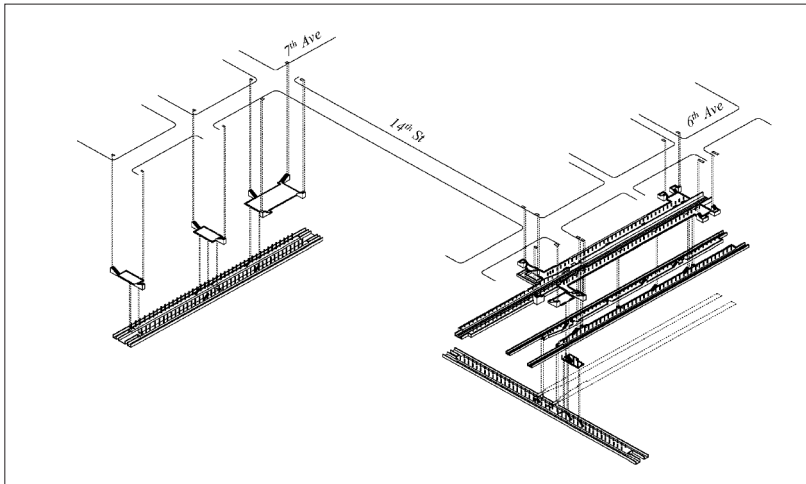


Figure 4. Phase 4 of the Transformation. Drawings by the author.

This introduces a subterranean passage, making a street detour unnecessary in most cases. However, not all platforms are connected to others via the corridor system. Furthermore, the corridors between the Canarsie Line and the 6th Avenue Line are bottlenecked and difficult to find, due to their location at the end of narrow side platforms.

Phase 5 – The Addition of the Connector between 6th and 7th Avenue Stations (1978)

The connector between the 6th and 7th Avenue station hubs is the latest addition to the station complex. In this building phase, the hubs one block apart are connected via an underground tunnel, adding yet another transfer point between hitherto separate Subway stations. The backlog crisis had become obvious at this point, and the retrofits were an attempt to improve the customer experience. The corridor is more spacious and ornamented than its 1940s predecessors. However, it is long and includes several turns to left and right, as well as steep ramps that make up for the difference in level between the interconnected stations.

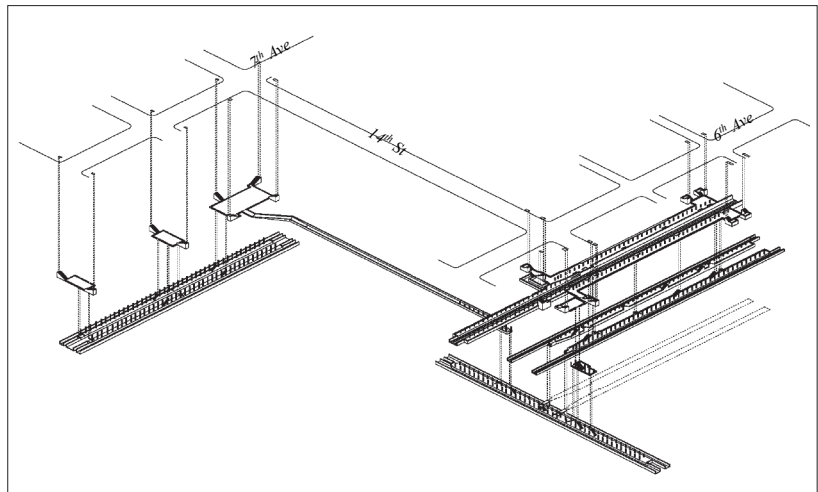


Figure 5. Phase 5 of the Transformation. Drawings by the author.

Media Analysis

This subsection analyses the media coverage of the New York City Subway during the years of expansion of the station complex. Each sample set was categorized by thematic coding as follows.

Categorizing the Sample Set

Phase 1 – 1908 (Sample Set of 46 Articles)

In the sample set representing 1908, the thematic distribution appears to be fairly evenly spread, with no evident peaks in interest. Financing constituted 15 per cent of the sample set; half of these articles reported on the planning and proceedings of the Hudson & Manhattan Railroad's bond funding, the other half dealing with financial notes and the deficit caused by the fare rate.

Reports of the opening of the Hudson & Manhattan train line and its proposed extensions comprised another 15 per cent of the articles. Most praised the faster commute thus enabled, and three out of seven articles featured the novelty of building an underground and underwater tunnel connecting Manhattan and New Jersey.

Reports featuring mostly other railway companies accounted for 13 per cent of the hits. These articles covered the building and expansion of the transit network, which comprised various transit lines owned by different private companies. For the purposes of this article, they are mainly of interest as examples of the general *zeitgeist*.

Coverage of the urban development of Manhattan and its surroundings comprised 9 per cent of the sample set. Half of these articles discussed the development of the real-estate market in these areas and the possibilities brought by the faster commute. Reports of communications between City officials and the transportation companies composed 8 per cent of the sample set. These reports suggest that the relationship between the service providers and the City of New York was tense from the beginning and would remain so. For example, pleading that their commerce was interstate rather than municipal, the Hudson & Manhattan Railroad refused the orders of the Public Service Commission to share financial and technical information on their operation. Other service providers operating in New York City shared records of stock holdings, accidents, and other technical data with City officials, but H&M was unwilling to do so.

The public's demands for better transit systems made up 7 per cent of the sample set. Another 7 per cent covered safety; the safety coverage can be divided into reports of crime and accidents. Yet another 7 per cent represented reporting of the progress of construction; the novelty of the enterprise was the interest of these articles as well. Reports on infrastructure planning, such as feasibility studies and political processes, constituted 4 per cent of the articles.

Phase 2 – 1918 (Sample Set of 36 Articles)

In the 1918 sample set, the prevalent theme was 'the opening of a new line.' More than one-third of the articles reported on the inauguration of a new transit line. Most such articles were reportages of the inauguration-day festivities or descriptions of the operation of the newly opened stations. They also included instructions on using the new facilities and new transportation lines. The most common secondary themes of the opening coverage were wayfinding, crowding in the facilities, and the larger context of urban development.

The second most common primary topic was 'transportation hub,' which constituted 19 per cent of the articles in the sample set. These articles described the formation of Times Square as the primary connector of transportation.

The third common primary topic was Subway expansion in general; 11 per cent of the sample set consisted of articles describing expansion, finished or planned, or the expansion to outer boroughs. Expansion was also a common secondary theme, and articles on that topic made up one-third of the sample set. Expansion occurred as a primary topic in the context of reports on further expansion and finished expansion. As a secondary topic, 'expansion' occurred commonly with the themes of urban development and/or connection to outer boroughs (8/10), crowding (4/10), and the Dual System (4/10). The deficit experienced by the Dual System features as the primary subject in 8 per cent of the articles. These articles noted that most of the deficit was City burn, i.e. essentially subsidized with tax money.

Another 8 per cent dealt with delays in building the infrastructure; delay occurred as a secondary theme in 14 per cent of the articles. This topic was very much intertwined with that of war. War provided the subtext for a third

of the articles and was often referred to in the contexts of labour and material shortage, both of which contributed to the delays.

Design critique was the primary subject of 6 per cent of the articles. In another two articles, such critique was a secondary theme. The critique covered spatial configurations resulting from the vertical placement of train lines, and the geographical positioning of train lines in relation to the urban context.

Phase 3 – 1924 (Sample Set of 57 Articles)

In the sample set representing the discourse of 1924, no topic was distinctly prevalent. The descriptive statistical analysis indicated a wide and even distribution of multiple themes.

The most common of these was the delayed construction, making up 16 per cent of the sample set. These articles addressed the delayed construction of the Canarsie Line (also referred to as the 14th Street Eastern Line), which had been in the making for nearly a decade, and the Brooklyn Crosstown Line, which had been in the planning but construction had not begun yet. Seven out of nine articles reported a transit inquiry, which was held after Transit Commission filed charges against the Mayor; in addition to investigating the delay, the alleged malpractices covered in the inquiry included the lack of equipment in the Subway, the failure to ratify the building of shop facilities, and the encouragement of illegal bus operation.

Capital planning composed 14 per cent of the sample set. These articles touch on the topic of the 5-cent fare as one of the organizational hardships resulting in a deficit. Another major capital planning discussion considered the budgeting of tunnelling work under the Hudson River, and whether the tunnel, once finished, should serve not just passenger traffic but also freight, which would result in a significant cost increase.

The articles covering the public demand for hastened Subway constructions and more transit lines comprised 12 per cent of the sample set. As a primary topic, this category has some automatic overlap with the category of delayed constructions, since the delay in the construction of the Canarsie Line and the planning of the Crosstown Line were discussed in this context as well. However, the goals of the citizen forums were not limited to these lines only but extended to arguing for a better and more extensive transit network in general.

Articles covering safety represent 12 per cent of the sample set; these reported on wrecks and on crime taking place in the infrastructure. Three out of six articles covered the ramifications of a specific lethal wreck, which resulted in charges made against the members of the Transit Commission and in a public debate between various actors, such as the Mayor, the chairman of the BMT, and specialized engineers reporting on risk assessment.

Only 7 per cent of the 1924 sample set consisted of reports on the opening of new Subway lines. And 5 per cent of the articles covered the efforts to develop a more regional approach to transportation planning. These articles included reports on a transit conference organized at the invitation of the Committee on a Regional Plan of New York and Its Environs.

Another 5 per cent covered the routing of the Canarsie Line, which appeared to cause conflicting interests. The comparison between the Subway and the aging elevated train line infrastructure composed 5 per cent of the sample set. Here, 4 per cent dealt with congestion, and another 4 per cent described the formation of transportation hubs, one of them being 14th Street. Yet another 4 per cent covered urban development and the change of the cityscape.

Phase 4 – 1940 (Sample Set of 39 Articles)

The most prevalent primary topic in the sample set of 1940s public discourse articles was reports of a new line opened or to be opened; these articles constituted 31 per cent of the sample set. The most common secondary topic in this set was congestion relief, which occurred in five out of twelve articles with the primary topic of ‘new line opened.’ The new line was applauded for bringing new service and complementing the existing infrastructure by adding a new link, thus reducing crowding in the entire system.

One-fourth of the articles with the primary topic of ‘new line’ were reports from the inauguration ceremonies. One-fourth included instructions on how to use the newly finished facilities and transit lines. One-fourth included reflection on the knock-on effects of the new lines on property prices and urban development.

Urban development was the main concern of 18 per cent of the articles; four out of seven reported on the efforts to improve the cityscape and to develop appealing districts through better transit facilities and connections. Speculation and reports of an increase in real estate prices were reported accordingly.

Closing or demolition of the elevated lines was the primary focus of 13 per cent of the articles. These portrayed the demolitions as an inevitable consequence of the rearrangement and modernization of the metropolitan transit system. Such views were already present in earlier sample sets, and elevated lines were deemed obsolete technology with problematic ramifications for the quality of cityscape and housing.

Another 13 per cent of the articles dealt with the unification of the transit companies under one City-owned body. Two out of five considered the unification of the employee base, and a transit strike was speculated. The union aimed to unify the work agreements of all the employees, including the former employees of the elevated lines. The employees of the three former companies were accustomed to different benefits, and the union sought to standardize them.

Safety made up 10 per cent of the sample set. Two out of four articles discussed accidents taking place in the facilities; one reported a lethal wreck, and the other reported a fall in the number of vehicle accidents taking place in the infrastructure. One of the four articles reported false bomb alarms; these alarms had nothing to do with the war, however, but fell rather in the category of crime coverage. Another one touched on the subject of war in suggesting that the underground infrastructure might come useful as a bomb shelter as well as in everyday commuting.

Design critique accounted for 5 per cent of the sample set, although this was discussed only in the Letters to the Editor section of the newspaper. One of the two letters critiqued the layout of the Canal Street–Broadway station, whereas the other suggested more entrances to the 8th Avenue–155 Street station as well as a new shuttle connecting the Washington Heights Line (IND) and the Broadway Line (IRT).

Of the sample set, 5 per cent comprised user-rate coverage; the ridership of the transit network was reported, and comparisons between different modes of transportation were made.

Phase 5 – 1978 (Sample Set of 14 Articles)

In the sample set representing the public discourse of 1978, the thematic distribution was relatively even. This sample set was the smallest, making the finds anecdotal.

Among the most common primary themes was capital planning: 20 per cent of the sample set. All these articles described the accumulating maintenance backlog. One of the three articles featured a report addressed to the Mayor and other City officials, recommending that they spend three times as much as currently planned on improving the infrastructure facilities. The planners cited in the report urged investments in maintenance and retrofits that would improve the customer experience, stressing that technical modernization was not enough; the services must be easy, comfortable, and safe to use. Another capital planning report dealt with a political dispute over the allocation of the City's transportation funds; in this dispute, promises were made of taking money from a planned highway and diverting them to mass transit use.

Another 20 per cent of the articles dealt with opening new transfer points.

Another popular topic was maintenance: 13 per cent of the sample set. One of the articles featured a non-profit foundation raising money to improve their local station conditions.

Another 13 per cent was made up of articles covering safety in the infrastructure. These articles reported crimes and accidents taking place in the infrastructural facilities, presenting them as potential dangers to the safety of the Subway passengers.

Yet another 13 per cent consisted of articles reporting on the reopening of customer service points that had previously been closed to cut the costs, as the Metropolitan Transportation Authority was in a constant state of financial crisis.

Indeed, 13 per cent of the articles featured an approaching transit strike and the necessary preparations made to ensure fluent commuting for city-dwellers regardless.

SYNTHESIS OF REVIEWED MEDIA CONTENT

At the turn of the nineteenth and twentieth centuries, the railway was a prominent novel technology that caught the imagination of the public at large. The analysis of the public discourse conducted in this article suggests that this fascination continued in the first half of the twentieth century, with the underground railway network specifically viewed as a thrilling new techno-

logy. In the sample sets dating between 1908 and 1940, the topic of the expansion of the underground transit network is prevalent. Respectively, the demolition of the elevated train lines is viewed as an inevitable phase in transit development. This seems to fall in with the analysis by King,³⁸ suggesting that the first quarter of the twentieth century was the most prominent time for the formation and expansion of the network. The novelty value of the construction is especially evident in the sample set of 1908, in which the underground and underwater tunnel construction is reported at length in numerous articles. The technological achievements of the infrastructural expansion were praised also during the transformational phase of 1940. The execution of the demanding construction of the IND 6th Avenue Line is described repeatedly in media coverage during that time. Another subject of interest occurring regularly throughout the first four sample sets was the urban development resulting from the Subway expansion and the faster commute it enabled. This too would suggest, that the Subway was perceived as a tool for collective success and development. A common topic of interest was the effect on the real-estate market of the urban development resulting from the expanding network. Although King³⁹ argues that the Subway expansion did not at the time communicate with the urban development officials, it does seem that (in public discourse at least) the connection between mass transit and areal development was noted. The Subway expansion and its effects on urban growth were also viewed as an opportunity to improve the New York cityscape.

As King points out, the formation of the New York City Subway differs from that of most other transportation networks, because the system was built by private enterprises with relatively little guidance from the public sector.⁴⁰ Thematic analysis of the public discourse suggests that the relationship between the City and the transportation providers had been tense, from the very beginning, as can be seen in the first three sample sets, dating from 1908 to 1924. In the 1908 sample set, the decision by H&M company to withhold key information from City officials was reported. The analysis also indicated that the problems resulting from private ownership were recognized, at least to some degree, at the outset. In the 1918 sample set, the deficit the Dual System was continuously experiencing is described as a deadlock. In the same year, *The New York Times* published a detailed map of the transit lines in the Dual System to educate their readers on how to use the infrastructure. Written instructions on using the infrastructure and finding the most conven-

ient commute were published throughout the sample sets from 1918 to 1940, suggesting that the use was unintuitive and that the free transfer points offered were insufficient.

Although perceptions of the Subway appear to be positive in the first four sample sets, critique of the network did occur. The usability problems pointed out in the Letters to the Editor and in the reported professional assessments were concerned mainly with wayfinding. Public actors, such as the Women's Subway Committee of the Brooklyn Chamber of Commerce and the Midtown Merchants of the Fifth Avenue Association, were vocal in their demands for faster construction of a larger and less congested transportation system. Crowding of the facilities was reported in the media coverage throughout the first four decades of the twentieth century, and the expansion was viewed as a remediative measure.

The sample set representing 1978 differs significantly from the previous phases. In the first four sample sets the general perception of the Subway appears to be positive and enthusiastic, but the 1978 phase presents a transit system that has reached a state of more or less permanent crisis. Funds are lacking and the infrastructure has fallen into disrepair. Safety (or the lack of it) features as a primary topic more commonly than before, although this may be an artefact of the small sample size. Customer comfort and safety have become a major concern; in earlier samples, technical, economical, and political aspects were stressed.

Customer experience used to be a grace note present in news about congestion and in the instructions on how to use the new facilities. Now the specialists explicitly stress that technical flawlessness is but one aspect of a wider whole.

Perhaps this reflects a new, more down-to-earth view on public infrastructure. Underground transit has ceased to be a fascinating new technology that will improve the cityscape and the urban experience. Rather, the Subway has become an established part of the City, and the younger generations do not remember the time before the current station complex and its lines. Its usage has become commonplace, but this does not mean its users are blind to its problems. Quite on the contrary, the problems are obvious and feature prominently in the public discussion. Man, rather than the machine, has become the primary focus of news coverage. This is also reflected in the coverage of the transit strike.

In prior sample sets, new infrastructure, construction delays, and speculation on further expansion were major themes. In 1978, construction works are not much discussed. This is hardly surprising, as no major expansion was underway or coming. New pedestrian tunnels were opened, one of them in the station complex examined in this article. However, it is not discussed any more than other subjects, which mainly deal with more long-term developments such as funding or customer experience. This suggests that the new tunnel was seen as a relatively minor improvement by most.

The developments of the 1970s must be seen in the context of the general cynicism of the era. The post-war economy had enjoyed strong growth for nearly three decades, but came to a halt during the oil crisis of 1973. By 1975, the unemployment rate was higher than it had ever been since the end of the war. The late 1960s had seen a steep rise in crime rates, and events such as the Watergate scandal (1972) and the disastrous end of the Vietnam War (1975) further increased the American public's distrust of the government. The general picture is that of stasis: the problems had existed for some time and were likely to exist in the future. Many wished for improvements and demanded public intervention to that end, but few expected a sudden change. Curiosity and enthusiasm about the Subway had disappeared.

CONCLUSION

This study aimed to gather knowledge on the past transformations in underground station environments to give context to the current urgent transformation needs, highlighted by the climate crisis, urbanization, and accessibility needs of the client base. Due to the scarcity of prior, peer-reviewed studies on the transformation and qualitative factors of underground stations, case study framework was employed to introduce new ideas and test out a new methodological route. The research questions were arranged to uncover the multiphase and multifaceted story behind station transformations. Through *RQ1: What are the phases of transformation of the station configuration?* the concrete transformations in the station environment were disclosed. Through *RQ2: Do those phases align with contemporary societal discourse?* the concrete transformations were contextualized by reviewing the transformation taking place in the public discourse.

For the purposes of this study, five transformational phases were recognized in the station complex. The first four took place in the first four decades of the twentieth century, the most prominent era of Subway expansion. These

phases were more similar than dissimilar: new stations operated by different companies were added to the site creating scattered configurations. During the construction of the fourth phase, the Subway system was unified under public ownership, and three of the four stations on the site were amalgamated into one complex. During this four-decade Subway expansion peak, the media content consisted mainly of optimistic reports on the expansion of the network, and even the more critical voices mostly demanded faster and wider expansion, rather than improvements in the facilities. Crowding and safety hazards in the facilities were reported, but were not perceived even partly as the result of the labyrinthine spatial arrangement; rather, further expansion was offered as a remedy for congestion. Both the transformations in the facilities and the discourse took no account of the problematic spatial arrangements that resulted from the infrastructure being built in rivalry rather than co-operation. It can be said, that the transformations of the facilities answered the public demand throughout the four transformations, and so it can be concluded that the infrastructural transformation and the public discourse were aligned. This most likely suited the needs of the (then private) transportation providers; the larger the infrastructure network, the greater the revenue.

The fifth and last transformation phase did not include the construction of a new station but introduced a new underground passageway connecting the last separate station to the complex; it was one of three new free transfer points inaugurated within the Subway network. The need for such additional connectors derived from the incompatibility of the stations originally designed to facilitate privately operated transportation services. As result, transfer within the paid zone was enabled, but the station circulation was further scattered, and the access from one station to another was rendered long and complex. Concurrently, the public conversation concerning the Subway echoed the paradigm shift taking place in society at large. The general distrust of public actors affected the conversation about public transportation, and the focus of the discourse had shifted from collective success stories to the dissatisfaction of individuals. The maintenance backlog, accumulated over decades, was widely reported, but the funds for renovation were lacking. The addition of the transfer passages can be viewed as a response to the system's crisis, and transit officials at the time estimated usage of the passages to reach 15 million passengers per year.⁴¹ However, adding three transfer points was but a drop in the ocean of repairs needed. It can be argued that

the transformation of the facilities was aligned with public debate; however, it was lagging significantly behind the public discourse.

The public discourse of the last transformation phase presaged the public initiatives and protests of later decades while the transportation provider was, and still is, facing a repair backlog and financial deficit that has been accumulating since before unification of the Subway in 1940. The criticism the Subway faces today is essentially no different from that of the 1970s. The maintenance backlog is as prevalent as ever, and customer satisfaction and safety remain unsolved issues. One could argue that the shift from a collective perception to the individualistic one is still going on. Whereas the discourse of the early twentieth century revolved around collective efforts and regional accessibility, the twenty-first-century discussion takes more account of the accessibility and safety of the users. In this case study, much of the problematic dynamic between infrastructure development and the travelling public sprang from the originally private arrangement of an inner-city railway system, which is generally considered a natural monopoly. The private ownership and the Dual Contract agreement resulted in problems that were evident from the outset, but disastrous in the long run. The public discourse and the configuration transformations were best aligned when reciprocity benefited the service provider financially. Lost opportunities in the history of the station complex are the transformations dating to 1940 and 1978. Though they entailed attempts to unify the stations and offer new routes from one line to another, they spread and complicated the station circulation. Some offered routes must have been very narrow even by the standards of the time: for example the corridor system connecting the platforms of the Sixth Avenue Line. What the facilities are still lacking, is a wide-scale design intervention aiming to piece together the incoherent parts of the scattered, previously privately owned stations. The next opportunity to do so comes with the Fast Forward accessibility improvements. Embracing a universal design approach to retrofitting the station to meet standards of equitable use would resolve some century-long difficulties faced by all Subway users.

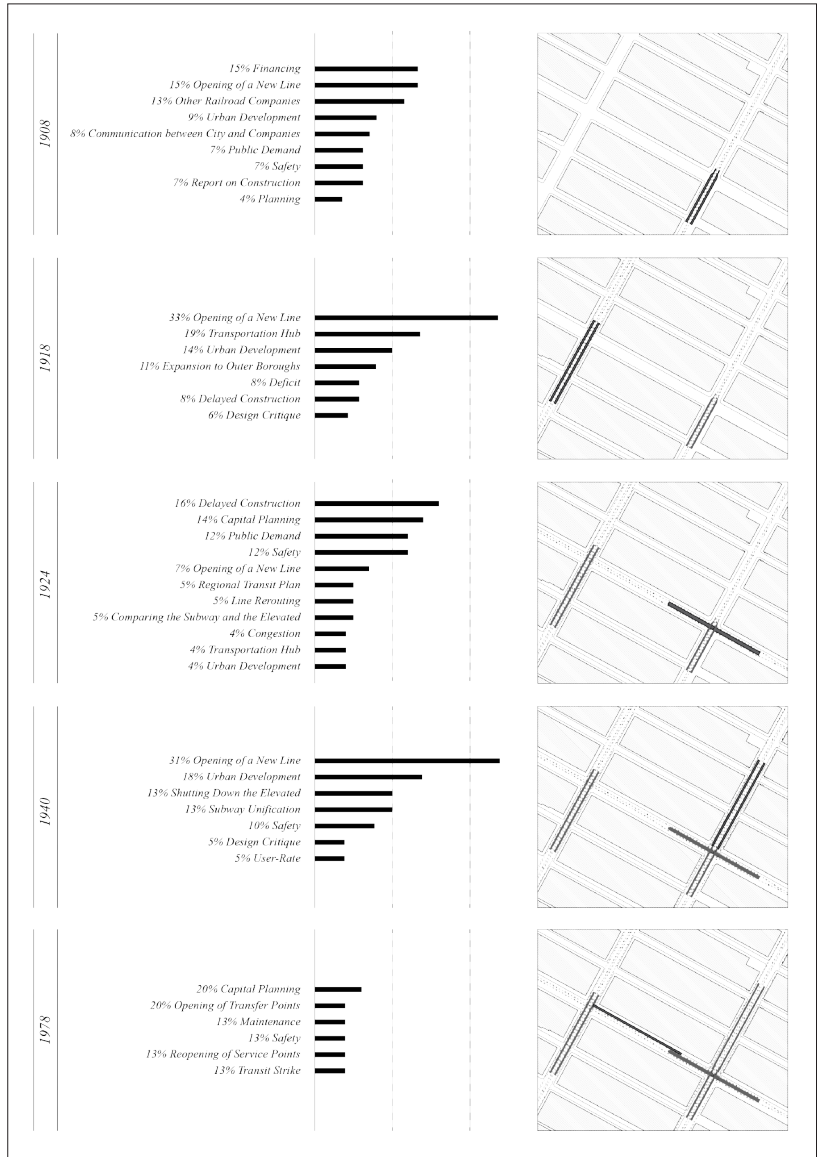


Figure 6. Thematic distribution of identified societal discourse on left; transformational phasing on the right. Figure by the author.

NOTES

¹ John Zeisel, *Inquiry by Design: Environment / Behavior / Neuroscience in Architecture, Interiors, Landscape, and Planning* (Cambridge and New York: Cambridge University Press, 1984).

² Metropolitan Transportation Authority, 'Facts and Figures: Subways', *Web.mta.info*, 2021.

³ Claire Tran, 'The Economic Toll of New York's Inaccessible Subway', *Bloomberg CityLab*, August 3, 2018.

⁴ Metropolitan Transportation Authority, 'Fast Forward', 2021.

⁵ David King, 'Developing Densely: Estimating the Effect of Subway Growth on New York City Land Uses', *Journal of Transport and Land Use* 4, no. 2 (2011), pp. 19–32 (referencing Hood 1995).

⁶ King, 'Developing Densely'.

⁷ Jonathan English, 'Derailed: The Postwar End of New York City Subway Expansion', *Journal of Urban History* 47, no. 4 (2019), pp. 832–48.

⁸ 'Public Service Commission Fixes July 15 for Opening of the New Seventh and Lexington Avenue Subway Lines', *The New York Times*, May 19, 1918, p. 32.

⁹ King, 'Developing Densely'.

¹⁰ English, 'Derailed'.

¹¹ King, 'Developing Densely'.

¹² English, 'Derailed'.

¹³ English assesses Mayor Hylan's initiative as somewhat flawed. If the intent was to centralize, why establish yet another company with no apparent connection to the existing organizational infrastructure?

¹⁴ English, 'Derailed'.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

²³ Ibid.

²⁴ Bent Flyvbjerg, 'Five Misunderstandings about Case-Study Research', *Qualitative Inquiry* 12, no. 2 (April 2006), pp. 219–45, <https://doi.org/10.1177/1077800405284363> (all URLs accessed in May 2023).

²⁵ Ibid.

²⁶ Ibid.

²⁷ Station, as used here, refers to a specific stop on a specific line; whereas a station complex may include multiple stops and multiple lines, accessible through the same facilities. As only one station complex is discussed here in detail, it will be 'the' station complex.

²⁹ 'Trolley Tunnel Open to New Jersey,' *The New York Times*, February 26, 1908, p. 1.

³⁰ 'New Subway Line to Open on Monday,' *The New York Times*, June 28, 1918, p. 22.

³¹ 'Celebrate Opening of Subway Link,' *The New York Times*, July 1, 1924, p. 23.

³² 'Sixth Ave. Subway Stands Rush Well,' *The New York Times*, December 17, 1940, p. 27.

³³ 'City Subways Add 3 Transfer Points,' *The New York Times*, January 16, 1978, p. 2.

³⁴ Zeisel, *Inquiry by Design*.

³⁵ 'OpenStreetMap', 2021.

³⁶ Wikipedia, 'List of train songs', https://en.wikipedia.org/wiki/List_of_train_songs.

³⁷ G. R. Gibbs, 'Thematic Coding and Categorizing', in *Analyzing Qualitative Data* (London: SAGE Publications, 2007), pp. 38–55.

³⁸ King, 'Developing Densely'.

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ 'City Subways Add 3 Transfer Points,' *The New York Times*.

TERRAIN VAGUE: A PROPOSAL FOR A LANDSCAPE LABORATORY IN THE CHARENTE ESTUARY

Francesco Cauda

ABSTRACT

Climate change is altering our landscapes at an unprecedented pace with consequences that are often unpredictable. Uncertainty is even greater when related to highly dynamic conditions, such as coastal and riverine landscapes that demand theoretical and operational tools able to embrace the shifting character of these territories.

The French term *terrain vague* [terē vag] is introduced as an interpretative aid to rethinking the ambiguous relationship between land (*terrain*) and water movements (in French *la vague*, or wave), a common meeting ground that accommodates fluidity, openness, and complexity. In this essay the *terrain vague* attitude will be expounded through a project that conceptually engages with the climate adaptation of the Charente estuary on the French west coast, an anthropized environment where most of the cultural landscape is in danger of permanent submersion.

The project suggests establishing a landscape laboratory in one of the river's meanders to study the impact of climatic variations on the local fauna and flora. This space will have to negotiate its boundaries with the rising water level, in a continuous process of transformation and interplay between natural fluctuations and man-made interventions. The water-based landscape acquires a generative role in the evolution and perception of the laboratory and becomes a place for observing and learning from the everyday landscape and its constant changes, in an educational process that invites the participation of experts as well as local communities and visitors.

KEYWORDS

Terrain vague, landscape laboratory, water, climate adaptation

PREFACE

The following essay is a further theoretical elaboration of the author's Master's thesis project titled 'Terrain Vague: An Evolving Landscape Legacy' carried out in the spring semester 2020 at the Aarhus School of Architecture. As such, the purpose of the project has not been method development in the context of climate adaptation, but an attempt to clearly formulate and illustrate the overall attitude used to understand and transform the case study under investigation and the reflections this approach has generated.

INTRODUCTION

In the night of 27–28 February 2010, the storm surge Xynthia hit the French Atlantic coast: due to a rare combination of high tides, violent westerly winds and low atmospheric pressure, flood defences along the shoreline failed to protect inner territories: more than 50,000 hectares of inhabited and

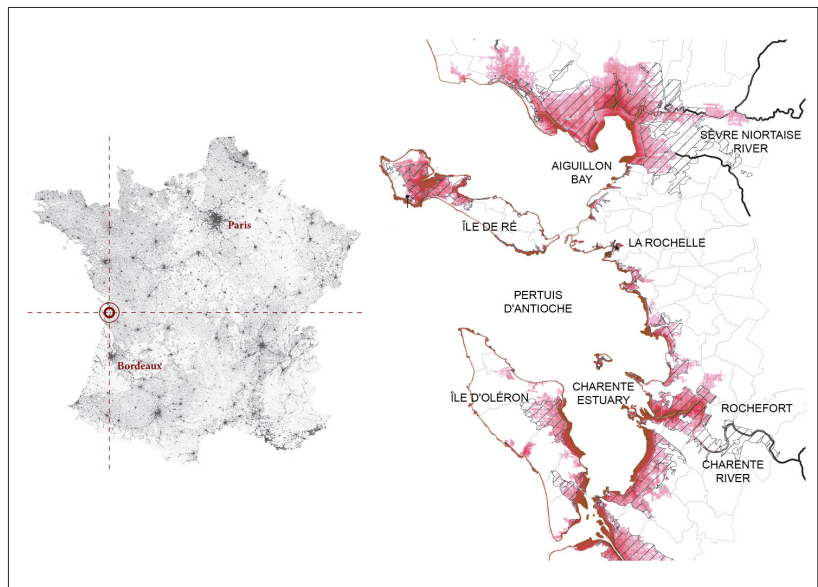


Figure 1. (Left) Geographical context and (right) flooded areas along the Atlantic Coast in 2010 due to storm Xynthia. (Property of the author.)

agricultural land, from the Gironde to the Loire estuaries, were flooded, and forty-seven people lost their lives.¹

As a response to this natural catastrophe, the government announced that ‘an exceptional plan to strengthen the dikes’ was under study.² Surprisingly, the careful survey conducted in the following months brought to light that coastal defences in 2010 were in a poor state of repair, and more than 50 per cent³ of dikes and levees in the Charente-Maritime Department needed to be rebuilt or greatly improved after the storm surge.⁴ Since then, new or restored flood defences have been installed in the most afflicted areas to protect the inhabited land from further damage. Some neighbourhoods built in flood-prone zones have been demolished, and residents forced to relocate elsewhere.

Due to the climatic crisis, extreme episodes such as Xynthia will become more and more frequent, with crucial uncertainties about the future of coastal and riverine environments. If we consider the latest IPCC report,⁵ it is highly probable that a 1.5°C warming will be exceeded in the years immediately after 2030, and it is virtually certain that the global warming threshold of 2°C will be exceeded during the twenty-first century. This warming will intensify the thawing of permafrost, and sea levels will continue to increase throughout the whole century, with a pessimistic scenario of a rise of at least one meter by the year 2100. Due to sea-level rise, extreme events that in the recent past occurred once every one hundred years (Xynthia, for instance) are expected to occur much more frequently by the end of the century. Furthermore, extreme precipitation will be more intense in many regions, even where average precipitation is expected to decrease. With global warming of 1.5°C, heavy rainfall and related floods are expected to intensify and occur more frequently in most of Africa, Asia, North America, and Europe. The image of flooded areas caused by storm Xynthia could therefore be seen as a sort of ‘postcard from the future’ of the Atlantic coast by the end of the century.

Even if thematic literature and projects have comprehensively developed sea-level rise adaptation strategies for coastal defences protecting densely urbanized territories,⁶ a lot remains to be explored about the future of marginal areas—i.e. sparsely populated regions with little agricultural and industrial value. Assuming that there might not be a strong economic convenience in defending land in marginalized areas, what would it mean—spatially as

well as culturally—to give more space to water? And how can we turn the urgent need to radically transform such areas into an opportunity to learn more about our environment?

This research project takes the devastating event of 2010 as an opportunity to imagine an alternative adaptation scenario for such territory: the new flood prevention policies having missed the chance to take into account natural fluctuations, widening a river's spaces and designating specific areas for temporary or permanent water storage.

Afforestation and restoration of natural hydrology in low-lying areas with carbon-rich soils are indeed considered one of the most effective strategies for reducing CO₂ emissions, and therefore limiting the rise in global temperature to 1.5 degrees centigrade.⁷ Through the new Green Deal, the European Commission is currently financing pioneering proposals with targets that include implementing forest ecosystems and rewetting drained peatlands currently under agricultural use in order to increase biodiversity and the stock of organic carbon.⁸

In the coming years, this urgent task of mitigating and adapting to climate change will put more and more pressure on the landscape. Overlapping ambitions on how to use the landscape have spatial consequences that are still largely unexplored yet highly topical. On a municipal level, for instance, these measures are often to be implemented in landscapes that hold other uses, with cultural and aesthetic aspects that shouldn't be ignored. These different desires often collide, with hard negotiations between local stakeholders and the government. From a landscape architectural standpoint, there is the need to find spaces in which to study the composition of innovative synergy effects, so that two or more types of land use can coexist and support each other. In this essay, the proposal to rewet part of the Charente river's floodplain while increasing afforestation aims to conceptually show how the European CO₂ reduction strategies could be spatially implemented on a test site.

From a theoretical perspective, this core of topics will be approached through the lens of *terrain vague*, a concept used by the author to understand and transform the project site with respect to its cultural and natural identity. Beside the existing literature and current debates around *the terrain vague* concept, a new layer of meaning will be proposed here to engage with the

transformation of highly dynamic sites such as coastal and riverine environments.

The first part is dedicated to the term *terrain vague*, its different meanings and possible implications in a landscape transformation project. In the second part, the focus will move to the estuarine environment of the Charente River, an area that since 2010 has acquired a critical role on the French political agenda. In the last part, the proposal will suggest the establishment of a landscape laboratory in one of the river's meanders, a prototype site for studying the impacts of climate change, and one where the water-based landscape acquires a generative role in the evolution and perception of the design proposal.

TERRAIN VAGUE AS AN INTERPRETATIVE AID

The overarching theoretical and spatial concept of this work relies on the French expression *terrain vague* [tɛrɛ̃ vag] and its different interpretations. This term has been used by the architect Ignasi de Solà-Morales⁹ to describe a contemporary spatial condition that includes vacant lots located outside the city's productive system. According to de Solà-Morales, *terrain vague* is both a condition and a process: it describes an indeterminate space without precise limits where the memory of the past seems to predominate over the present.¹⁰ These seemingly abandoned sites illustrate the sum of anthropic and natural activities: they are containers of a collective history and memory. They also evoke uncertainty and have the feeling of spaces that are mostly outside our control, even if they are the result of processes generated by human activity.¹¹ As such, they create room for all those elements excluded from the urban realm, in a synthesis often hovering between former and future developments.¹²

Indeed, according to Gilles Clément and his notion of a third landscape, it is precisely here that life takes new forms and generates new spaces of freedom: even if lacking a precise function, these spaces protect biodiversity, which proliferates through spontaneous evolution of biological elements.¹³ The third landscape appears by subtraction in the anthropized territory with an artificial character of what seems to be 'naturally' present.¹⁴ This understanding of left-over spaces seems relevant nowadays. In the epoch of the disputed notion of the Anthropocene—where everything on Earth is steeped in human influence and meaning¹⁵—it helps to rebalance the relationship between the human presence on the planet and the relentless work of nature.

As described by de Solà-Morales, in a place that ‘has become “empty” because it plays no recognizable role’,¹⁶ uncertainty and freedom are vital to understand the evocative potential of *terrain vague* and the unexpected, spontaneous conflicts it may generate. Indefinite sites may acquire a positive meaning and activate different ways of perceiving the transformation of our everyday landscape. According to the Danish artist Willy Ørskov, in the *terrain vague* we can read microprocesses through which a new production of meaning and consciousness of human surroundings is created.¹⁷

In the attempt of defining an equivalent English expression, *terrain vague* has often been translated with terms such as ‘wasteland’,¹⁸ ‘derelict land’,¹⁹ ‘vacant land’,²⁰ or even ‘space of uncertainty’²¹ and ‘transgressive zone’,²² that over the years have attached negative connotations to the term. All these definitions describe ambiguous spaces with a degraded status and empty or unused land for alternative or subversive activities.²³ However, according to de Solà-Morales, *terrain vague* contains subtleties and interpretations that are lost in roughly equivalent translations in English or other languages, as they all contain restricting aspects without fully reflecting the complexity of the original concept.²⁴

The French *terrain* (from the Latin *terrānum*) connotes a precise portion of a site—either urban or rural—and is sometimes referred to as ground, soil, or earth. In English, on the other hand, it generally designates a portion of rural land with regard to natural features. But if the meaning of *terrain* doesn’t significantly differ between the two languages, the translation of *vague* seems to be open to different interpretations. In this regard, what follows is a brief investigation across its etymological domains and possible meanings.

On the one hand, it is accurate to say that *vague* comes from the Latin verb *vagari*, to wander or roam, which in turn comes from the noun *vagus* that means wandering, roaming, and—more figuratively—generic, uncertain, an indefinite condition. Furthermore, *vague* has its roots also in another Latin word, *vacuus*, which means vacancy, emptiness, or availability.

On the other hand, *vague* has also a close relation with the German *Woge*, which means movement of seas or swell. It is not by chance that in French language the noun *la vague* means wave or, more metaphorically, water movement. In this idea of something that comes and goes, both *Woge* and *la vague* visually describe an activity that can’t be bordered, territorialized, or

occupied in the same way as land.²⁵ As flows, they are always moving and in a fluid process of becoming. Thus, being in constant evolution due to their instability and fluctuation, both terms relate back to the original Latin verb *vagari*.

This triple meaning of the French *vague* as ‘vague’, ‘vacant’, and ‘wave’ open a multitude of interpretations when linked back to *terrain*, moving away from the dialectic which sees *terrain vague* as either a disorderly vacancy or as an emancipated space disassociated from urban activities. The introduction of this third meaning of *vague* as wave adds a new perspective to the concept. It could therefore be argued that this interpretation pushes us to question the binary distinction between land (*terrain*) and water movements (*la vague*, in its ‘wave’ sense), favoring negotiation rather than separation. In this respect, *terrain vague* could be understood not only as a physical and aesthetic condition, but as an approach to the concept of landscape transformation processes in such highly shifting sites as coastal and riverine environments.

While opening the way for both spatial uncertainty and promise, this approach raises new questions about the ambiguity of the line that separates and differentiates land from water; it pushes the reflection into the intrinsic uncertainty of any transformation process dealing with natural fluctuations and embraces it as an integral part of the design.

In this situation the role of landscape architecture is inevitably problematic, because it is usually conceived as a tool to donate (or impose) a new rationality on spaces that have lost it. This *conditio sine qua non* rules out the possibility of designing more dynamic elements that, in the long run, might undermine the overall concept envisioned by the architect.

However, openness towards future events shouldn’t be perceived as a shortcut to non-design. On the contrary, a playful game with duration and time opens up the potential for adding temporality to the time-zero defined by the project.²⁶ This seems relevant here, because landscape architecture is, by definition, a discipline that deals with living matter and natural processes in constant evolution. Indeed, the spatial transformation that a project generates can also be projected into a more-or-less probable future about which we can only make hypotheses. In the attempt to prepare territories for their future vocations,²⁷ the design precision of the time zero is just as important as its openness to events that might happen in the future.

Terrain vague is here proposed as a concept to rethink the usual land-water dichotomy via an attitude that can embrace the complexity of highly dynamic and shifting sites. Based on the etymological analysis, the term could therefore be used to:

- *describe* the actual condition, theorized by de Solà-Morales, of residual and ambiguous spaces in the process of transformation but still suspended in between the memory of the past and the uncertainty of the future;
- *question* the irreducible link between land (*terrain*) and water movements (*la vague*): a meeting ground that accommodates fluidity and instability;
- *design* transformation processes open to change over time, where uncertainty, openness, and a certain degree of indefiniteness are used as design elements.

TO DESCRIBE: THE CHARENTE ESTUARY AS TERRAIN VAGUE

Uncertainty is ineradicable, and there is every reason not to see it as a limitation but to approach it positively as a challenging fact that is inherent in social action.

Maarten Hajer et al., *Een plan dat werkt*²⁸

The estuarine landscape, covering more than 20,000 hectares along the Charente River, is built on the contrast between the uplands and the marshlands, which can be divided into two macro categories. The first, located inland, is marked by humid zones and wetlands supplied by fresh continental water. On the other hand, the second, along the coast and the mouth of the river, is directly related to the maritime dynamics and characterized by transitional waters: a mix of fresh and salty water typical of estuarine conditions.

Due to the humid environment and being so low-lying in relation to the current sea level,²⁹ this fragile territory threatened by climate change represents the richest environmental milieu in terms of biodiversity and ecological potential. For this reason, it is protected under the Natura 2000 legislation,³⁰ in terms of both habitat and bird directives.

Being in the marshlands along the Charente estuary is an alienating experience. In this antithesis of the urban sphere, a feeling of spatial and sensorial estrangement arises while wandering in search for the river. Endless

sequences of empty fields give no peace to those who crave a visual landmark in the horizon. Here and there, subtle reliefs bordered by the presence of a shy vegetation and crowned by the houses of local villages complement the absolute flatness of this abstract landscape.

Water is everywhere and reveals itself through a labyrinth of canals—*conches*, *rigoles*, and *fossés*—built to drain the land and evacuate water towards the river. The creation of this anthropized water-based territory required the outflow of major resources. The first reclamation works,³¹ conducted by the monks, started in the tenth century and were soon interrupted by religious wars. In 1599, after three centuries of abandonment, Henri IV promulgated the royal edict for *L'assèchement des Marais de France et des Lacs*.³² To conduct the operations, the king hired Humphrey Bradley, a hydraulic engineer working for the Dutch Republic and one of the foremost experts of the poldering technique.³³ Swamps and marshlands were separated from the river by a system of dikes—*levées*—and subsequently drained. At that moment in time, controlling nature eradicating the uncertainty created by a fluctuating landscape was primarily ‘a question of flood defence, border protection, social peace-making and profit maximizing’.³⁴

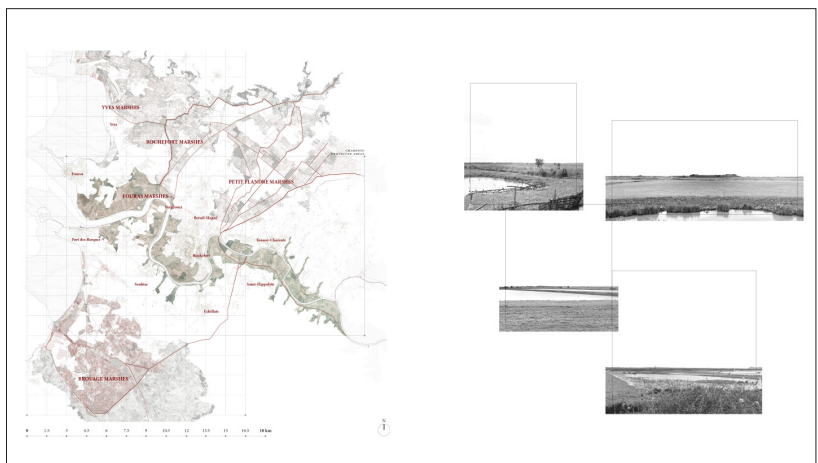


Figure 2. Plan of Natura 2000 areas and representative pictures. (Property of the author.)

In a few centuries, a ‘tide-dominated’³⁵ landscape, naturally subjugated to water dynamics, was turned into a fertile and reliable land. The vague boundaries of the Charente floodplain, changing according to climatic shifts, seasonal floods and tide cycles, gave way to the waterproof landscape we observe nowadays, a territory that appears to be borrowed from the river rather than won from its waters. Paradoxically, this landscape is based on water and, at the same time, strongly resists it, working against natural oscillations to guarantee stability and security.

In a land protected on its perimeter but constantly exposed in elevation, canals and ditches don’t seem to belong to any river. The perception of exposure is removed because the Charente, hidden behind earth embankments, can be seen only when walking along its banks. As the French Government also recognized immediately after Xynthia, there is an urgent need to improve people’s awareness of floods, especially along the coast.³⁶ It is evident in fact that this cognitive dissonance among local communities increases the possibility of major catastrophes when extreme weather conditions occur. From this point of view, ‘also the extensive flood defence infrastructure plays an ambiguous role, being both protection and entrapment, as it often encourages risky behavior in the protective shadow of the levee’.³⁷

Given all these premises, the estuary gives a good depiction of the *terrain vague* described by de Solà-Morales. At the same time, it also seems to be the place for questioning the ambiguous and uncertain relation between land and water. The following investigation focuses on its anthropic legacy as well as its past and future climatic evolutions.

TO QUESTION: THE AMBIGUITY OF THE LINE IN BETWEEN LAND AND WATER

The same parts of the earth are not always moist or dry, but they change according as rivers come into existence and dry up. And so the relation of land to sea changes too, and a place does not always remain land or sea for all time, but where there was dry land there comes to be sea, and where there is now sea, there one day comes to be dry land.

Aristotle, *Meteorology*³⁸

In representing our histories, landscapes testify to what we were.³⁹ If we conceive a territory as a sort of open-air archive illustrating the passage of human agency, then we should also consider that same territory as bearing the fingerprint of natural processes that shaped its malleable surface over time. In this conception of the landscape as a palimpsest,⁴⁰ an understanding of natural dynamics and their interplay with mankind's transformations is essential to inform and clarify the future role of a place, even the most anthropized one.

According to the French Architect Manuel Delluc,

a landscape is the bearer of a complex memory that is preserved in its every aspect. The landscape designer's art thus consists in first observing the given landscape and then knowing how to discern the reasons behind its formation, so that those same factors can be employed as elements in the design.⁴¹

This aspect links well with the idea that a *terrain vague* is a space generated by human activity where the traces of a past culture or land use are still readable, even if they have lost their original sense of purpose.

In this conception of 'memory as an exercise of cultural imagination',⁴² the design should be able to filter from the past those elements that can be relevant for the future, thereby adding a temporal and cultural dimension to its spatial quality. As John Dixon Hunt reminds us, this effort is essential because in the past and future lies the necessary reservoir for our design and imagination.⁴³ It is evident that no past can be fully recreated, but the aim of landscape architecture should be to reinterpret the past into a new story that is potentially more useful for contemporary and future needs. This approach can be applied on any different scale of time and space, and can also involve dynamics that transcend our physical perception as human beings. From this perspective, the 'deep time' of a place,⁴⁴ with its relentless geological processes, can be seen as a form of landscape memory. Deep time is not an abstract, distant concept, but a visible presence in the everyday, the boundless arc of non-human history that shaped the world as we perceive it.

On a macro-scale, the Charente region is divided into two main geological formations: the Jurassic in the north and the Cretaceous in the south.⁴⁵ These

two main plates, made of limestone plateaus and smaller islands, meet in the estuary area giving form to a sort of geological archipelago. The sedimentary infill layer, here defined as common shifting ground, fills the voids between these islands. It is characterized by very low sediment supply⁴⁶ and constitutes the previously described terrain vague. Such a suspended landscape illustrates the reclamation effort made over the centuries and now threatened by permanent submersion.

Cartographic analysis shows how this common shifting ground, due to its geological origin and low position, has been an object of constant movement and evolution over the millennia.

The former *Golfe des Santons*—which developed during the Flandrian transgression⁴⁷—slowly filled up due to the fall in sea level and a double phenomenon of sedimentation caused by ocean tides and by fresh continental waters.⁴⁸ Even if not very precise, ancient maps show the shifting character of this site in a natural process which is technically called ‘shoreline regression.’⁴⁹

In the case of the Charente estuary, the human-induced sea-level rise described in the IPCC report could slowly push back the shoreline, especially if the flood-defence infrastructure proves inadequate and/or too costly to maintain.

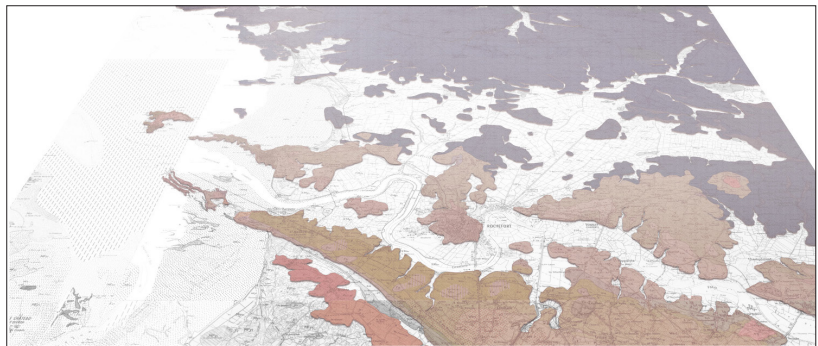


Figure 3. Geological analysis: Jurassic, Cretaceous, and Holocene basin (common shifting ground). (Property of the author.)

Following the overall attitude, this landscape transformation project tries to depict the impact of a different flood mitigation strategy, shifting the focus ‘from a model of vertical containment to a model of spatial prevention.’⁵⁰ The aim of repositioning natural processes in the living environment finds inspiration in the concept of wetness theorized by the landscape architects Anuradha Mathur and Dilip da Cunha.⁵¹ It aims to re-evaluate the binary distinction between land and water, moving from a condition of separation—where water is tamed and kept outside—to a condition of negotiation, where its fluctuations are welcomed as part of the territory’s hydrological cycle.⁵²

This proposal’s radical adaptation scenario foresees a progressive transgression of the shoreline, inverting the natural dynamic that we observe in ancient maps. The estuarine territory would therefore resume the appearance of a marine gulf and see the resurgence of the geological archipelago. However, the intrusion of human desires in the geological record produced, in the case of the Charente estuary, a landscape legacy that reflects a very specific way of inhabiting this territory. What preceded the playground of water and nomadic geographies was then turned into a static environment unable to behave in harmony with its natural fluctuations and watershed’s dynamics.

With the aim of reintroducing a certain elasticity and openness in a landscape petrified by centuries of hard engineering, nature restoration and



Figure 4. Cartographic research: status of the Charente estuary during, respectively: Roman times, 1593, 1765, and 1820–66. The last two maps show the results of the land reclamation project directed by Humphrey Bradley.

heritage preservation are anything but an unproblematic undertaking. On the contrary, they highlight the challenging ambition of the European Landscape Convention (ELC), which, among other things, aims at integrating cultural and natural heritage when speaking about landscape transformation. According to ELC, landscapes are a foundation of people's identity and public need, and these should be explicitly stated as landscape quality objectives.⁵³ Nature restoration and heritage preservation could otherwise become a source of dissonance, especially if one perception of a landscape and its values can suppress other valid perceptions, in conflict with the needs of different local communities to identify themselves within the same territory.⁵⁴ In the awareness that a design should be open towards a multitude of possible and unpredictable stories,⁵⁵ understanding and working with a multilayered proposal might provide an inclusive approach where nature restoration and heritage preservation could coexist in the same place. In this proposal, future adaptation scenarios and ancient land reclamation will therefore be considered as two equally important facts in the history of the Charente estuary, allowing people to experience this complex environment without one dominant narrative imposed at the expense of the other.

These aspects open critical reflections about the transformation of such a complex landscape and the preservation, to a certain extent, of its exceptional cultural heritage. It is evident, though, that the common shifting ground represents the ideal place to fully investigate the potential of the *terrain vague* attitude in all its spatial and theoretical implications. Starting from these premises, the design proposal tries to critically intervene in a landscape that has been shaped over the centuries by geological, climate, and man-made transformations and that will continue to be so shaped, even in the future.

TO DESIGN: A LANDSCAPE LABORATORY IN THE COMMON SHIFTING GROUND

When the boundaries of a flood are not defined by the quantity or velocity of water but also by landforms and structures carefully designed to shape and mitigate the 'disaster', the result can be considered a floodscape, physically and culturally defined.

Frédéric L. M. Rossano, Floodscapes

The design proposal focuses on the meeting point between land and water, a fertile research ground for both conceptual and spatial reflections. The scale

and complexity of the territory requires any further investigation to be undertaken as an open-ended strategy. The main objective is to define a landscape transformation process open to change over time and also responsive to the cultural identity of the area. The project focuses on a strategic site located in the river's floodplain and in contact with one of the main geological islands of the estuary. Its size (250 hectares) and the presence of important cultural traces make it the ideal space in which to test the implications of the overall approach from a design perspective.

The marginal character of this site, in the vicinity of small villages and surrounded by the endless marsh landscape, is seen as offering an opportunity to intervene in the area without a specific program determined *a priori*. Along with the experimental aspect of this research, the proposal suggests establishing a landscape laboratory to observe and gather knowledge from the effects of natural phenomena active on a broader territorial scale.

The notion of a landscape laboratory draws upon a long tradition in Nordic landscape architecture. As a term, it stresses the central role of landscape and spatial aspects in the experimental meeting between disciplines and between people and the landscape. Its distinctiveness derives from integrating a landscape architectural dimension into its experimental design. Researchers focus on the spatial qualities of different landscape elements and vegetation structures and the spatial experiences they generate to the visitors.⁵⁶

Since the establishment of the first landscape laboratory in Alnarp in the early 1980s by Roland Gustavsson, this successful concept has been associated with a common experimental platform for interdisciplinary education, demonstration, and research on urban and peri-urban forests. In these sites, experts can conduct full scale outdoor research and teaching activities, workshops, conferences, and guided tours. According to Gustavsson, these laboratories should be seen as long-term experiments for many different contexts where landscape enrichment and dynamic vegetation are studied and demonstrated as an inspiration for urban forests, agricultural land, parks, gardens, and road environments.⁵⁷

From an Humboldtian perspective, a great part of our response to the natural world should be based on our physical relation with it through the senses and emotions, experiencing nature through its variations.⁵⁸ In this regard, the laboratory is conceived as a learning space which facilitates a reflective

approach to landscape and its constant changes. It involves people through reflection upon their experiences, enables them to engage with natural processes, make choices and take positions they would not have taken without that experience. As the Anthropocene forces us to rethink the way we inhabit our environment, landscape laboratories can show how to make space for both natural and social processes to evolve over time.⁵⁹

Despite the long-lasting research and successful results, this concept is still largely unexplored outside Scandinavia. Moreover, none of the well-established laboratories—such as Alnarp, Sletten and Snogeholm—deal with coastal and/or riverine environments. For this reason, a laboratory in the Charente estuary could add a new perspective on landscape dynamics strongly influenced by the presence and movement of fresh and salty water. The urgent need to formulate an alternative scenario for flood-risk mitigation can therefore be matched to an opportunity to learn more about this territory. Moreover, this proposal fits well with the critical role that the estuary has acquired in recent years on the national agenda. Indeed, the establishment of a permanent *Littoral-Regional Atelier* in the area has been discussed for a while since Xynthia, as way of fostering multidisciplinary studies on climate-change effects.⁶⁰ A landscape laboratory in the Charente's floodplain could therefore become part of an urgent public discussion and contribute to the development of adaptation strategies useful also for other similar areas along the Atlantic coast. However, while a strong political response on territorial management and landscape architectural research is required, there is also the urgent need to formulate inclusive practices for the benefit of local communities and cultures.

The macro-scale study highlighted the natural fluctuations latent in this landscape and the conflicts that might arise from giving more space to the river. This is especially true in such an anthropized landscape characterized by extensive use of flood-defence infrastructure, which constitutes its main cultural identity. In recent decades however, several floodplain restoration projects have been carried out around Europe in highly infrastructured and culturally valuable areas, with the aim of combining flood-risk mitigation with spatial quality and meaning.

The Room for the River (RftR) project in the Netherlands represents one of the most advanced examples of ecological restoration sensitive to the cultural features of the landscape. Active from 2006 to 2015, it consisted of thirty

different project sites located in flood-prone positions. Such an ambitious program represented a paradigm shift from usual flood management policies previously carried out in the Netherlands.⁶¹ Another innovative aspect of this territorial transformation was its dual objective of ensuring safety and contributing to spatial quality—intended as the balance between hydraulic effectiveness, ecological robustness, and cultural meaning and aesthetics, enhancing existing landscape qualities.⁶² This cultural meaning also included cultural history and referred both to human–water interaction and to its physical results. Flood defence infrastructures such as dikes and levees were relocated further inland, de-poldering large areas to leave more space for water fluctuations. However, the RftR program’s aim was not to restore uncontrolled river dynamics, but to sustainably protect the country from the effects of climate change and rising sea levels. Even if experts are still debating the project’s long-term effectiveness, there is a common consensus that acknowledging flood risks allows inhabitants to be more aware.⁶³

The Isar Plan in Munich represents another great example of water management and ecological restoration being combined in a project where the floodplain of the river has been turned into an urban park. The works began in 2000 and were completed in 2011.⁶⁴ On a different scale but with a similar approach to the RftR, the Isar Plan aimed to facilitate recreational uses in an open nature-like landscape, aesthetically attractive and capable of enhancing the cultural value of the river’s space.⁶⁵ Even if the river has not recovered a real meandering space, the old binary variation—dry meadow or flood, land or water—has evolved towards a gradual transformation of the river by raising water levels via the design intervention of stepped banks and shallow pebble beaches. The Isar space—today much enjoyed by the population of Munich—reveals its value every time water covers and uncovers paths and grassland, in a public space that functions as a ‘litmus paper’ of the river’s fluctuations. The sensitive design has provided public access to a space of indecision, highlighting the rise and fall of water instead of neutralizing its effects. It also provides an educational space, for living with these dynamics outside the myth of full safety, where the experience of flooding can sensitize citizens to natural processes and related acceptable risk.⁶⁶ The RftR project and the Isar Plan now stand out as state-of-the-art interventions that showcase the cultural, recreational, and informative potentials of ecological restoration when re-naturalizing rivers’ floodplains. They represent a step forward in the way territorial landscape transformation can be conceived, taking an opposite direction to other (still relevant) case studies, such as the Skjern

River Delta restoration in Denmark. In this project, the renaturalization of the river has erased the land reclamation made in the 1960s. The conservation of one cultural heritage—the supposed original meandering river—was imposed at the expense of another: the embanked canal was reduced to an unrecognizable trace of the past without respecting the history of this place and the productive relationship to nature shared by local farming communities.⁶⁷

Another example, similar in premise but different in outcome, is the Aire Project in Geneva, designed by Georges Descombes. The Aire River flows through valleys historically devoted to farming. From the late nineteenth century, it was progressively canalized. In 2001, the State of Geneva opened a competition with the idea of restoring the river to its original shape by destroying the canal. The winning proposal suggested instead to combine the straight territorial cut of the canal with a parallel new vast space of divagation for the river. The canal became the centre of gravity for the transformations, in a project poetically in dialogue with what was already there. The urgent ecological shifts requested from the competition brief have therefore been coupled with a larger cultural change.⁶⁸ The new organization of the place associates the new river space and a linear series of gardens in the former canal. This unexpected juxtaposition organizes and frames the perception of the surrounding territory and its traces of human modifications, stimulating a renewed understanding of the canal itself.

The experimental character of this project is particularly visible in the design of the new riverbed. Descombes, conscious of the uselessness of designing a fixed river, proposed instead a launching pattern. This *losange* shaped diagram, based on the percolation principle with dissipative forces, shapes, opens a complex series of undetermined channels for the water.⁶⁹ As a result, year by year the river flow displaces various materials—sediments, gravels and sands—designing its own bed and geomorphology. This erodible corridor, in dialogue with forces present on the territory, allows the river to exist as a living milieu. During the years of its construction, the place has been turned into an open-air laboratory for observing and measuring the natural dynamics at work on the site, with the most advanced technological tools. The aim is to acquire new knowledge of natural restoration and fluvial geomorphological processes.

The project proposed here, therefore, seeks to combine the main objectives of the landscape laboratory concept with the approach to nature restoration and cultural enhancement we observe in the Room for the River Project, the Isar Plan and, especially, in the Aire Project. The resulting proposal is a place where scientific research can be carried out in respect of cultural heritage features and in dialogue with the shifting dynamics of the Charente estuary, while creating a new type of public space for the inhabitants.

In this territory, levees and dikes literally represent a cultural landmark, with no exception made for the laboratory site. As can be seen from old maps, the several levees of this area were raised during the Napoleonic period to protect part of the river's meander from flooding. Understanding this structural framework opens up the possibility of intervening in the landscape in continuity with its logic and memory. Analysis and reading acquire a fundamental role in the definition of a proposal able to enter into dialogue with both the place and those dynamics generated by different sources, forces, activities, and actors.

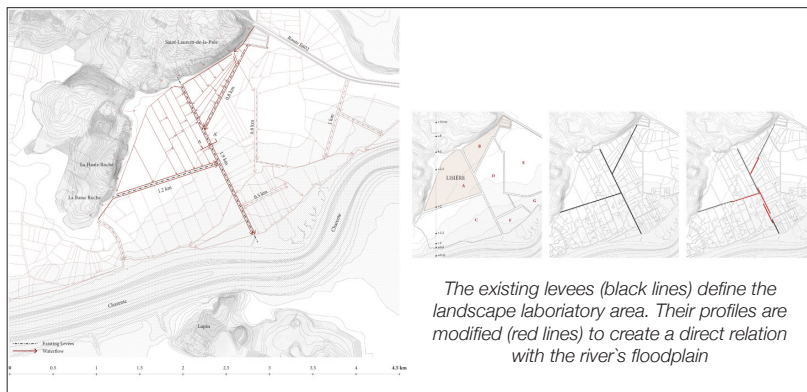


Figure 5. Site analysis: topography, hydrography, and main cultural traces (levees). The image on the left shows the topography of the area, with the geological island in the north and the space protected by the levees in the south, in close proximity with the river. (Property of the author.)

As the existing levees are used to define the space of the laboratory, special attention is given to its southeast perimeter which acquires a structural role in the definition of the design proposal. This clear figure is not meant to preserve the closed, impermeable area defined by these earth embankments. On the contrary, it aims to suggest an identifiable space that will have to negotiate its boundaries with the river's fluctuations and the intrinsic instability of estuarine dynamics.

The acquired site-specific knowledge opened the possibility of reinterpreting and transposing⁷⁰ these simple territorial elements into a more complex spatial experience, through a design sensitive to both the imaginative sense of the place and its physical perception. On the one hand, this approach gives the opportunity to rethink important cultural traces of the territorial morphology that would be lost under the rising water level. On the other hand, their transposition becomes the pretext to rethink their function.

The levees, realized to protect and create an enclosed space, are turned into devices to make tangible water fluctuations in the area. Through a careful redesign of the section profile in relation to the topography, their original profiles are therefore modified, interrupted, and broken down into different segments.

In line with the overall *terrain vague* attitude, the intervention doesn't create a closed environment but, on the contrary, gives the laboratory different degrees of porosity. Instead of enclosing the site within embankments, break-

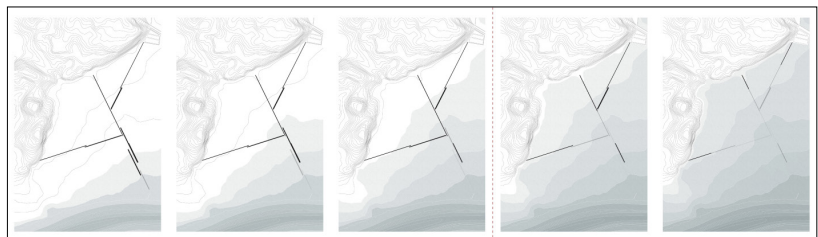


Figure 6. Flood stages 2100: submersible and non-submersible levees in relation to sea-level rise and tides, respectively +1m (permanent condition), +1.5m and +2m (temporary condition), +2.5 and +3m (extreme conditions). (Property of the author.)

ing down the relation with the outer floodplain, the proposal embraces the shifting character of the territory and defines a space whose perimeter will change according to water fluctuations.

From this perspective, the water-based landscape acquires a generative role in the composition and aesthetic perception of the proposal, with a design that gives meaning and presence to the term floodplain.

In continuity with the overall approach, the reinterpreted levees can be seen both as a territorial element and as a process. As a territorial element, they define the space of the landscape laboratory and behave as piers. These promenades make it possible to explore the site even when it is partly or entirely flooded, satisfying the desire of going towards what has disappeared under the fluctuating water. And as a process, they could catalyse the interception and accumulation of fluvial sediments caused by the ebb and flow of the tides. From this point of view, the reinterpreted levees can be seen as a device that can 'co-opt the mechanisms forming this landscape'⁷¹ while revealing forces that would otherwise be imperceptible. The evidence and reason for the architectural intervention might therefore dissipate over time, in a dialectical loop that reflects the way we perceive the site nowadays. The acceptance of a design element modified by natural processes fits well with the *terrain vague* attitude, a manipulation that could turn natural phenomena into an aesthetic creation and new ecological potential for the place.

In this constant process of hiding and revealing components and processes of the site, water is considered as a co-designer in the evolution and perception of the proposal.⁷² The latter, a man-made artifice begun by the architect, might in the future appear as natural as if it had always been that way. In line with Gustavsson's approach in Alnarp but with a substantial difference in the physical elements under study, spontaneous natural processes become a conscious part of the transformation process while experimenting with evolutionary design and creative management.⁷³ The laboratory space, in continuity with its environmental flows, could therefore foster scientific and spatial studies in the relation between fauna, flora, and their evolving environment.

The inner parts of the laboratory fit and transpose the existing land structure. A robust vegetative framework will assure the spatial organization of the area: the composition of perspectives, monumental promenades and vegetative

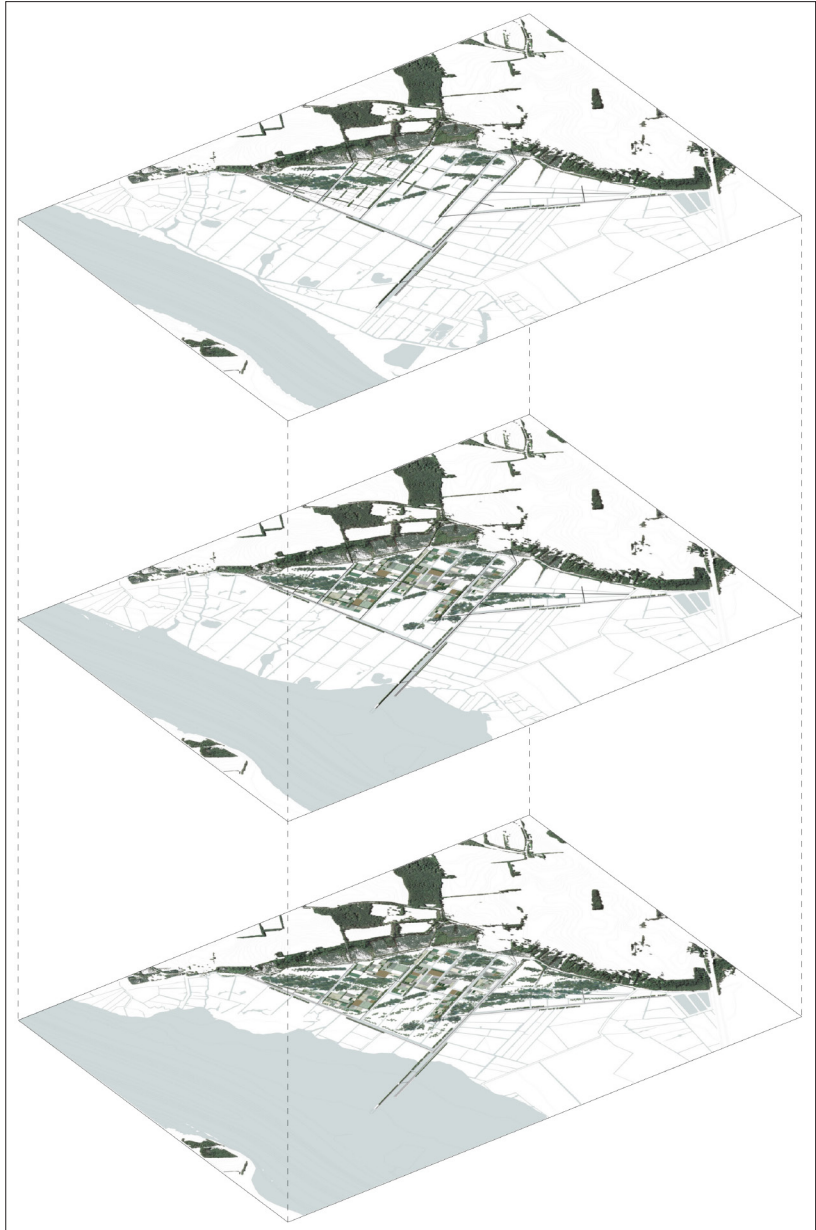


Figure 7. Axonometric view, phases of development. *Phase 1 (2020–30):* Transformation of existing levees. A robust vegetative framework will ensure the spatial organization of the area (first rows of trees and forest patches are planted in respect of existing land structure). The main circulation network is realized, predisposing the west part of the laboratory for further development. *Phase 2 (2030–60):* Realization of the light framework—colonization of the predisposed landscape with agricultural fields and orchards. Implementation of the circulation network. Sea level +0.5–1 m. *Phase 3 (2060–2100):* Complete development of the Laboratory with mature woodlands and humid zones intermingled with agricultural activities. Implementation of the circulation network. Sea level +1–1.5 m. (Property of the author.)

sceneries borrowed from the early French garden art are blended with the landscape laboratory tradition of working with openness towards change over time. In the spirit of this concept, more experimental or temporary activities will be added with a focus on natural processes and human interference through an evolutionary approach that calls, according to Gustavsson, for a continuous redesign.⁷⁴ Due to its increasing richness, the laboratory is meant to become a place where public activities could take place. It would be possible, for instance, to observe humid zones for endangered fauna and flora or to experience a miniaturized agricultural landscape enriched by the afforestation patches.

Some areas, such as those under the influence of tidal fluctuations, are left to spontaneous evolution and could develop within a few decades into mature climax of vegetation with different biotopes and microclimates. From a landscape ecology standpoint, this transitional zone could be considered as an ecotone, 'a narrow ecological zone which possesses a mixture of floristic and faunistic characteristics in between two different and relatively homogeneous ecological community types':⁷⁵ on the one hand the wetter humid environment of the estuary characterized by transitional waters, on the other hand the drier upper system of the drained marshes and relief boundaries. According to van der Maarel, in the ecotone 'fluctuations are strong and create a time-series of strongly different but individually relatively homogeneous

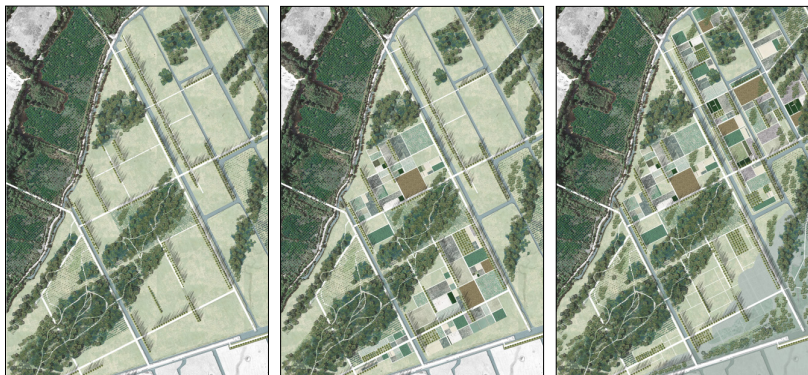


Figure 8. Landscape laboratory zoom: phases of development (2030, 2060, 2100). (Property of the author.)

environments.⁷⁶ Because of the fluctuating water level and salinity gradients that depend on tide cycles and watershed's dynamics, the laboratory welcomes, connects and enhances different degrees of wetness. In this left-over land-in-between-water, therefore, the *terrain vague* concept finds its highest expression: physical space and process both at the same time. This space demonstrates the evolving complex dynamics of the estuarine landscape in a sort of intentional 'third landscape'.

In doing so, the project establishes a dialogue between the history of the place, its natural processes and its users. While addressing the slowness required by environmental processes, the laboratory becomes a source of participation and acquires a educational role, not only for landscape architects and researchers, but also for local communities and visitors.

This final point is crucial, since it underlines the public aspect of this proposal, and hence the need for active collaboration in this collective effort of territorial adaptation—a double process that enriches both the subject and its environment, amplifying the resonance of the place itself. The result is a proposal

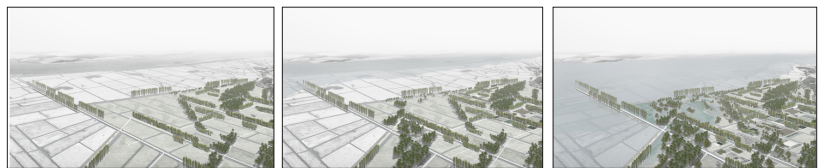


Figure 9. Landscape laboratory, phases of development (2030, 2060, 2100). (Property of the author.)



Figure 10. Landscape laboratory boundary (promenade west) under the influence of tidal fluctuation. (Property of the author.)

that tries to merge multidisciplinary research objectives with ecological restoration, heritage preservation and public participation, through a design that aims to clarify the landscape by amplifying the site's character.⁷⁷

CONCLUSION

This work aimed to establish an open discussion to rethink the relation between land and water, moving away from its binary opposition in favor of more inclusive practices, especially when dealing with highly dynamic conditions such as coastal and riverine environments. It could be argued that this proposal, settled in a fragile and protected area, goes against the Natura 2000 legislation. Considering recent climate trends, however, there should be room to question whether this approach to biodiversity preservation is still valid. It seems paradoxical to protect an ecosystem from human interference when, at the same time, that same ecosystem is deeply threatened by human-induced climate change. In the case of the Charente estuary, an active and sensitive approach could—in the long run—have more beneficial effects, reintroducing a certain coherence in the way river and people relate to each other.

The *terrain vague* described by de Solà-Morales, with its ambiguity and evocative potential, has been used as a lens to interpret the estuarine landscape of the Charente River. Using a multilayered approach, this research project tried to 'weave together' different spatial scales of time and space, reinterpreting history in its natural and cultural manifestation.⁷⁸ The proposal depicts phases of transformation grounded on a thorough reading of the site, despite the awareness that a large team of experts would have been necessary to detail aspects and effects of the suggested design and its impact on the current land use. In this perspective, the transposed levees constitute a sort of 'memory elevator' to reveal, without any nostalgia, the cultural identity of the place.⁷⁹ Nowadays, the urgent need to adapt our territories calls for transdisciplinary platforms to foster scientific research and development among disciplines. If realized, the proposal could add a new perspective to current landscape laboratory research carried out in the Scandinavian context, broadening the scope and geographical boundaries of this concept to other European case studies. In line with state-of-the-art nature restoration projects, the design investigates the creation of a 'floodscape',⁸⁰ a culturally defined public space that accepts the uncertainty produced by natural fluctuations. This aspect represents a breakthrough in the way the everyday landscape could be perceived by its inhabitants. If in the past, local populations were more aware

of the risk posed by coastal storm surges, mainly because people were living in closer contact with water,⁸¹ then inclusive practices should be initiated to improve the current lack of awareness. The project embraces this need, mindful of what happened in 2010 with storm Xynthia and sensitive to future climate predictions. This seemed relevant to mitigate the direct effect of floods while making them visible, tangible, and acceptable again. Furthermore, the landscape laboratory acts as a 'permanent display of natural variations'⁸² and offers the experience of change, stimulating observation and participation.

Whether this landscape laboratory could have beneficial effects and create stronger resilience among individuals, local communities, and the estuarine territory remains an open question. And there is a lot still to be explored about the educational and participatory potential of landscape architecture. It underlines the importance of seeing landscape architecture as a form of 'knowledge producer',⁸³ bringing the specific case study into an urgent and much broader discussion about the future of such territory and its inhabitants.

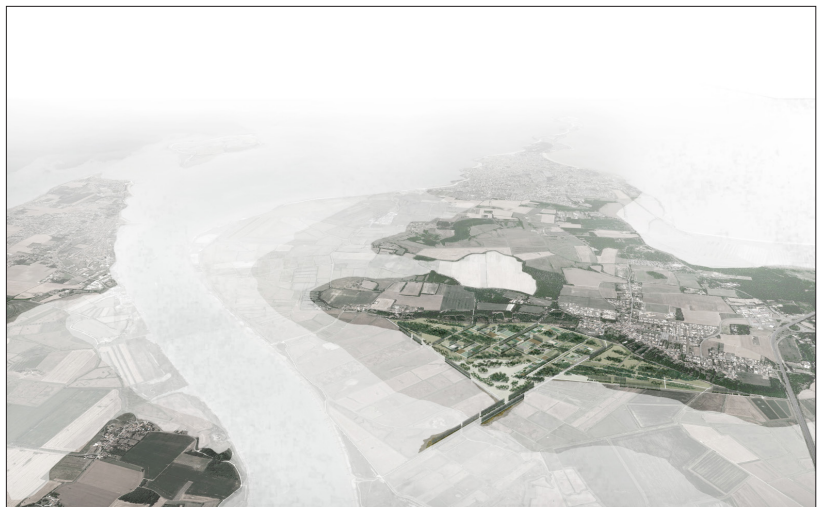


Figure 11. 2100: fully developed landscape laboratory in the meeting ground between land and water. (Property of the author.)

If from one viewpoint the suggested design enhances the meeting point between land and water, from another its sensitivity to maintaining the existing *terrain vague* qualities could be disputed. De Solà-Morales stated that architecture seems ‘incapable of doing anything other than introducing violent transformations . . . , striving at all costs to dissolve the uncontaminated magic of the obsolete in the realism of efficiency.’⁸⁴ However, this novel interpretation of *terrain vague* might provide new opportunities both in research and design, reorienting the debate around this concept.

To conclude, this attitude has allowed the author to consider possible unplanned variations in the design, without compromising the defined character of the proposal. In respect of habitats shaped over time by natural mechanisms and ancient cultures, it has shown—on a conceptual level—the potential for repositioning evolving dynamics within the living environment.

NOTES

¹ Bas Kolen, Robert Slomp, Wim van Balen, Teun Terpstra, Marcel Bottema, and Stefan Nieuwenhuis, *Learning from French Experiences with Storm Xynthia: Damages after a Flood* (September 2010), https://www.researchgate.net/publication/279180065_Learning_from_French_Experiences_with_Storm_Xynthia_-_Damages_after_A_Flood/link/558c62208ae40781c204c02/download (all URLs accessed in May 2023).

² Le Monde, *Le bilan de la tempête Xynthia s'alourdit à 50 morts* (26 February 2010), https://www.lemonde.fr/planete/article/2010/02/26/violente-tempete-attendue-ce-week-end-sur-la-france_1311983_3244.html#ens_id=1311986.

³ 120 km of dikes and levees out of 224 km.

⁴ Darren Lombroso and Freddy Vinet, 'A Comparison of the Causes, Effects and Aftermaths of the Coastal Flooding of England in 1953 and France in 2010', *Natural Hazards and Earth System Sciences* 11 (August 2011), pp. 2321–33, https://www.researchgate.net/publication/253163597_A_comparison_of_the_causes_effects_and_aftermaths_of_the_coastal_flooding_of_England_in_1953_and_France_in_2010.

⁵ IPCC Summary for Policymakers, in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf.

⁶ See for instance Jane Bicknell et al., *Adapting Cities to Climate Change* (London and New York: Routledge, 2009), Jeroen Aerts et al., *Climate Adaptation and Flood Risk in Coastal Cities* (London and New York: Routledge, 2011), David C. Major and Sirkku Juhola, *Climate Change Adaptation in Coastal Cities: A Guidebook for Citizens, Public Officials and Planners* (Helsinki: Helsinki University Press, 2021), and Barbara Norman, *Urban Planning for Climate Change* (London and New York: Routledge, 2022).

⁷ European Commission, '2030 Climate Target Plan', https://climate.ec.europa.eu/eu-action/european-green-deal/2030-climate-target-plan_en#:~:text=With%20the%202030%20Climate%20Target,below%201990%20levels%20by%202030.

⁸ European Commission, 'Green Deal', https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3746.

⁹ Initially, in Ignasi de Sola-Morales, 'Terrain Vague', in *Anyplace*, edited by Cynthia Davidson (Cambridge, MA: MIT Press, 1995), pp. 118–23.

¹⁰ Ignasi De Solà-Morales, 'Terrain Vague', in *Terrain Vague: Interstices at the Edge of the Pale*, edited by Manula Mariani and Patrick Barron (London and New York: Routledge, 2014), pp. 24–30.

¹¹ Ibid.

¹² Patrick Barron, 'At the Edge of the Pale', in *Terrain Vague*, pp. 1–20.

¹³ Gilles Clément, *Manifesto del Terzo paesaggio* (Macerata: Quodlibet, 2005).

¹⁴ Ibid., p. 15.

¹⁵ Martin Prominski and Hille Seggern, *Design Research for Urban Landscapes: Theories and Methods* (New York: Routledge, 2019), p. 42.

¹⁶ Bernardo Secchi, 'Un'urbanistica di spazi aperti / For a Town-Planning of Open Spaces', *Casabella: Il disegno degli spazi aperti / The Design of Open Spaces*, no. 597–98 (January–February 1993), p. 116.

¹⁷ Willy Ørskow, *Terrain Vague*, English and Italian version in the individual catalogue for the artist's biennale 1976; most recently in *Terrain Vague* (Borgen, 1992), also in *The Open Sculpture* (Borgen, 1987), p. 101.

¹⁸ Raymond P. Gemmell, *Colonization of Industrial Wasteland* (London: Edward Arnold, 1977).

¹⁹ John R. Oxenham, *Reclaiming Derelict Land* (London: Faber, 1966).

²⁰ Ann Bowman and Michael A. Pagano, *Terra Incognita: Vacant Land and Urban Strategies* (Washington, DC: Georgetown University Press, 2004).

²¹ Kenny Cupers, 'Towards a Nomadic Geography: Rethinking Space and Identity for the Potentials of Progressive Politics in the Contemporary City', *International Journal of Urban and Regional Research* 29, no. 4 (2005), pp. 729–39.

²² Gil M. Doron, 'The Dead Zone and the Architecture of Transgression', *City: Analysis of Urban Trends, Culture, Theory, Policy, Action* 4, no. 2 (2000), pp. 247–63.

²³ Patrick Barron, 'At the Edge of the Pale', in *Terrain Vague*.

²⁴ Ignasi De Solà-Morales, 'Terrain Vague', in *Terrain Vague*.

²⁵ Phil Carney and Vincent Miller, 'Vague Spaces', in *Strange Spaces: Explorations in Mediated Obscurity*, edited by André Jansson and Amanda Lagerkvist (Farnham: Ashgate Publications, 2009), pp. 33–56.

²⁶ The notion of 'time zero' is used by Georges Descombes in the documentary *Dessine-moi une rivière*, directed and written by Michael Favre (2017). It is not intended as a tabula rasa, but as the initial state of the realized project which will trigger the natural phenomena active on place.

²⁷ Michel Desvigne, *Le paysage en préalable: Michel Desvigne, Grand Prix de l'urbanisme 2011*, edited by Ariella Masbouni (Paris: Edition Parenthèses, 2011).

²⁸ Maarten Hajer, Dirk Sijmons, and Fred Feddes, eds., *Een plan dat werkt: Ontwerp en politiek in de regionale planvorming* (Rotterdam: Nai, 2006), p. 37, cited in Frédéric L. M. Rossano, *Floodscapes: Contemporary Landscape Strategies in Times of Climate Change* (Rotterdam: nai010 publishers, 2021), p. 219.

²⁹ O. Renault, G. Karnay, E. Lay, B. Le Guet, and M. Vincent, *Cartographie de l'aléa retrait-gonflement des argiles dans le département de la Charente-Maritime*, Rapport-BRGM/RP-52408-FR, September 2003, <http://infoterre.brgm.fr/rapports/RP-52408-FR.pdf>.

³⁰ These sites are designated to protect a certain number of habitats and species representative of European biodiversity. Human activities and infrastructure projects are possible on Natura 2000 sites. However, to avoid activities detrimental to biodiversity, projects likely to have effects on protected species and habitats must be subject to prior assessment. This aspect is crucial as it opens various possibilities in the transformation and adaptation processes that can be initiated in response to climate change. See <http://www.natura2000.fr/natura2000/qu-est-ce-que-natura-2000>.

³¹ For more information, see Préfet de la Charente-Maritime, *Les marais de la Charente-Maritime*, <https://www.charente-maritime.gouv.fr/Actions-de-l-Etat/Environnement-risques-na>

turels-et-technologiques/Milieux-Foret-et-Biodiversite/Marais-et-zones-humides/Les-marais-de-la-Charente-Maritime.

³² 'The drying up of the Marshes of France and the Lakes' (translation by the author).

³³ An operation that designates a low-lying land that has been reclaimed from a body of water and is protected by dikes.

³⁴ Frédéric L. M. Rossano, *Floodscapes: Contemporary Landscape Strategies in Times of Climate Change* (Rotterdam: nai010 publishers, 2021), p. 60.

³⁵ Bernadette Tessier, 'Stratigraphy of Tide-Dominated Estuaries', in *Principles of Tidal Sedimentology*, edited by Richard A. Davis Jr. and Robert W. Dalrymple (Dordrecht: Springer, 2012), pp. 109–28.

³⁶ Darren Lumbroso and Freddy Vinet, 'A Comparison of the Causes, Effects and Aftermaths'.

³⁷ Rossano, *Floodscapes*, p. 253.

³⁸ Aristotle, *Meteorology*, edited and translated by E. W. Webster (London: Oxford University Press, 1931), <http://classics.mit.edu/Aristotle/meteorology.html>.

³⁹ Michel Desvigne, *Intermediate Natures: The Landscapes of Michel Desvigne* (Basel: Birkhäuser, 2008).

⁴⁰ André Corboz, *Ordine sparso: Saggi sull'arte, il metodo, la città e il territorio* (Milan: Urbanistica Franco Angeli, 1998), pp. 177–91.

⁴¹ Sébastien Marot, *Desvigne & Dalnoky: The Return of the Landscape* (New York: Whitney Library of Design, 1997), p. 11.

⁴² André Corboz, 'Memory, Method, Network, Opening', in Georges Descombes, *Il territorio transitivo / Shifting Sites*, edited by Giordano Tironi (Rome: Gangemi editore, 1988), p. 24.

⁴³ John Dixon Hunt, 'Les temps de l'histoire et l'invention du lieu', in *Le temps du paysage*, edited by Philippe Poullaouec-Gonidec, Sylvain Paquette, and Gérard Domon (Montreal: Presses de l'Université de Montréal, 2003), pp. 37–49, <https://books.openedition.org/pum/13884>.

⁴⁴ The concept of 'deep time' was first described in 1788 by the Scottish geologist James Hutton, although only coined as a term two hundred years later by the American author John McPhee. It is based on the idea that the Earth's mineral surface has been shaped by forces (for instance erosion and volcanic activity) with such slowness as to overwhelm the scale of human lives and furnish convincing images of eternity.

⁴⁵ Dominique Sellier, 'Analyse intégrée du relief et la sélection déductive des géomorphosites: application à la Charente-Maritime (France)', in *Géomorphologie: relief, processus, environnement* (online) 16, no. 2 (2010), pp. 199–214, <https://journals.openedition.org/geomorphologie/7931>.

⁴⁶ Ibid.

⁴⁷ The Flandrian transgression is divided into two stages: the Upper Pleistocene (17,000–6,000 BP), a period of rapid rise of sea level at the rate of 9 metres in a thousand years; and within the Holocene (from 6,000 BP to the present), marked by a progressive decline in the rate of sea-level rise, from 4 metres to 1 metre in a thousand years or by sea-level fluctuations close to the present level. See https://link.springer.com/referenceworkentry/10.1007%2F0-387-30843-1_190.

⁴⁸ Dominique Sellier, 'L'analyse intégrée du relief et la sélection déductive des géomorphosites.'

⁴⁹ A marine regression occurs either due to relative sea-level fall or to increased sediment supply during a time when the relative sea level is stable. . . . The opposite of regression is 'transgression, which occurs if the relative sea level rises and former land is submerged. See https://link.springer.com/referenceworkentry/10.1007%2F978-94-007-6238-1_196.

⁵⁰ Rossano, *Floodscapes*, p. 153.

⁵¹ Anuradha Mathur and Dilip da Cunha, 'Stop Thinking Water Somewhere / Start Experiencing Wetness Somewhere', in K. B. Hiesinger et al., eds., *Designs for Different Futures* (Yale University Press, 2019), pp. 192–203.

⁵² Dilip da Cunha, 'The Invention of Rivers' (Daniel Urban Kiley Lecture at GSD Harvard, 19 February 2019), <https://www.youtube.com/watch?v=39qJ3DKnPkg>. According to Dilip da Cunha, wetness is ubiquitous: it doesn't always hit the surface; sometimes it is suspended in the air, while other times it is part of the soil but not directly visible as water. From this perspective, natural phenomena such as the flooding of a river no longer exist: the river is not, in fact, water in between two lines, but a much more elastic entity which manifests itself through the rising and falling of water.

⁵³ European Landscape Convention*, 2000, art. 5, <http://efaidnbmnmbnbpcajpcgclcfndmkaj/https://rm.coe.int/1680080621>.

⁵⁴ Thomas Juel Clemmensen, 'Pluralising Nature: Rethinking the Skjern River Restoration Project', *Nordisk Arkitekturforskning / Nordic Journal of Architectural Research* 2 (2017), pp. 137–53, <http://arkitekturforskning.net/na/article/view/1118>.

⁵⁵ John Dixon Hunt, 'Les temps de l'histoire et l'invention du lieu.'

⁵⁶ Lisa Diedrich and Catherine Szanto, 'Introduction: Free the Woods from Anesthesia!', *Scape #15 Dossier Landscape Lab* (2016), p. 7073.

⁵⁷ Roland Gustavsson, 'Landscape Laboratories as a Scandinavian Concept: Concepts and Experiences Based on Twenty-Five Years of Experimental Work', in *Forestry Serving Urbanised Societies in the North Atlantic Region*, edited by C. C. Konijnendijk and H. Jóhannesdóttir, TemaNord 2010:577 (Copenhagen: Nordic Council of Ministries, 2010), pp. 131–63.

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⁶³ Sander van Alphen, 'Room for the River: Innovation, or Tradition?'

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⁶⁵ Rossano, *Floodscapes*, p. 95.

⁶⁶ Ibid., p. 101.

⁶⁷ Thomas Juel Clemmensen, 'Pluralising Nature'.

⁶⁸ Georges Descombes, *Aire: The River and Its Double* (Zurich: Park Books, 2018).

⁶⁹ Ibid.

⁷⁰ Transformation which is inscribed onto current or past practices that formed the landscape.

⁷¹ Michel Desvigne, *A Landscape Inventory*, edited by Dorothée Imbert (Columbus, OH: Applied Research & Design Publishing, 2018), p. 21.

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⁷⁹ Sébastien Marot, *L'art de la mémoire, le territoire et l'architecture* (Paris: éditions de la villette, 2010), p. 116.

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CAJAMARQUILLA: A NEW PROPOSAL FOR INTERVENTION IN ARCHAEOLOGICAL SITES

Alexander Auris Gonzales

ABSTRACT

As the speed of urbanization increases in the Global South so does the number of (archaeological) heritage sites that are being incorporated into the urban fabric. Attempts to protect such sites ban the people living near them from entering them, since preserving these spaces often takes place by completely closing off access to them. The broader consequences for urban space and its inhabitants and the effects on the urban dynamics are often neglected. These tensions between urban development, the preservation of archaeological heritage, and the everyday life of urbanites deserve our attention.

In this contribution we take a look at this paradoxical relationship. Cajamarquilla, a 167-hectare-large archaeological site with open boundaries in Peru is the study case. This site is analysed based on the possibilities that its condition offers the city. Paths are visible in the desert landscape of this site. They are a product of the repetition of trajectories that people take in order to go home, to school, the market, the bus stop, et cetera. Its open boundaries have enabled Cajamarquilla to become integrated into the dynamics of the city and the people living around it have integrated it into their everyday life. By analysing the paths as a sign of physical and cultural integration, an aesthetic experience, and an action of activism, the site is presented as an example for a new approach to public archaeology and tactics for appropriating and participating in such spaces.

KEYWORDS

Heritage, right to the city, landscape, archaeology

INTRODUCTION

In the city, there are monumental spaces and archaeological sites that have historical relevance and reinforce the identity of the city and its inhabitants. When a space or building is given a title such as 'patrimony of humanity' or 'national patrimony', it gains rights for its preservation, but this title simultaneously creates a barrier for the population and the city. The preservation of such spaces is expressed by enclosing their boundaries; this situation simultaneously has other consequences in the surroundings, such as making certain urban dynamics disappear. There is thus a paradoxical relationship in the action of preserving, since enclosing space creates a (physical and social) barrier for the population and makes one wonder if there is another approach to preservation that also involves the population in the process. The right of the people to use these spaces not only as visitors but as actual protagonists and dynamic agents is the main topic that this article examines by looking at a specific study case, the archaeological site of Cajamarquilla in Lima, Peru. Cajamarquilla is an archaeological site, a 167-hectare-large¹ – thus approximately the size of the historical centre of Lima – pre-Hispanic citadel located in the eastern zone of Lima, Peru. This archaeological site is listed by Peru's Ministry of Culture, which thus designated boundaries and a buffer zone for its protection. As of 1980, the surroundings began to be inhabited, and this urban expansion has become consolidated today. Although there is a boundary, the site is, however, still permeable and the inhabitants of the surroundings have been able to cross the archaeological site in different directions in order to reach their workplaces, markets, schools, or bus stops. Traces of these trails are inscribed in the desert surface of this site and are extensions of existing streets in the urban area. In some parts of the archaeological site, the new paths overlap the pre-Hispanic paths, which is how the population integrates this space into its daily dynamics and makes it a useful space for the city and not merely an urban void used solely for tourism. The relevance of this space is the openness of the site and its integration into the everyday activities of the people living around it.

METHODOLOGY

This article uses Cajamarquilla as an example of a new approach to interventions in archaeological sites that integrates people's rights to appropriate and participate in them, specifically in patrimonial sites. First, a general comment on the conditions of patrimonial sites in Peru and an analysis of the actual state of Cajamarquilla is presented so as to show the opportunities that the current conditions offer as a new approach to interventions. Secondly, the

article analyses actions that take place in Cajamarquilla that show the right to appropriate to this space. By revising the concepts of Michel de Certeau and Tovi Fenster, the article examines the existing paths as examples of an appropriation of the space. Thirdly, it analyses the right of the population to participate based on two concepts that integrate the population into the preservation of patrimonial sites. These concepts represent an epistemology of archaeology that introduces the reasons that make the population interested in the preservation of patrimonial sites today, and the concept of public archaeology offers a methodology for integrating the population into the study and preservation of an archaeological site. Finally, the main points of the research are addressed and presented as a conclusion of the potential of Cajamarquilla as a model for new interventions in others patrimonial sites.

HERITAGE SITES

Lima is a city of overlapping urban fabrics: beneath the contemporary fabric, there is the history of a pre-Hispanic city that has been depredated and occupied by the urban growth.

There are more than 360 recognized patrimonial sites in the city and most of them are surrounded by contemporary constructions. This has resulted in the disappearance of a large number of monuments in the territory, or in other cases, their reduction until they became islets with no apparent meaning for the modern city.²

In Lima, there are cases where patrimonial sites can still be appreciated, such as the Huaca Pucllana and Mateo Salado, which are examples where the restoration of the sites has contributed positively to the surrounding area and developed a more dynamic relationship with population. But there are other cases, such as the Huaca Paraiso,³ which was partly demolished by a construction company. Each one of these still existing patrimonial sites offer opportunities to recover and strengthen the identity or various identities of the Peruvian people, and also serve as resources for the citizens living around the sites by providing a source of cultural, educational, productive, and leisure-oriented activities.

The relation between these patrimonial sites and the city takes different forms, but it is always a boundary: a physical element that varies in form depending on the size of the specific patrimonial site, but always separates them from their surroundings visually, spatially, and even politically. Each

patrimonial site is put in a particular category such as national patrimony, archaeological site, or monument, and when they become of interest to a worldwide audience, they become human patrimony. These categories imply that different levels of budget and prioritization for conservation projects are assigned by the government or other organizations. When a physical space and the element that it contains are assigned one of these labels and/or categories, it gains rights for its preservation and conservation, but the label simultaneously becomes a delimitation between the space and the population living around it.

Patrimonial archaeological sites that are not defined by their own boundaries (such as heritage buildings) should always have a buffer space toward the contemporary development. There is a difference between how these areas are defined at each site, due not only to their locations or size, but also the political interest in them, which is assessed based on the economic value that

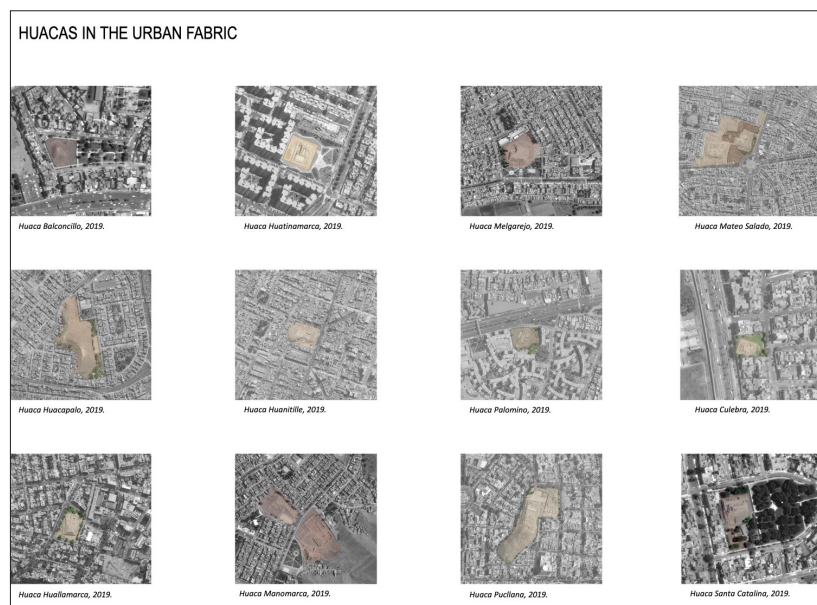


Figure 1: Huacas in the urban fabric. Source: the author.

the space surrounding them has. This has an impact on the accuracy of the boundaries of the archaeological site, the buffer zone, restoration projects, educational programs, et cetera.

In order to understand this differing treatment, I will compare two archaeological sites in Lima: Cajamarquilla and Pachacamac. These sites are two of the biggest contemporary mud citadels on the coast of Peru. The first was an administrative complex and the second a religious one. Nowadays, the treatment of these two areas is completely different. On the one hand, Pachacamac has received huge investment and attention over the last twenty years. This archaeological site has a site museum,⁴ several programs for rehabilitating and reconstructing the various buildings, and, in 2021, the National Museum of Peru was inaugurated in the buffer zone of this site.⁵ Cajamarquilla on the other hand has not received as much funding for excavations and other infrastructure projects. There is nonetheless a small interpretation centre, and the initiatives that take place there are collaborations between a variety of non-profit organizations and the population. The specific characteristic of the organization of this site will be presented later in this essay in the chapter on the right to participate. It is nevertheless important now to explain how the initiatives to rehabilitate these two sites have varied to such an extent. On the one hand, the rehabilitation of Pachacamac, which is overseen by the Ministry of Culture, is based on government decisions, and, on the other, the projects in Cajamarquilla arise from bottom-up initiatives that involve the population, community leaders, and non-profit organizations working in the area.

Cajamarquilla as a New Model

Cajamarquilla is a mud city located 20 kilometres from the coast of Lima. It was a great commercial centre due to the fact that the entire low valley was used for agriculture thanks to irrigation canals originating from the Rímac river, which is located 3 kilometres south of the site. Cajamarquilla experienced various stages of occupation: first the Ichma culture in the early intermediate period from 200 to 600 CE; from the Nievería culture with Wari influences from roughly 600 to 1000 CE; and finally, in the late intermediate period, the Ichma culture, from 1000 to 1476 CE, which came to an end with the invasion of the Spanish⁶ (Segura Llanos, 2001). It is difficult to understand the urban organization and development of the site due to the aforementioned multiple layers of occupation from different periods in history. As Canziani mentions in his book *City and Territory in the Andes*:

There was a relatively orderly development of the main complexes, such as the Tello Complex, which is located to the northeast. . . . On the other hand, in the sectors to the south and west, a very dense and chaotic configuration is observed that seems to be the result of the successive and spontaneous aggregation of structures without greater order or concert.⁷

The area around Cajamarquilla was uninhabited until the early 1980s. Due to the process of internal migration, the boundaries of the site started to be occupied: the first was the southern boundary; then, in the beginning of the 1990s, the northern boundary of Cajamarquilla was occupied and an educational building was positioned as a boundary. Nowadays, a large number of settlements border Cajamarquilla: Casa Huerta La Campiña, Santa Cruz, and Paraíso to the north, El Ayllu to the east, the Jicamarca ravine to the south, and the Nievería water canal, which borders various fields, to the west.

The occupation of these boundaries and the urban growth has had three clear impacts on in the territory of Cajamarquilla:

The first is the depredation of the agricultural land by the erection of materials factories and human occupation; as a result, only 40 per cent of the water of the irrigation canals is used today. These canals were very important for the ancient inhabitants of Cajamarquilla; the middle valley sector of the Rímac River has excellent agricultural lands, which is why the irrigation canals were developed and administered throughout the periods of occupation. The 7.7-kilometre-long Nievería canal is located on the right side of the valley and borders the southern side of the archaeological site. It enabled the population of the site to make use of the water for domestic and agricultural purposes. In addition, 'the Nievería canal was one of the determining factors for the construction and expansion of the Cajamarquilla archaeological site, which has a broad expanse of architectural material based on mud walls and adobones^{8,9}. Irrigation canals had a strong link with some heritage sites such as Cajamarquilla, but they are today being used to a lesser extent and their close relationship with the site is therefore no longer evident.

The second consequence is the new state of Cajamarquilla's boundaries towards the city. On the southern edge, a dry creek serves as a boundary and separates Cajamarquilla from the urban area; on the western edge, it is delimited by an irrigation canal that is still in use, and on this side of Caji-

marquilla the boundary is very clear and there has be no depredation of the patrimonial site. On the northern boundary, a communal centre, a park, and a school serve as a buffer zone for the archaeological site. On the eastern boundary, there is now a new industrial zone and this boundary is thus in the

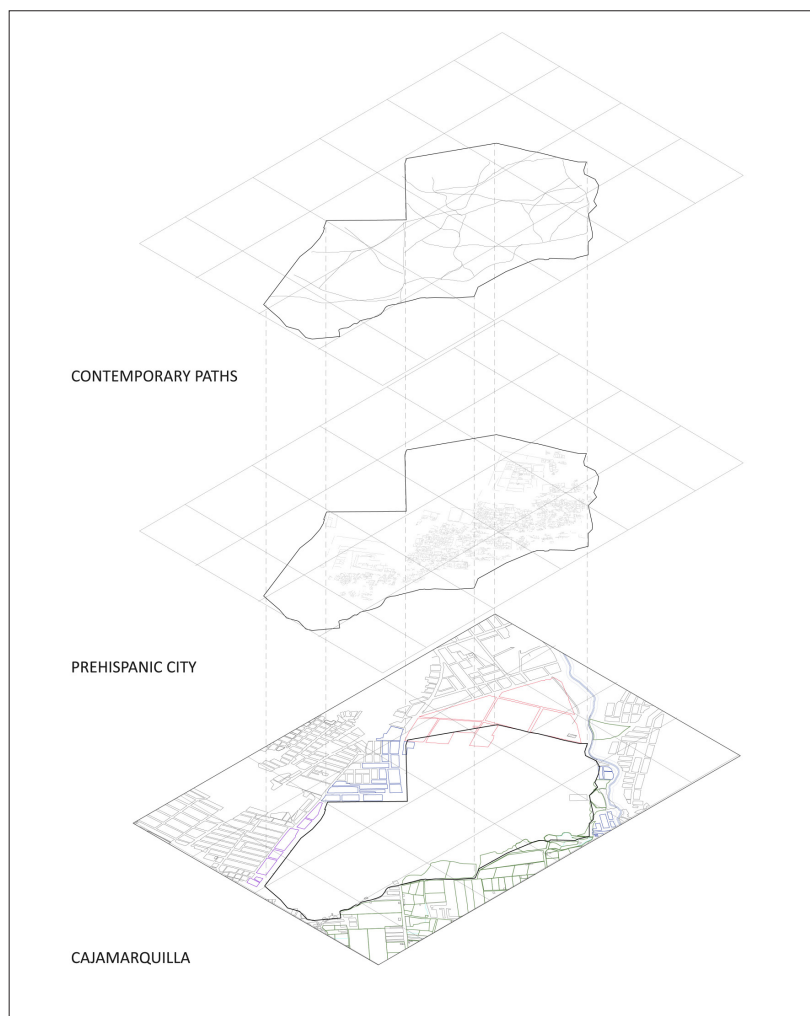


Figure 2. Superposition of urban fabrics (2015). Source: the author.

worst condition: the industry has occupied a part of the archaeological zone through excavations to obtain construction materials, and this has altered the boundaries of Cajamarquilla. Part of the reason why the initial boundaries have not been respected is that the archaeological zone is only partially registered in public records (SUNARP) which makes the task of protecting the site's boundaries even more complicated.

In Lima, where most of the archaeological sites are situated within the urban fabric, some of them have been fenced off based on a policy of the Ministry of Culture, which supports an archaeological discourse that emphasizes conservation over the social dynamics or other benefits that an open site might provide to the population.

The construction of perimeter protection fences has become more frequent in recent years, especially in monuments that are subject to improvement. . . . The sites that have this kind of protection are, however, very rare compared to those that do not have it, being difficult to enclose them when they are extremely extensive.¹⁰

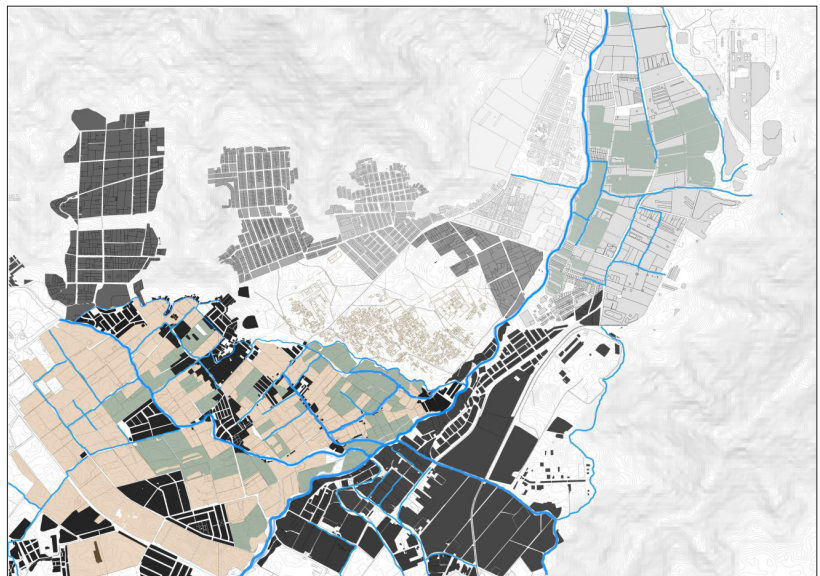


Figure 3. Urban growth: blue black to grey, from the 1980s to 2010. Source: the author.

Cajamarquilla is the largest mud city on the central coast of Peru, so it was not possible to enclose it. The damage is nonetheless comparable with that of other patrimonial sites with physical boundaries. On the other hand, over the years, its open boundaries have enabled different dynamics to occur within its grounds, exceptional dynamics that are not found in closed archaeological sites and make it worth questioning whether the establishment of physical limits is the most appropriate response to dealing with heritage spaces. The conditions of this site are particular due to its size and complexity. The new layer of contemporaneity, the paths left by the life of the city, make Cajamarquilla an even more interesting case of study. These paths and traces are the next consequence of the occupation of the boundaries of Cajamarquilla that will be analysed.

The third consequence is the footprint that the city has generated in Cajamarquilla: these traces are paths crossing from one side of the archaeological site to the other, connecting people with schools, their homes, or bus stops and making transit a different experience, in which the solitude enables people to perceive the landscape, the topography, and the city from a fair distance. These paths are a way to domesticate and reclaim this large uninhabited space, an approach to integrating it, and one could say even to urbanizing it. In some way, Cajamarquilla is thus still in use centuries after its construction, which has always been its nature.

The exceptional continuity of occupation of Cajamarquilla, from its origins during the Lima or Maranga era, passing through the occupations corresponding to the Middle Horizon, Late Intermediate and even the Late Horizon offer an exceptional testimony of continuity in the urban validity of this city.¹¹

Even though the former city of Cajamarquilla is not occupied per se today, people still manage to interact with it and walk through it on a daily basis. Sometimes the paths they use go over the pre-existing streets of Cajamarquilla, other times they go through open areas, and some even cross over the walls of mud, adding various layers of contemporaneity to this archaeological site. The fact that it is possible to have a close relationship with this heritage site is a privilege, but also enables the inhabitants of the surrounding areas to have a sense of belonging that might be translated, with good guidance, into actions of caring for and preserving the site.

This is all possible due to the fact that the Cajamarquilla archaeological site does not have closed boundaries, which thus enables all of the dynamics that happen in the city to cross the archaeological site as well. Its physical condition creates the space for appropriation that will be the next point of analysis in this article.

THE RIGHT TO APPROPRIATE

Before the lines of paths appeared, the arid surface of Cajamarquilla was a silent site. With the beginning of the urban expansion and the populating of its boundaries, the site started to be perceived as strange. People living around it began having a need to walk through it and cross it in various directions. They did so in order to connect with other urbanizations around the site and with the rest of the city. Walking became an action performed on the site and started to draw its traces on it. This section of the article analyses the right to appropriate this space through using it on a daily basis. The action of walking is examined on two different levels: one focuses on the social approach of this action, on the construction of belonging in urban space; and the other section analyses the physical consequence of walking in Cajamarquilla and its relevance.

There is a connection between the right to use the city and the right to belong in de Certeau's theory on *The Practice of Everyday Life*.¹² He claims that a sense of belonging is constructed through the use of 'tactics,' one of which is walking:

The ordinary practitioners of the city live 'down below,' below the thresholds at which visibility begins. They walk – an elementary form of this experience of the city; they are walkers, Wandersmänner, whose bodies follow the thick and thins of an urban 'text' they write without being able to read it.¹³

'This construction of a syntax is part of the process of appropriation and territorialization.'¹⁴ Walkers have the potential to become individual designers of their own trajectories, and the process of appropriation/belonging can be individual in relation to how much each individual uses the city. The process of belonging can also be developed by groups through the use of public space and the repetition of certain practices. Viki Bell engages with these repetitive practices as 'performativity and belonging'.¹⁵

Performativity as the repetition of certain performances which are associated with ritualistic practices with which communities colonize various territories. These performances are in fact the realization of the right to use in certain spaces and through them a certain attachment and belonging to place is developed.¹⁶

Walking becomes a performance and the repetition of the same path creates not only a communal story, but also a common approach to appropriation and belonging in the city.

Claiming belonging in a representative but not confrontational way, such as leaving signs of a particular action in the surface of Cajamarquilla, is the representation of the use and integration of this space into the daily routines of the people living around it. Belonging to a site gives people the readiness to protect and reclaim their rights, and closing the boundaries of this site would also limit the people's right to free transit. These signs of belonging, these new paths in Cajamarquilla today, did not exist prior to the urban expansion.

The populated areas that now exist around the Cajamarquilla site are of low socioeconomical status and have many deficiencies. Less than ten years ago, some of these settlements did not even have access to potable water within their reach. Nowadays, they still struggle to find some services close to their homes. They therefore have to go to Nievería or Vitarte to buy products they cannot find in their area, or to go to the dentist or the doctor. They cross this archaeological site not only to go to school or visit friends, but also to obtain medical aid or products to fulfil basic needs. This is why these paths not only represent the desire, but also the need of these people to be connected to the rest of the city. Understanding this also means comprehending why the archaeological site might seem like a hindrance for some of them, but also shows how they have appropriated it and how it is now part of their daily routine and identity. This gives them a sense of belonging to the place that can serve as the basis for participatory projects in the future.

These traces are the result of the performative tactic of belonging. But how did these lines acquire their specific shape? Two points are joined by a straight line; in the context of Cajamarquilla, this straight line is modified by the topography, the pre-Hispanic buildings and the connections of the existing streets. Before the paths were created, many more traces were marked on

the terrain. These traces were part of *dérives*,¹⁷ of people who passed through Cajamarquilla. The archaeological site provides sufficient landscape resources to create a *dérive* based on the landscape and the pre-Hispanic buildings. The freedom that existed forty years ago, when there was no sign of surveillance, allowed for all sorts of possible *dérives*. But how can we explain that, among all of these *dérives*, some have been traversed more frequently and become desire paths?

'Desire path is a term given by French philosopher Gaston Bachelard that refers to pathways made by people or animals that are marked by the erosion in a soft surface.'¹⁸ These paths connect points of attraction for people, or they can simply be transitional spaces that are different than the paths and roads proposed by urban planning. But, as de Certeau claims, these traces show an absence of action (people walking, passing by, movement) and thus have the capacity to make invisible the operations that made them possible.¹⁹

In the arid surface of Cajamarquilla, some of these desire paths are extensions of existing streets on the urban periphery. As an action of appropri-

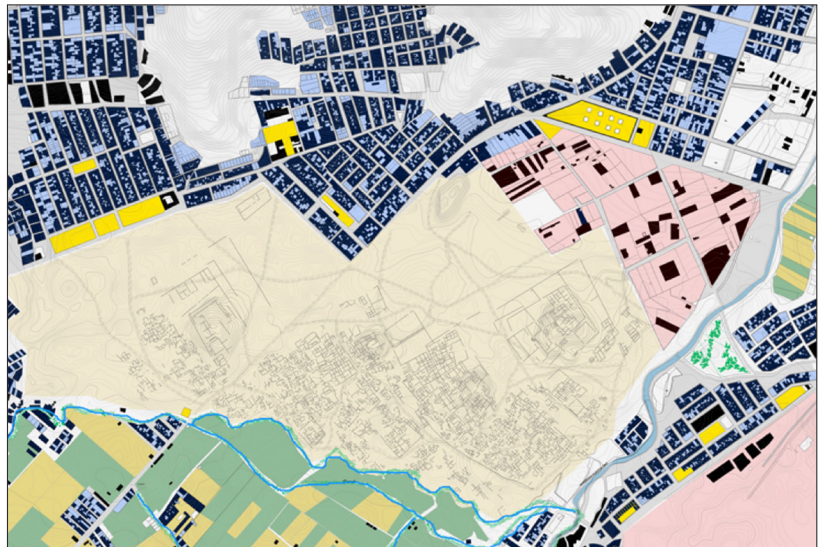


Figure 4: Land use (Cajamarquilla 2015). Blue = housing, red = industry, light yellow = brick factories, green = agricultural areas, and bright yellow = public program (educational, commerce, markets) – source: the author.

ation, these desire paths might take the names of the existing streets; each line could be given a name, and this could also be a way of appropriating Cajamarquilla and including these names in the rhetoric of their walking. As de Certeau states, there is a rhetoric in walking just as in speaking, and each person has a 'way of operating'.²⁰ Allowing the desire paths to be named would help articulate the trajectory of people's steps and would facilitate the creation of memory and inclusion in the population's system of reference. These desire paths have been there for decades, they claim that they are part of the city, which they are on a practical as well as social level. The desire paths are thus already an approach to urbanizing this arid space.

THE RIGHT TO PARTICIPATE

The dynamics that occur in Cajamarquilla today can be considered indications for the development of a new model for managing archaeological sites within cities like Lima. Over the years, there have been various proposals that have sought to encourage citizen participation, such as an initiative by the state, and hand-in-hand with NGOs working in the area. These three agents (the population, the government, and NGOs) have tried to manage



Figure 5. Traces on Cajamarquilla's surface. Photograph: the author.

and develop proposals for the site both jointly and individually and have had some successes and failures. This part of the article seeks to analyse this new model for managing archaeological sites based on the interventions in the site, the importance of educational activities for the population, the relationship between the aforementioned protagonists and the community's level of participation and involvement in making decisions with respect to interventions in the site.

Within the discipline of archaeology, there have been concerns about the participation of the population in the process of preserving patrimonial sites, communicating discoveries beyond scholarly circles, and the interest that motivates people to become part of this. These topics claim the importance of participation and the benefits it produces with respect to the attitude towards patrimonial heritage and its preservation. Participating as a dynamic protagonist and not only as a visitor means including the ideas of citizens in the management and making of decisions about interventions that might affect them.

Public archaeology is a discipline that studies the relations between archaeology and contemporary society, with all their implications, whether economical, sociological, or political.²¹ It is a relative new discipline that saw the need to open up the practice of archaeology to the public and now serves as an opportunity for new approaches. As Gabriel Moshenska describes it: 'It refers to archaeological work conducted by professionals which includes, by design, the provision of participation opportunities for members of the public or a specific community.'²² The people become an important agent of participation and this can be expressed in various examples of participation.

It is very difficult to realize the importance of preserving patrimony when it can be regarded merely as empty land and as a possible space to invade, especially in the case of housing a crisis. In his essay 'Proposals for an Epistemology of Heritage', Joan Feliu Franch describes twelve principles that lead people to defend and protect heritage. Among them, he states the management of patrimony should be thought of from the perspective of contemporaneity and as a both intellectual and social act. He states that the management of patrimony has to be autonomous from the past and has to consider the people who it is aimed at. This denotes including the needs and cultural background. Otherwise, it will be perceived as a gap, the consequence of which is that whenever there is a situation of cultural threat, the population will not react.²³

The approach of public archaeology benefits not only the community from the immediate surroundings of the sites, but also visitors and authorities, because it creates a horizontal dialogue between multiple protagonists and facilitates discussion of a variety of ideas. It generates an atmosphere in which everyone's opinions are heard and valued. This thus enables everyone to benefit, but also to take responsibility for the decisions made regarding the archaeological site.

In recent years, the idea has emerged that each individual's right to benefit from cultural heritage is fully completed also through his or her involvement in the definition of the process, and therefore the activities, of managing and preserving cultural heritage.²⁴

Through a participatory process, people increase their involvement with the site and this enables them to strengthen themselves as a community with something in common: an archaeological site to care for.

A small interpretation centre was created in Cajamarquilla in 2010. It was built with the help of the NGO Cesal and also served as a communal centre; it thus had an enormous impact on the participatory presence of the population. Paulo Bejar,²⁵ one of the archaeologists who worked there for seven years, agreed to be interviewed for this article. He provided valuable information on how the interpretation centre operated, and the challenges and achievements along the way. The interpretation centre was built as a response by the Ministry of Culture to multiple conflicts between the inhabitants of the surrounding areas of the archaeological site and the ministry's policies. The event that triggered the establishment of the interpretation centre occurred in 2009. La Campiña, a neighbourhood to the north of the site, had no access to the potable water system (a different reality than in the area to the south and west of the site). One evening, the inhabitants of La Campiña therefore installed a clandestine pipeline across the archaeological site in order to bring water to their area. This installation was executed as a communal task, the National Institute of Culture (INC) tried to stop their activities, and that provoked a confrontation and physical attacks by the residents on the authorities. The root of this conflict was the lack of communication between the INC and the population, since the latter sought to obtain authorization to install the pipeline, but never received a response. The bureaucracy got the petition of the community stuck in the offices of the INC for more than nine months. The interpretation centre was thus established as a way to connect

the population with the authorities horizontally through pursuing reconciliation with the people.²⁶

The interpretation centre operated from 2010 to 2017 and had two permanent archaeologists, even though no excavation work was currently taking place. They were in charge of communicating with local leaders, educational institutions, and local companies to address their doubts and requests; they also took responsibility for dealing with incursions²⁷ into the site. The two main achievements of the interpretation centre during its seven years of operation, as described by Paulo Bejar, were empowering local leaders and working with educational institutions in the area.

The first achievement was realized in cooperation with representatives of the different settlements, who though they had come up with ideas for the place over the years, no one had listened to them. The interpretation centre, subsequently known as the Decentralized Module for Citizen Participation, enabled the population of the area, represented by local leaders, to participate by sharing their ideas for interventions in the site. As Paulo Bejar mentioned, the community around the site had a large number of ideas based on their latent needs. Among their proposals was the creation of a living fence, the cultivation of a garden of native species, and the installation of a sports field.²⁸ Most of these proposals could not be carried out due to legislative hurdles, but the fact that they had a group of specialists to listen to their ideas and take them into consideration empowered the community and created a better environment for a participatory process.

The second achievement was also very important because it enabled students to acquire knowledge about Cajamarquilla as a result of the inclusion of the topic of local cultural heritage in the curricula of some of the schools. The archaeologists also visited schools to talk about the site and organized guided visits for students. This educational activity was more intense and necessary on this site because of the particular reason for its open boundaries, which enabled these children to cross the archaeological site in order to go to school. The aim of the program was for children to learn about the importance of the patrimony with which they coexist, so that they would respect and not damage it. By having the different areas of the archaeological site explained to them, the children absorbed information about its architecture and then recognized and understood the place when they subsequently went

through it. The subject of Cajamarquilla was not only studied from a historical perspective, but was also incorporated to the curricula in an integral way, as part of other classes such as mathematics or science. These activities added a layer of familiarity and enabled them to include these points in their system of references, creating a broader network that linked school, home, and Cajamarquilla.

Other educational programs took place at the interpretation centre on the initiative of the Ministry of Culture and were financed by NGOs as well as private companies. One of them was the Weaving Women Project.²⁹ This project selected residents living in settlements around the site to teach them, through daily workshops, the weaving techniques used by the ancient cultures in the area. This project was not only created with an educational objective, but was also supposed to provide them with new working skills with an economic value. Such programs facilitated a change in perspective for the neighbours around the archaeological site, from seeing it as a hindrance to regarding it as an opportunity for the community. Such projects also helped strengthen the ties between the population and other protagonists such as the authorities or private companies, which is an important part of any participatory process.

In 2017, the interpretation centre closed its doors due to new management in the Ministry of Culture, which decided not to continue the project. Until then, the interpretation centre had managed to reconcile the present and the past in the area, and to reshape the relationship between the community and the heritage site as described on the web page of the *Qhapaq Ñan Project*,³⁰ a project developed by the Ministry of Culture. Unfortunately, today the interpretation centre is closed and abandoned, but the impact it had during its years of operation remains. Its appropriation by the population as a communal centre and the activities of the Ministry of Culture and its educational programs around the site reinforced the sense of community and people's cultural awareness. This local protagonist also had a great potential to shape a participatory presence in the making of decisions related to the archaeological site, which might have provided a very important example of citizen participation and public archaeology, which is not widespread in the city. Hopefully, the authorities will recognize the importance of this centre and consider restarting the project and continuing to facilitate a participatory process in Cajamarquilla.

As mentioned in the paper 'A Participatory Approach for Circular Adaptive Reuse of Cultural Heritage':

The interpretation of cultural heritage as a common good implies the adoption of more innovative governance policies and solutions capable of grasping this complexity and responding to the changing needs of communities.³¹

Cajamarquilla should be perceived as a common good and as a resource for the communities in its surroundings. The establishment of an interpretation centre was thus a first step in what might have turned out to be a participatory process without precedents in Lima.

Strengthening a sense of community makes it possible for the population to be part of the decision-making regarding topics related to the archaeological site that is their neighbour. This enables them to not only raise their voices in preservation actions, but also to actively fight for and reclaim their rights from the government as well as reclaim a more responsible attitude from other protagonists such as private investors. Cajamarquilla's actual condition of open boundaries should not only be physical, but social as well. Including the population in participatory events such as educational programs and involving local organizations in the planning and inquiries with respect to future interventions provide the basis for an original approach to new interventions in patrimonial sites.

STATE OF RUIN AS AN OPPORTUNITY

Cajamarquilla's mud walls have been eroded by the wind, water, and vandalized by people with access to the site. Traces of these acts of vandalism go back to the beginning of 1900. Today, the once inhabited citadel can be described aesthetically as a ruin. While this article does not focus on the various academic definitions of *ruin*, it is nonetheless important to mention the opportunity that this word provides with respect to a new vision for this archaeological site.

The negative connotations that this concept has for the population and the government in turn create space to approach the site in a different way. On one hand, it is seen as a ruin, which means that it is a potential space where the city can grow; and on the other, it is perceived as a burden for which they carry responsibility. The juxtaposition of the desire to occupy and neglect by

the government creates a space for freer negotiations about the future of the site.

This is a real situation today, and this condition thus facilitates active participation by the population. But what if we think instead of a more utopian alternative? What if we embrace the state of ruin in the site and accept its future disappearance?

Merely thinking about the possibility of the site disappearing opens up a wide range of questions, such as how can its disappearance be planned? What is the future use of this space? How can archaeological excavations take place? How long would it take to see the site erode completely or be camouflaged by proliferating nature? Although these questions are now being raised in this article, the author's stance is not to make the site disappear or for it to be abandoned; instead, by addressing this alternative view, these new questions can be used as tools that can be integrated in a realistic future plan for the site.

NEW AND FAILED PROJECTS

In addition to the desire paths on the surface of Cajamarquilla, there have also been attempts by the population to appropriate this space in a more permanent way. There have been multiple incursions over the years, generally by people who do not really understand the complexity of this site and see the broad open spaces as an opportunity to resolve their issue of a lack of housing. Some traces have also been left on the site as a product of other attempts at appropriation, such as a clandestine cemetery in one area of the site and a villa that was built near it in the 1960s. On the other hand, people see a communal potential in this space and think about an appropriation that benefits its neighbours by means of different initiatives like the creation of gardens of native plants or a sports field. This approach shows that this space is thought as a resource for the community. It is probably how the authorities should think about this space as well and how they should approach proposals for interventions in the site or at least on its boundaries.

One possible project for the boundaries of the site was designed by SERPAR (Servicio de Parques de Lima) some years ago thorough taking into consideration the needs of the population of the area. A team of architects and other professionals contacted various representatives of the neighbouring population and asked for their opinion by means of focus groups.³² The team

proposed a cultural park, with the idea being that the population would thus use this archaeological zone to a greater extent. They acknowledged that it was already being used intensely, but solely for daily travel, and they considered it important to generate permanence and translate this walking activity into other activities in the area.³³

These projects have only remained on paper, since the lack of continuity in these initiatives corresponds to the change of presidents, ministers of culture, or local mayors.

CONCLUSION

Enclosed Sites and Possibilities for Boundaries

While it is important for the inhabitants from around the archaeological site to know where the protected space begins and ends, this should not imply that the site is enclosed. From the perspective of the physical analysis of the site, Cajamarquilla does not show damage where the edges are natural, or where the government, in negotiation with the community, has installed public facilities (in order to prevent illegal occupation). However, the archaeological site has been affected to the greatest extent in places where industry is located in the surroundings.

While physical delimitations such as walls or fences are a traditional approach to protecting a heritage space, it is more sustainable to think about other possible designs for these boundaries. A design that is conceived as a process that interweaves the lived experience of the population, leaders of the community, and educators with the professional experience of designers, architects, artists, archaeologists, and governmental agents. Design and negotiation with the population should not be seen as two different strategies, but instead as part of the same process.

Borders as Interfaces: Space and the Agency and Role of Architects

The definition of limits should help prevent incursions, by both the population and industry. The boundary should not be seen as an abstract line that divides properties, but as a thick limit: an interface. An interface that separates (or connects) past and present, the pre-Hispanic with the contemporary city. By interface I mean a transitional space that allows for the interaction of users. This is translated not only in the design of these interfaces, but also in the governance and decisions regarding how they are developed. The inter-

action should be present in the process of design and in the finished built intervention.

In this process, the agency of space and architects become relevant so as to start thinking about new solutions that include the community, landscape, and patrimony.

Designing with Desire

Designing with desire. With this, I mean design that arises from the needs, dreams, and desires of population, a bottom-up system in which the architect becomes an enabler for making these desires materialize as spatial proposals. By being true to the desires, the space can be kept active and part of the dynamics of the city. The population around Cajamarquilla has created new urban dynamics as a result of the lack of government presence. This alternative approach must be valued because it is a reaction by the population and turns this dynamic into a search for belonging, place-making, visibility, and the right to their city. The process of appropriating these spaces and the resulting new dynamics should be considered as a new model of coexistence between communities and archaeological sites. Cases like Cajamarquilla deserve to be studied and could be taken into consideration in new approaches for the management of heritage sites. Opening up archaeological sites in the city and letting people make use of them for various activities increases the sites' value for the community and creates a contemporary layer that overlaps the archaeological ones. This layer perpetuates the use of an ancient space like Cajamarquilla, which has kept evolving for centuries as a result of its being occupied by different communities. Here the role of design becomes relevant again so as to imagine what the future uses, temporal or permanent, that these spaces could embrace are: designs led by architects and artists in dialogue with the community.

Desire Paths and Constructing Belonging

It can be said that the desire paths reflect the real needs of the people who use the site. They, however, also reflect a subtle approach to domesticating Cajamarquilla, since these are marks have been made on the desert surface over several decades.

The way we construct belonging to the city is by means of the frequency with which its spaces are used and the repetition of actions such as walking

through them. In this sense, keeping Cajamarquilla a space that people use, even if only as a space of transit, can lead to the development of a sense of belonging. And this can also translate into responsibility and care for it, can make its neighbours assume the duty of protecting this space. While the lines above include several suppositions, by validating experience as knowledge, we can say that people take care of their homes and neighbourhoods, and the heritage site has the capacity to become a part of this system.

Cajamarquilla facilitates the flow of urban dynamics of the population and makes this space part of their everyday life. Besides the fact that it is extremely different from the other places they walk by on their daily routines, crossing this site every day enables them to recognize this space in a different way; and this remains in their memory. In the personal experience of the author, walking through Cajamarquilla makes the passing of time feel slower, the distance to the city makes some sounds more present and the temperature become more extreme. In addition, because the desire paths are extensions of the existing streets, they expand the system of references of the people that walk along them. And by connecting the contemporary and pre-Hispanic cities in a line, the references and landscape that one sees on this route broaden the understanding of urban space. This makes the openness of the space go from being physical to social, since the system of references is shared by the community and identifies them.

Public Archaeology

Public archaeology as a discipline has already begun to reveal the importance of the involving the population in the process of rehabilitating archaeological sites. With the interpretation centre, Cajamarquilla previously had an attempt to involve the population and encourage citizen participation as an initiative by the authorities, but this process stopped when the centre was closed a few years ago. This process resulted in several achievements, one of the main ones being the work with schools in the area. Education is one of the pillars of heritage conservation, since having a population that is informed about the archaeological site with which they coexist prevents risks of damage to it and generates a better atmosphere between the site and the people. This education process should function in both directions. Professionals and institutions should also remain open to how they can learn from the lived experiences of the community.

Agents and Governance

Cajamarquilla is an example of an alternative, bottom-up approach to governance in patrimonial sites. Since the boundaries of the site began to be occupied, there have been negotiations between the population and the government. The authorities play an important role in the management of any archaeological site, and new approaches to this issue should also be reflected in the proposals for future interventions in patrimonial sites. Governmental authorities have the ability to convene participatory processes that guarantee the involvement of other protagonists such as private companies, non-profit organizations, and the community. Currently, the Ministry of Culture of Peru engages in a discourse associated with conservation above all. It invests in various some archaeological excavations and infrastructure (information centres, museums, et cetera), but little attention is currently being given to community involvement, especially in sites like Cajamarquilla, which do not have the characteristics to become a huge touristic attraction. There are, however, various policies referring to the democratization of access to these sites that the ministry tries to follows. This translates into free access for Peruvians or people who live in the same province. This is nonetheless not sufficient, since true democratization of archaeological spaces implies that the population can contribute to decisions regarding the future of such sites, especially if they are the community affected by what happens in these spaces on a daily basis.

Through the action of non-profit organizations in the area, people can be motivated to make Cajamarquilla an exemplary space of struggle for its preservation by the state. The presence of the leaders of the various settlements and their desire for change and a better space to live offer a big opportunity to create a participatory process that benefits both the preservation of the site and the community as well. People have needs and these are projected onto Cajamarquilla. It is important not to disregard the desire of the population to intervene in the site, but instead to help them understand that this is not merely a large unused space, but an opportunity: a space where they can participate by providing input and designing possibilities that benefit the urban space, their quality of life, and the preservation of Cajamarquilla as well.

NOTES

¹ The actual surface area is not defined due to the continuous predation of its edges and various bureaucratic issues

² V. Chirinos, 'Encounters and disagreements around archaeological heritage in metropolitan Lima [encuentros y desencuentros entorno al patrimonio arqueológico en lima metropolitana]', *Arkeopáticos: Textos sobre arqueología y patrimonio* 3 (Spring 2013), p. 44.

³ 'Ministry of Culture will denounce real estate companies for destroying El Paraíso temple [Ministerio de Cultura denunciará a inmobiliarias por destruir templo de El Paraíso]', *El Comercio* (2 July 2013).

⁴ The Pachacamac Museum, designed by the Peruvian studio Llosa Cortegana Arquitectos, was among the six finalists of the international architecture competition Mies Crown Hall Americas Prize in Chicago, Illinois, USA. 'Pachacamac Site Museum is a finalist for an important international architecture award [Museo de Sitio Pachacamac es finalista de importante premio internacional de arquitectura]', *Ministry of Culture* (24 June 2016), <https://www.gob.pe/institucion/cultura/noticias/48754-museo-de-sitio-pachacamac-es-finalista-de-importante-premio-internacional-de-arquitectura> (all URLs accessed in May 2023).

⁵ The competition for the design of the National Museum was won by the architect Alexia León Angell. It was inaugurated in July 2021. Nicolás Valencia, 'First place in the ideas competition for the National Museum of Peru [Primer Lugar en concurso de ideas para el Museo Nacional del Perú]', *Archdaily* (29 August 2014), <https://www.archdaily.pe/pe/626140/primer-lugar-en-concurso-de-ideas-para-el-museo-nacional-del-peru>.

The contest for Pachacamac Park was held in May 2019 and was won by the team made up of the architects Alfaro, Lachhwani, and McKay. Fabian Dejtjar 'The winning projects of the Parque Pachacamac contest in Lima: archaeology and ecology will have the same meaning [Los proyectos ganadores del concurso Parque Pachacamac en Lima: arqueología y ecología tendrán el mismo significado]', *Archdaily* (12 May 2019), <https://www.archdaily.pe/pe/916799/los-proyectos-ganadores-del-concurso-parque-pachacamac-en-lima-arqueologia-y-ecologia-tendran-el-mismo-significado>.

⁶ R. Segura Llanos, *Rite and Economy in Cajamarquilla: Archaeological investigations in the Julio C. Tello Architectural Complex [Rito y economía en Cajamarquilla: investigaciones arqueológicas en el Conjunto Arquitectónico Julio C. Tello]* (Lima: Fondo Editorial de la Pontificia Universidad Católica del Perú, 2001), p. 200.

⁷ José Canziani, *City and Territory in the Andes [Ciudad y Territorio en los Andes]*, 2nd ed. (Lima: Fondo Editorial de la Pontificia Universidad Católica del Perú, 2015), p. 391.

⁸ The adobones are mud bricks used by ancient cultures for structures especially in coastal areas of the country.

⁹ Y. Huaman, 'The Late Intermediate Period in Cajamarquilla from the evidence of the Tello sector [El Periodo Intermedio Tardío en Cajamarquilla a partir de las evidencias del sector Tello]', *Arqueología y Sociedad* 34 (2021), pp. 367–415.

¹⁰ Pedro Espinoza, 'The management of archaeological monuments in Lima, Peru: overview, diagnosis and proposal [La gestión de monumentos arqueológicos en Lima, Perú: panorama, diagnóstico y propuesta]', *Córima, Revista de Investigación en Gestión Cultural* 2 (2017), <https://doi.org/10.32870/cor.a2n2.6083>.

¹¹ Canziani, *City and Territory in the Andes*, p. 392.

¹² Tovi Fenster, 'The Right to the Gendered City: Different Formations of Belonging in Everyday Life', *Journal of Gender Studies* 14, no. 3 (2005), pp. 217–31.

¹³ Michel de Certeau, *The Practice of Everyday Life* (Berkeley: University of California Press, 1984), cited in Fenster, 'The Right to the Gendered City', p. 222.

¹⁴ Fenster, 'The Right to the Gendered City', p. 222.

¹⁵ Vikki Bell, 'Performativity and Belonging: An Introduction', *Theory, Culture and Society* 16, no. 2 (April 1999), pp. 1–10, cited in Fenster, 'The Right to the Gendered City', p. 223.

¹⁶ N. Leach, 'Belonging: Towards a Theory of Identification with Space', cited in Emma Rooksby, *Habitus: A Sense of Place*, edited by Jean Hillier (Aldershot: Ashgate, 2005), p. 288.

¹⁷ A *dérive* is a method of moving through the city used by the Situationists and described by Guy Debord in the 'Theory of the Dérive', consists of walking through the spaces of the city without any apparent intention or plan, and letting oneself be carried away by the attractions that can be felt in the moment.

¹⁸ Manuela Sanoja, 'Desire lines: collective intelligence against bad urban design [Líneas del deseo: inteligencia colectiva contra el mal diseño urbanístico]', *La Vanguardia* (January 2019), <https://www.lavanguardia.com/vivo/ciudad/20160307/40264404805/lineas-del-deseo-caminos-del-deseo-ciudad.html>.

¹⁹ Certeau, *The Practice of Everyday Life*, p. 91.

²⁰ Ibid.

²¹ Neal Ascherson, 'Editorial', *Public Archaeology* 1 (2000), pp. 1–4, <https://doi.org/10.1179/pua.2000.1.1.1>.

²² Gabriel Moshenska, *Key Concepts in Public Archaeology* (London: UCL Press University College London, 2017), p. 5–6.

²³ Joan Feliu, 'Proposals for an epistemology of Heritage [Propuestas para una epistemología del Patrimonio]', *Devenir* 1, no. 2 (2014), pp. 11–25, <https://doi.org/10.21754/devenir.v1i2.233>.

²⁴ Antonia Gravagnuolo, Serena Micheletti, and Martina Bosone, 'A Participatory Approach for "Circular" Adaptive Reuse of Cultural Heritage, Building a Heritage Community in Salerno, Italy', *Sustainability* 13 (2021), <https://doi.org/10.3390/su13094812>.

²⁵ Enrique Paulo Béjar Purizaca graduated from the Universidad Nacional Mayor de San Marcos with a degree in archaeology. He is currently earning his master's degree in sociology with a minor in political studies at the same university, where he works on the issues of politics, hegemony, and discourses in the cultural management of the Cajamarquilla archaeological zone. He has worked in the field of cultural and community management for roughly ten years, the highlight of which was his seven years of work in the citizen participation module (Cajamarquilla interpretation centre).

²⁶ Paulo Bejar, 'Cajamarquilla Interview' [interviewed by Alexander Auris] (21 September 2021).

²⁷ Incursions are an illegal method of land grabbing, usually carried out by people with limited socioeconomic resources looking for a place to settle. They choose areas where there is a lot of empty land, and archaeological sites are often victims of this because there are large unexcavated spaces and their protection is not always guaranteed.

²⁸ Bejar, 'Cajamarquilla Interview'.

²⁹ 'Weavers de Cajamarquilla: new experience of the Ministry of Culture and private companies [Tejedoras de Cajamarquilla: nueva experiencia del Ministerio de Cultura y la empresa

privada]’ *Ministry of Culture* (12 August 2013), <https://www.gob.pe/institucion/cultura/noticias/46542-tejedoras-de-cajamarquilla-nueva-experiencia-del-ministerio-de-cultura-y-la-em-presa-privada>.

³⁰ Ibid.

³¹ Gravagnuolo et al., ‘A Participatory Approach for “Circular” Adaptive Reuse of Cultural Heritage’, p. 5.

³² They found out that their main interest was having green areas around them as well as recreational spaces for themselves and their children.

³³ Unfortunately, this project did not come about due to the ministry’s bureaucratic obstacles. The way in which this project approached the problem was appropriate because it regarded the neighbours as decision-making agents, since, ultimately, it is their space and they are the ones who are going to make use of it.

LIFE-CYCLE ASSESSMENT OF TRANSFORMATION SCENARIOS OF A TRADITIONAL DANISH HOUSE

Teddy Serrano, Thomas H. Kampmann, and Morten W. Ryberg

ABSTRACT

Renovation is usually seen as more environmentally friendly than restoration, but little information can be found in the relevant literature on the subject. The 'Apprentices' House' is a small, neglected, half-timbered house from 1887, located on the island of Bornholm in Denmark. To make the house suitable for dwelling again, a restoration or renovation must be carried out. An environmental life-cycle assessment (LCA) was conducted to quantify the environmental impacts pertaining to those transformation scenarios, so as to identify the most environmentally friendly way to make the building inhabitable again. The influence of relevant parameters on the output results, that is, the assessment period of the study (fifty or one hundred years were considered) and the dataset used to estimate building materials lifetimes (two were considered), was also studied. The results show that for most environmental impact categories, restoration performs as good or better than renovation. This conclusion is robust regarding the choice of the assessment period. When changing the material lifetime data, restoration shows similar impacts, but results for renovation expose substantial variations. The LCA results were finally compared with LCAs on new single-family residential homes to assess the climate performance of restoring or renovating as an alternative to demolishing the existing house and building a new one. The comparison indicates that transforming an existing building appears to be preferable to the construction of a building and, thus, the most climate-friendly solution.

KEYWORDS

Restoration, traditional building materials, building archeology, sustainable houses

INTRODUCTION

Background

When reusing an existing historical building, there are mainly two approaches, either to restore or to renovate. The difference between both practices can be defined as follows. Restoration means to repair existing building parts using materials and techniques that were used for the construction of the building in the first place. In Denmark, this can for instance involve abiding by the requirements and recommendations from the Danish Agency for Culture and Palaces, Culture Heritage (SLKS), in case the building is listed.¹ The restoration of a building also entails the maintenance of its cultural heritage, with, for example, regional traditional building practices that make it easier to repair and maintain the building. This requires that the architects, engineers, and especially craftsmen working with the building have the necessary restoration skills and experience.² It is for example very important that traditional materials (e.g. paint and mortar) are not too dense to prevent condensation formation, or that stronger materials (e.g. concrete) are not applied to weaker materials (e.g. burnt bricks), in order not to damage them.³ In the case of a renovation of a historical building, in turn, building parts are replaced by contemporary ones using modern materials and with the intention of meeting the requirements of the building legislation in the country where the building is located. Contemporary techniques are usually widely known and do not require special restoration knowledge. As to the building materials, they can be purchased easily in most places. In this article, the 'transformation' of a building is used as an umbrella term to refer to the restoration or the renovation of this building.

Among architects working with transformation of the existing building stock, there is a widespread perception that it is more sustainable to restore existing buildings using traditional techniques and materials, rather than to renovate them using cutting-edge contemporary materials. Concrete knowledge on this subject is, however, missing, as only a few studies have quantified the environmental impacts of restoration, especially with regard to other transformation options, or to the construction of new buildings.⁴ Moreover, the existing studies do generally not propose detailed sensitivity analyses to estimate the influence of the modification of input parameters (e.g. the lifetime of building materials considered) on the overall environmental performance of the transformation options studied.

Object of Study

The master's programme in Cultural Heritage, Transformation and Conservation (KTR) at the Royal Danish Academy focuses on limiting the climate impacts of buildings by transforming the existing building stock, while preserving both the valuable aesthetic expression and cultural heritage of existing buildings. In 2017, KTR came in contact with Dansk Håndværk (Danish Craftsmanship), which had just bought an old house on the Danish island of Bornholm, 'The Apprentices' House' (fig. 1), with the purpose of transforming the building into a place where young people could come and be introduced to various crafts. The building, from 1887, had undergone a number of questionable renovations and appeared to be in a rather neglected condition with many alterations, while some of the original building elements had been preserved. This house, which is about to be restored, is a



Figure 1. 'The Apprentices' House' as it looked when the project started in 2018 with a raised Eternit slate roof, plastic-painted walls, plinth, and half-timbering. Photo: Thomas Kampmann.

good example of many other similar traditional single-storey half-timbered houses in the countryside. Moreover, the measurements of the different building elements and the large quantitative data gathered by the previous archeological and architectural studies conducted (cf. Appendix, Figures A.6–A.8) gave an extensive overview of the material composition of the house. This case study was therefore seen as a good opportunity to perform an environmental assessment of different building transformations and to contribute to addressing the identified knowledge gaps.

Research Objectives

The purpose of this study was to find out which transformation scenario for the house had the lowest environmental impacts, with a focus on climate change, due to its relative importance in the eyes of decision makers in the building sector. Calculations of the environmental impacts associated with each transformation option were carried out to determine which option would be the most environmentally friendly. The assessment was performed using life-cycle assessment, a widespread and standardized tool for assessing the environmental performance of products and systems. The study also included relevant parameter variations, such as the source of the lifetime of the building materials considered or the choice of the assessment period. Finally, a comparison between the selected transformation scenarios and the construction of a new standard building of a similar size was carried out.

THEORETICAL FRAMEWORK: QUANTIFYING ENVIRONMENTAL IMPACTS WITH LIFE-CYCLE ASSESSMENT

Life-cycle assessment (LCA) is a standardized⁵ tool for quantifying the possible environmental impacts of different solution alternatives. LCA can thus be used to support decisions by identifying the alternative with the lowest potential environmental impact.⁶ The primary strength of LCA is that it considers the full life cycle of the alternatives and all potentially relevant environmental impacts. By including all life-cycle stages and environmental impacts that may be relevant, LCA can avoid possibly overlooking important aspects that might otherwise have led to a shifting of burdens.⁷ For instance, a reduced use of insulation might improve environmental impact performance related to material production. However, the associated increase of heat loss over the building lifetime may create an even larger environmental impact. Likewise, options for reducing global warming by use of biomaterials might give rise to other impacts due to increased land use from biomaterial production. Such potential trade-offs can be highlighted in an LCA and provide decision-

makers with an informed basis for making the best possible decision from an environmental perspective.

An LCA consists of four main phases,⁸ as illustrated in Figure 2: 1) Goal and scope; 2) Life-cycle inventory (LCI); 3) Life-cycle impact assessment (LCIA); and 4) Interpretation. An LCA is an iterative process. It is thus common to go back and revise the scope or the LCI after interpretation, in case the results are not fully in line with what was described in the goal of the LCA study.

In the Goal and scope phase, the objectives of the LCA are defined. The scoping of the LCA is done by specifying exactly what the LCA should assess and by defining the scope and principles on which the LCI and LCIA should be performed. In the LCI, the product system of a solution alternative, for example a building, is modelled across its full life cycle starting from raw material production, through production and manufacture, over use, until final disposal and waste treatment. The modelled LCI consists of several activity-specific processes that include information on the resource use and emissions of chemicals (collectively called ‘elementary flows’) into the environment from each process. In the LCI, all elementary flows from all

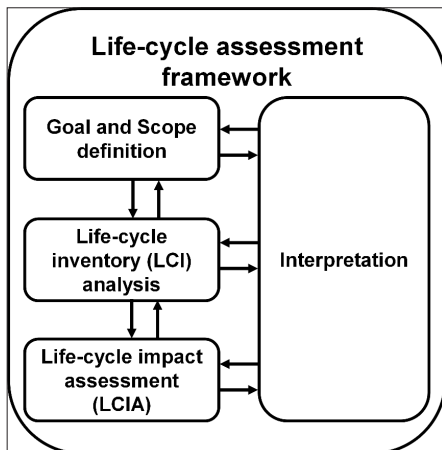


Figure 2. The overall theoretical framework for an LCA, consisting of the four phases in an LCA. Model by Morten W. Ryberg.

processes that are part of the alternatives' life cycle are aggregated to provide a full inventory of all the resources uses and chemical emissions related to the alternative. In the LCIA phase, the inventory of elementary flows from the LCI are translated into potential environmental impacts, such as climate change, land use, water use, resource depletion, ecotoxicity, et cetera. Finally, the results of the LCIA are evaluated in the Interpretation phase to identify which of the alternatives has the overall lowest environmental impact.⁹

LCA is often used to quantify the environmental impact of buildings or building components, for instance as part of building certification schemes. While LCA is mainly applied to new buildings, it is also used for identifying the most environmentally friendly options for renovating existing buildings. Here LCA can be used for answering two types of questions. 1) What were or are the environmental consequences of renovating using one approach compared to an alternative approach? 2) What are the environmental savings from reusing the materials that are kept during the renovation compared to production of new, comparable materials? LCA can thus be utilized for identifying the best alternative, environmentally speaking, or can indicate the impact savings of renovating compared to new construction. The solution to be selected in an LCA on renovation depends on the overall goal of the LCA and the decision (or types of decisions) that the LCA is intended to support. Indeed, LCA is the best method for quantifying and showing the potential environmental impacts of an activity, such as the renovation of a house.¹⁰ However, LCA cannot provide information about any of the other aspects that are important to consider during a decision-making process. Thus, it is not advised to base decisions solely on LCA results or on other tools for evaluating; for instance, economic and social factors (such as aesthetic, cultural, and historical values) are needed to provide a solid and comprehensive basis for decision-making.

METHODS

Description of the Different Transformation Scenarios

In this study, LCA calculations have been made for four scenarios of transformation of the existing building—three restoration scenarios and one renovation scenario. The former are intended to be carried out as if the building were listed—although it is not the case here. When a building is listed in Denmark, except for carrying out ordinary maintenance, one must first contact SLKS, which is responsible for listed buildings in the country. Based on a description and drawings of the project, they decide if one can get

permission for the desired changes. As the considered building in this study is actually not listed, SLKS has not been consulted. It is, however, the authors' belief that the described changes to the building are within the realm of what could realistically be approved.

In the first scenario, Scenario 1 (S1), as many original building parts as possible are preserved, and the building parts added are preferably made up of materials similar to the original materials. No exterior insulation has been considered, as this would heavily alter the appearance of the building and, in this particular case, not be aligned with the guidelines provided by SLKS.¹¹ A limited re-insulation is therefore carried out (75 mm internal insulation on exterior walls), as probably permitted in a listed house. This allows the proportions of the room to remain almost identical, with only little valuable living space lost.

As it was expected that the heat loss from the building would be of great importance for the overall environmental impact, an additional restoration scenario, which includes a higher insulation thickness in the house, was considered. This scenario is Scenario 1b (S1b). S1b is therefore similar to S1, but the internal wall insulation is increased to 200 mm, and retrofit insulation is fitted to the existing exterior doors with 40 mm insulation.

As SLKS has not confirmed whether the proposed work in Scenario 1 would be approved, a scenario without re-insulation, which, according to the authors, has the greatest probability to be accepted by the agency, was included. This Scenario 1c (S1c) was also relevant as it permitted an assessment of how important re-insulation of an older house will be. In S1c, the building is therefore restored as specified in Scenario 1, but without post-insulation or addition of secondary glazing to the windows. This scenario is therefore the one that entails the least intervention on the building. There are many people—especially architects—who believe that this option is likely to be the most environmentally friendly, as the future development of green energy production means that insulation will be of less relevance in reducing environmental impacts.

Finally, in Scenario 2 (S2), the house is renovated to comply with the Danish building regulations from 2018¹² in relation to energy consumption and with the use of new contemporary building materials. Here, ceilings, walls, and floors are re-insulated and exterior doors and windows replaced with new

ones. In this scenario, mineral wool (300 mm) is used to insulate the walls of the building. This requires an additional air gap of 50 millimetres between the insulation and the existing wall, thereby reducing substantially the effective living space.

Scope of the Study

To compare the two renovation options, a functional unit describing the main function provided by the transformation options of the building was defined. In this study, the functional unit was defined as ‘use of the building for dwelling during one average year in Bornholm, Denmark’. As the results of this LCA may only involve decisions made to buildings that are in a similar situation to this house, the results are not expected to have large-scale consequences on the building sector. Therefore, the decision context, specifying the intended application of the study, was defined as a micro-level decision support. This is also reported as *Situation A* in the ILCD LCIA methodology, a document providing detailed guidance for LCA applications and recommended by the European Commission.¹³ As a result, we modelled the life-cycle inventory (LCI) using an attributional approach, that is, using data on market average suppliers. We used the cut-off methodology¹⁴ for modelling recycling as recommended in the European standard on LCA of construction.¹⁵

Performing an LCA also requires defining an assessment period, which specifies the time frame of the study. In building LCA, the assessment period is normally defined as equal to the lifetime of the studied building. Fifty years has become the standard lifetime used in building LCA.¹⁶ However, fifty years can be considered a relatively short lifespan, especially for restoration architects that are used to working with buildings that have a much longer lifespan. Extending the assessment period raises problems as to the difficulty of estimating future technological, environmental, and societal developments, on which the LCA is also based—one can just try to see how much the building sector and society in general have developed over the last fifty years. This being said, the restoration scenarios assume that the building is listed and, in this case, that a lifespan of only fifty years is very unlikely—not least considering that the building is now already 134 years old. An assessment period of one hundred years, which considers a house lifetime of one hundred years, was therefore also studied to show how it may affect the environmental performance of the different solutions and the comparison among the four scenarios.

The impact results were estimated for sixteen environmental impact categories based on the European Commission's recommended ILCD LCIA methodology.¹⁷ For one of those sixteen impact categories, however, 'ionizing radiation E', the results, shown as interim, were not considered mature enough to be used and were therefore left out. The characterized results were then related to the annual impact of an average person in the world in 2010 using the normalization references derived by Sala et al.¹⁸

The system boundaries for the LCA are indicated in Figure 3. The foreground system consists of processes that are directly involved in the life cycle of the transformation. These processes were directly created in this study based on available data about the building as described in the 'Results' section. The LCI was modelled in the dedicated LCA software OpenLCA 1.10.3. The background system was based on the data in Ecoinvent 3.7, using the 'cut-off' database in accordance with European standards.¹⁹

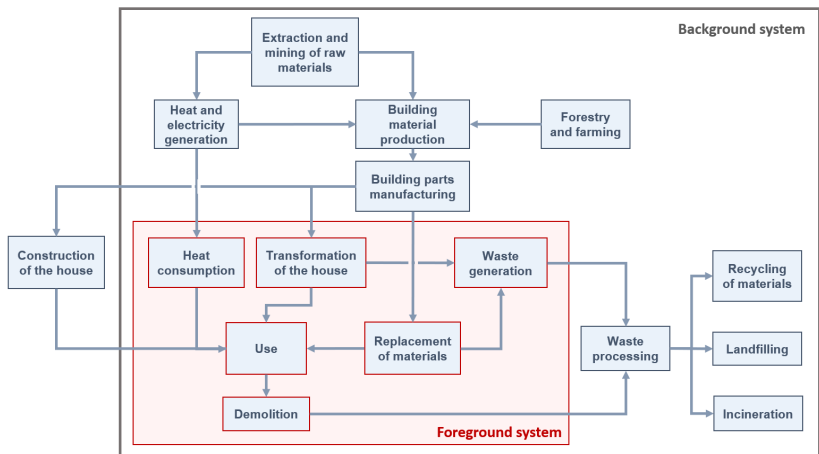


Figure 3. System boundaries of the LCA, applicable to all scenarios. The foreground system consists of processes that are directly involved in the life cycle of the transformation. Modified model by Teddy Serrano based on ISO 14040

Life-Cycle Inventory

In this section, the life-cycle inventory (LCI) is provided with details for each of the following life-cycle stages:

- the transformation stage, accounting for the removal and input of building parts and materials during the restoration or renovation process;
- the replacement stage, standing for the replacement of the building materials whose lifetime is lower than the building lifetime;
- the energy consumption during the use phase;
- the demolition stage, representing the end-of-life treatment of all the house materials at the end of the building lifetime, when the building is torn down.

A description of the LCI for those stages is further detailed in the next subsections, providing details as to which materials were included in the scope of this study, as well as how the quantity of energy consumed in the building was calculated. The description of the LCI of this study is based on that of another study that was carried out on the same building.²⁰ Regarding the modelling of processes, for many widely used contemporary materials (e.g. clay brick, concrete, wood), equivalent unit processes have been directly adopted from the Ecoinvent database. For specific materials and products (e.g. some insulating materials, windows), new processes were created in order to best account for their composition. The full list of the processes modelled for the LCI is provided in an open online data repository on Zenodo²¹ (sheet 'LCI Materials' and 'LCI Building').

Transformation

During this first stage, regardless of the scenarios of restoration or renovation, old building materials are being removed from the house, while others are retained. Some new building materials are also added during this transformation process to rehabilitate the house. Differences are, however, observed regarding the type and quantity of materials removed or added to the house in the different scenarios. As the scenarios S1b and S1c are slight variations of Scenario 1, we now provide details on this phase only for Scenarios 1 and 2 (S1 and S2, respectively).

To estimate the bill of materials under both scenarios, on-site measurements of the building were first performed. This enabled one to make drawings of

the house (cf. Appendix, Figures A.1–A.5), from which material geometries were determined in order to make an inventory of the materials present in the house before transformation. Then, in both scenarios, it was considered that the brick and timber structures, oak and pine beams, wooden roof structure, stairs, foundations, and interior doors of the house are kept as far as possible. In S1, all windows and exterior doors are also preserved. It was, however, assumed that 30 per cent of the retained structural timber, 5 per cent of the masonry, and 5 per cent of the wood composing the kept doors and windows needed to be replaced. In both S1 and S2, the modern materials introduced during past renovation attempts, for instance the one that occurred in the late 1960s, are removed (such as mineral wool and gypsum in the walls, or fibre cement on the roof). For the new materials ultimately entering the house, thatching covers around 75 per cent of the surface of the roof in S1, the rest being covered with tiles. In S2, only tiles are used. For the windows, they are considered to be extended by a wooden frame with a layer of energy glass in S1, while in S2, new wood-aluminium windows, of the two-pane energy type, are replacing the old ones. In S1, the new interior walls are generally rebuilt with adobe bricks and covered in clay mortar, whereas gypsum and mineral wool are preferred in S2. In both options, the chimney is rebuilt with burned bricks. Finally, regarding the insulation, in S1 the building envelope (composed of all the surfaces in touch with the exterior) is insulated as thick as possible without altering the original appearance of the surfaces. This thickness has been set to 75 mm, which was assumed to be a balanced compromise. Insulation materials are chosen so that they are comparable to the materials originally used when the house was first built, such as hempcrete,²² wood fibre,²³ and windproof insulation.²⁴ The floor is constructed and insulated using wood fibre insulation and Ytong.²⁵ In S2, the building envelope is insulated with mineral wool only to meet the energy requirements of the current standards.²⁶ As to the inside part of the exterior walls, they are modelled as covered with lime mortar in S1, and gypsum in S2.

Table 1 provides an overview of the material inputs and outputs for those two scenarios. For S1b and S1c, the bill of materials is similar to that of S1, except for the insulation. Indeed, in S1c, no insulating materials, or secondary glazing in the windows, are considered to be used during the transformation phase. On the contrary, in S1b additional insulation is used (compared to S1) in the exterior walls and the exterior doors; this results in the input of

19.98 m³ of hempcrete instead of 9.18 m³ for the exterior walls, as well as an additional 0.29 m³ of wood fibre insulation and 0.10 m³ of plywood for the doors. A full overview of the life-cycle inventory used for modelling the two transformation options, including the specific processes employed to model the full life cycle, is provided in the dedicated data repository.²⁷

Table 1. Material input and output for the transformation phase in Scenario 1 (S1) and Scenario 2 (S2).
Source: The authors.

		Scenario 1 – Restoration			Scenario 2 – Renovation			
	Material	Kept	Removed	Added	Kept	Removed	Added	Unit
Beams	Oak wood	1.11	0.48	0.53	1.11	0.48	0.53	m ³
	Pine wood	0.63	0.82	0.71	1.02	0.44	0.44	m ³
Ceiling	Gypsum		0.35			0.35	1.25	m ³
	Mineral wool		0.49			0.49	44.85	m ³
	Timber	4.64		1.05	3.78			m ³
	Lime mortar	2.17	0.11	0.94	0.67	1.61	0.02	m ³
	Wood insulation			44.63				m ³
Exterior doors	Glass (new glazing)						0.02	m ³
	Glass (old glazing)	0.01		0.01		0.01		m ³
	Pine wood	0.51	0.03	0.03		0.54		m ³
	Wood-alu door frame						14.41	m ²
	Plywood							m ³
	Wood fibre insulation							m ³
	Linseed oil			6.51				kg
Exterior walls	Gypsum		0.22			0.22	1.20	m ³
	Lime mortar		0.13	1.50		0.13		m ³
	Brick	15.82	0.83	0.83	15.82	0.83	0.83	m ³
	Timber	0.42	0.11	0.11	0.42	0.11	0.11	m ³
	Hempcrete			9.18				m ³
	Windproof			0.24				m ³
	Mineral wool						29.98	m ³
Floor	Concrete		6.65			6.65		m ³
	Timber	2.44		1.53	2.44		1.53	m ³
	Wood insulation			39.71				m ³
	Aerated concrete			13.24				m ³
	Mineral wool						26.47	m ³

		Scenario 1 – Restoration			Scenario 2 – Renovation.			
	Material	Kept	Removed	Added	Kept	Removed	Added	Unit
Foundations	Concrete	3.08			3.08			m ³
	Natural stones	7.58			7.58			m ³
Gazebo	Brick	1.98	0.10	2.01	1.98	0.10	2.01	m ³
	Bitumen sheet			10.12			10.12	m ²
	Pine wood			0.87			0.87	m ³
Inner elements	Pine wood	2.58	0.05	0.05	2.52	0.05	0.05	m ³
	Glass (old glazing)	0.00			0.00			m ³
Interior walls	Concrete		0.95			0.95		m ³
	Gypsum		3.32			3.32	1.32	m ³
	Brick	6.63	3.39	1.40	6.63	3.39	1.40	m ³
	Adobe brick		1.15	6.81		1.15		m ³
	Mineral wool		5.92			5.92	8.26	m ³
	Lime mortar	0.08		1.78		0.08		m ³
	Clay mortar			1.65				m ³
Roof	Bitumen sheet			52.36			195.86	m ²
	Pine wood	5.20			5.20			m ³
	Fibre cement		1.63			1.63		m ²
	Thatched roof			171.50				m ²
	Tiles			2.06			7.72	Tonnes
Windows	Glass (new glazing)						0.15	m ³
	Glass (old glazing)	0.06		0.04		0.06		m ³
	Pine wood	1.09	0.06	0.29		1.15		m ³
	Wood-alu window frame						13.85	m ²
	Linseed oil			25.11				kg

Replacement

When the assessment period exceeds the lifetime of the materials, they are considered to be taken down from the building and replaced by the same material input. In the building sector today, there is a strong focus on the durability of different building parts, and the subject is controversial. Lifespans are extremely difficult to predict due to the multitude of unknown factors that affect the actual lifetime of a building material. Therefore, the environmen-

tal impacts were estimated based on two sets of building material lifetime estimates. First, material lifetimes (LT1) were based on a study from Statens Byggeforskningsinstitut,²⁸ which provides estimates of material lifetimes for different uses of the materials in the building. A second set of material lifetimes (LT2) was developed by the authors. This was partly based on building archeological investigations, where the age of the individual building parts was determined from the experience of restoration architects.²⁹ Depending on the assessment period taken into account (either fifty years, also referred to as AP50 or one hundred years, referred to as AP100), the number of times that materials need to be replaced during the lifetime of the building varies. Those are documented in Table 2, showing the building material lifetimes depending on the lifetime source taken, as well as the corresponding number of replacements for each assessment period.

*Table 2. Material lifetimes used for the study, and their corresponding number of replacements during the building lifetime, depending on the lifetime source (LT1 or LT2) and assessment period (AP50 = fifty years; AP100 = one hundred years) considered. *Only 20 per cent of the linseed oil is assumed to be replaced every ten years. Source: The authors.*

Building material	Material lifetime source		Number of replacements for AP50		Number of replacements for AP100	
	LT1	LT2	LT1	LT2	LT1	LT2
Bitumen sheet	50	50	-	-	1	1
Brick	300	300	-	-	-	-
Clay mortar	50	50	-	-	1	1
Concrete	200	150	-	-	-	-
Fibre cement	80	80	-	-	1	1
Glass (new glazing, energy panes)	20	20	2	2	4	4
Glass (secondary glazing)	50	100	-	-	1	-
Gypsum	50	40	-	1	1	2
Hempcrete	50	50	-	-	1	1
Lime mortar	60	100	-	-	1	-
Linseed oil*	10	10	4	4	9	9
Natural stones	300	300	-	-	-	-
Plywood	60	60	-	-	1	1

Building material	Material lifetime source		Number of replacements for AP50		Number of replacements for AP100	
	LT1	LT2	LT1	LT2	LT1	LT2
Mineral wool	60	40	-	1	1	2
Adobe brick	100	100	-	-	-	1
Thatching	50	50	-	-	1	2
Tiles	80	80	-	-	1	1
Timber	100	100	-	-	-	-
Wood/alu doors frame	50	40	-	1	1	2
Wood/alu windows frame	50	40	-	1	1	2
Windproof insulation	60	60	-	-	1	1
Wood fibre insulation	60	60	-	-	1	1
Ytong	100	100	-	-	-	-

Energy Consumption for Heating

By definition, the energy consumption for heating is meant to balance the heat lost during the use of the building. In order to estimate the transmission heat loss of the house, an assessment of the insulating performance of the building envelope and the doors/windows under both scenarios was carried out. The assessment was based on the recommendations of the Danish Standard 418:2011 + Till.1:2020.³⁰ It includes the calculation of transmission heat loss through all the surfaces of the house in contact with the outside during an average year on Bornholm island, Denmark. Heat transfer was also calculated at the junction between those surfaces, in particular between the foundation and the walls and around the doors and windows frames. The calculations used to estimate the yearly transmission heat loss are provided in the aforementioned online repository³¹ (sheet 'Heat loss, S1' and 'Heat loss, S2'). Table 3 shows the estimated annual heat loss for the building in all scenarios. The ventilation heat loss related to the renewal of the interior air, has, for the default case, not been studied. The data available to quantify airflow through the building envelope was indeed not deemed sufficient to differentiate the losses across the scenarios. This point is further discussed in the section 'Comparison of Restoration/Renovation Scenarios' below.

Table 3. Heat loss through the different surfaces of the building envelope, as well as doors and windows, for all scenarios. *Considering a heated floor area of 204 m². Source: The authors.

Results for one year	Transmission heat loss (MJ)				Relative to S1		
	S1	S1b	S1c	S2	S1b	S1c	S2
Windows	8,847	8,847	14,490	9,329	-	+64%	+5%
Exterior doors	9,301	5,036	12,624	5,705	-46%	+36%	-39%
Ceiling	10,584	10,584	163,675	9,261	-	+1446%	-13%
Floor	7,569	7,569	25,910	8,880	-	+242%	+17%
Exterior walls	22,547	13,463	77,021	6,875	-40%	+242%	-70%
Total	58,848	45,499	293,719	40,050	-23%	+399%	-32%
Total per square metre*	288	223	1,440	196	-23%	+399%	-32%

The heat supply is modelled as being provided with a heat pump, which is replacing the old oil boiler that was previously used for heating the building. The electricity input for the heat pump is based on a dynamic electricity grid mix. The grid mix in 2020 was founded on communication with the utility company on Bornholm, which manages the electricity supply. The electricity grid mix in 2035 was founded on the energy strategy of Bornholm, where electricity is assumed to be fossil-free and based on a combination of electricity from wind and photovoltaic energy.³² A gradual change from the grid mix in 2020 to the mix in 2035 is modelled. The electricity grid mix in 2035 is kept constant until the end of the assessment period. An overview of electricity sources used for modelling the electricity grid mix on Bornholm in 2020, and from 2035 onwards, is shown in Table 4.

Table 4. Overview of the modelled electricity grid mix on Bornholm in 2020 and from 2035 onwards. Source: The authors.

Electricity source	Percent of total electricity consumption	
	2020	from 2035 onwards
Electricity from Sweden	25.1%	0.0%
Biogas	8.3%	0.0%
Photovoltaic	12.8%	2.3%
Wind	43.5%	97.7%
Wood chips	7.9%	0.0%
Coal/Oil	2.3%	0.0%
Total	100.0%	100.0%

Demolition

At the end of the assessment period, corresponding here to the building lifetime, the building is considered to be demolished. The demolition phase therefore comprises all of the end-of-life processes of the materials that make up the different building parts of the house

RESULTS

The characterized impact scores, that is, the environmental impact results in absolute values, are shown in Table 5. They provide details for each of the fifteen impact categories, for the lifetime source chosen (LT1 or LT2), and for the assessment period considered (AP50 or AP100). A color code has been added to present internally normalized results, that is, the relative performance of the different scenarios compared to an internal reference. For a given assessment period and impact category, the reference = 1 was taken for S1 and LT1. This allows one to compare the results, and therefore to pinpoint the scenarios with the lowest environmental impacts for a given impact category or to identify the influence of the variation of the source of the lifetime, or the assessment period on the relative performance of the scenarios.

When the calculations are made with an assessment period of fifty years, the results show that for each of the fifteen impact categories, regardless of the lifetime source chosen, S1c seems to perform worse than any other scenario; sometimes up to a factor 4 to 5 compared to S1 (notably for 'Freshwater ecotoxicity', 'Ionizing radiation Human health', 'Mineral fossil & renewable resource depletion', and 'Water resource depletion'). S1b performs slightly better than S1, regardless of the lifetime source considered (results for S1b are on average 10 per cent lower than S1). The renovation scenario (S2) shows impact scores of a similar magnitude compared to S1 in most impact categories when considering the lifetime source LT1. For nine out of fifteen categories, the results' difference between the two scenarios is indeed lower than 20 per cent. Nonetheless, it should be noted that for four impact categories ('Acidification', 'Mineral fossil & renewable resource depletion', 'Particulate matter', 'Photochemical ozone formation'), S2 performs 44 to 68 per cent worse than S1. With LT1, 'Land use' is the only impact category where S2 performs significantly better than S1 (-25 per cent). When considering the lifetime source LT2, a more significant difference between S1 and S2 is observed. Depending on the impact category, impact scores of S2 are indeed either equivalent or up to 2.5 higher than S1 (as it is the case for 'Acidification' or 'Mineral fossil & renewable resource depletion').

Table 5. Characterized results for fifteen impact categories. Details are provided for each scenario (Sx = Scenario x), material lifetime source (LT1 or LT2) and assessment period (AP50 = fifty years; AP100 = one hundred years). The color code shows internally normalized results, that is, the relative performance of the different scenarios compared to an internal reference. For each impact category, the reference = 1 was taken for S1, AP50 and LT1 in this impact category. Source: The authors.

		AP50				AP100			
		S1	S1b	S1c	S2	S1	S1b	S1c	S2
Acidification	LT1	2.6	2.5	5.6	4.3	1.9	1.8	4.4	3.7
molc H+ eq/year	LT2	2.6	2.4	5.6	6.6	1.8	1.7	4.3	4.8
Climate change	LT1	631	577	1,477	715	430	386	1,129	538
kg CO ₂ eq/year	LT2	631	578	1,477	838	408	364	1,108	598
Freshwater ecotoxicity	LT1	48,564	38,444	229,988	40,335	47,337	37,347	226,394	39,506
CTUe/year	LT2	48,564	38,434	229,998	47,581	47,258	37,268	226,324	43,123
Freshwater eutrophication	LT1	0.12	0.11	0.44	0.17	0.11	0.10	0.41	0.16
kg P eq/year	LT2	0.12	0.11	0.44	0.25	0.11	0.10	0.40	0.20
Human toxicity, cancer effects	LT1	0.00018	0.00016	0.00065	0.00017	0.00018	0.00015	0.00065	0.00016
CTUh/year	LT2	0.00018	0.00016	0.00065	0.00023	0.00018	0.00015	0.00065	0.00020
Human toxicity, non-cancer effects	LT1	0.00025	0.00020	0.00088	0.00029	0.00022	0.00017	0.00081	0.00028
CTUh/year	LT2	0.00025	0.00020	0.00088	0.00045	0.00022	0.00017	0.00081	0.00035
Ionizing radiation Human health	LT1	75	63	308	71	44	39	170	50
kBq U235 eq/year	LT2	75	63	308	87	43	37	169	58
Land use	LT1	2,443	2,551	2,536	1,830	1,868	1,956	1,674	1,461
kg C deficit/year	LT2	2,443	2,514	2,572	2,687	1,749	1,837	1,557	1,878
Marine eutrophication	LT1	0.59	0.60	1.15	0.62	0.47	0.47	0.96	0.53
kg N eq/year	LT2	0.59	0.59	1.16	0.88	0.45	0.45	0.94	0.67
Min., fos. & ren. Resource depletion	LT1	0.049	0.039	0.223	0.077	0.047	0.038	0.218	0.076
kg Sb eq/year	LT2	0.049	0.039	0.223	0.120	0.047	0.037	0.218	0.097
Ozone depletion	LT1	0.000044	0.000040	0.000140	0.000049	0.000039	0.000035	0.000131	0.000045
kg CFC-11 eq/year	LT2	0.000044	0.000040	0.000140	0.000061	0.000037	0.000034	0.000130	0.000051
Particulate matter	LT1	0.40	0.38	0.84	0.57	0.29	0.27	0.68	0.48
kg PM2.5 eq/year	LT2	0.40	0.38	0.84	0.84	0.27	0.26	0.67	0.61
Photochemical ozone formation	LT1	1.9	1.9	3.6	2.9	1.6	1.5	3.0	2.7
kg NMVOC eq/year	LT2	1.9	1.9	3.6	3.8	1.5	1.5	2.9	3.1
Terrestrial eutrophication	LT1	6.2	6.1	13.3	7.4	4.8	4.7	10.5	6.4
molc N eq/year	LT2	6.2	6.0	13.4	10.9	4.6	4.4	10.3	8.1
Water ressource depletion	LT1	485	402	2,165	421	299	254	1,313	300
m ³ water eq/year	LT2	485	401	2,165	527	299	254	1,313	353
Impact scale (relative to S1 and LT1)		0.7	0.8	0.9	1	2	3	4+	

When the assessment period is changed to one hundred years, the scenarios perform on average 20 per cent better compared to when fifty years is considered. For some impact categories, such as ‘Freshwater ecotoxicity’ or ‘Human ecotoxicity (cancer effects)’, the difference is less significant (around -5 per cent for AP100 compared to AP50). For some others, for example ‘Ionizing radiation human health’ or ‘Water resource depletion’, it is more substantial (around -40 per cent).

In Figure 4, the results are shown for a specific environmental impact, ‘Climate change’. Additional information has been added here, providing details on the contribution of the energy use during the use phase of the building to the total climate impact (dark area), as well as that of the production, use, and end-of-life treatment of all building materials (light area). For AP50, regardless of the lifetime source, the impact scores of materials are equal in S1, S1b, and S1c. It is the energy use that determines which scenario performs the best: S1b performs slightly better (-9 per cent) than S1, and S1c substantially worse (+134 per cent) than S1. For S2, when LT2 is considered, the impacts of materials are significantly higher (+22 per cent) than with LT1. Compared to S1, they are around 36 per cent higher with LT1, and

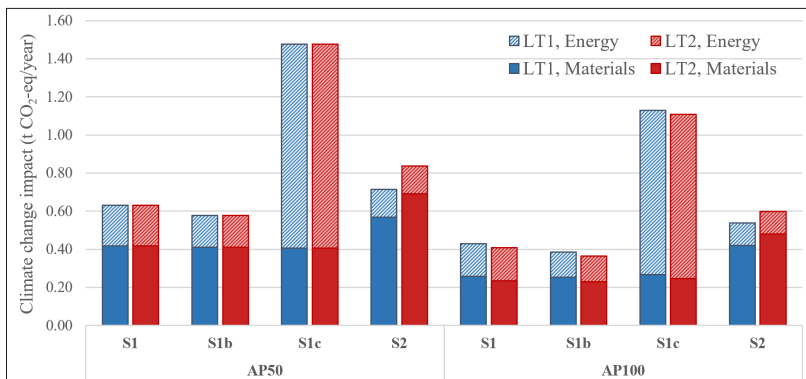


Figure 4. Characterized results for climate change (in t CO₂-eq/year), provided for each scenario (Sx = Scenario x), material lifetime source (LT1 or LT2), and assessment period (AP50 = fifty years; AP100 = one hundred years). Source: The authors.

66 per cent higher with LT2. The impact of energy use of S2 is, however, the lowest of all scenarios, which is consistent with the relative lower heat loss calculated for this scenario in Table 3. When both energy and materials are considered finally, the impacts of S2 are 13 per cent higher than S1.

The conclusions remain similar when switching to an assessment period of one hundred years, although the gaps between the different scenarios are wider. Indeed, although more materials need to be replaced for AP100 (see Table 2), the impacts of the transformation and demolition stages are divided by a factor 2 compared to AP50, which increases the contribution of energy use that is the main differentiating factor between the scenarios. For LT1, for example, S1b still performs slightly better (-10 per cent) than S1, and S1c still substantially worse (+163 per cent) than S1. The difference is ultimately bigger (+25 per cent) between S2 and S1.

DISCUSSION

Comparison of Restoration/Renovation Scenarios

The results of the study show the trade-off between impacts related to the materials and impacts related to the energy use, such as heating, during building operation. It is important to strike the right balance. For instance, no (or very little) utilization of insulation to reduce operational heat use will not be good for the environment at present. This is because the impacts related to the heat generation will exceed the environmental benefits from not producing the additional insulating material. This is perfectly illustrated in S1c, which overall has the worst environmental performance across the 4 scenarios. Indeed, as shown in Figure 4, the climate impact from operational energy use is 1.1 t CO₂-eq / year, which is about 73 per cent of the total climate impact for the fifty-year assessment period. Likewise, S1b, which is designed with the intention to be energy efficient while still maintaining the original appearance of the building, generally performs best across all impact categories (thirteen out of fifteen for both fifty- and hundred-year assessment periods, see Table 5). In S1b, the energy used to heat the building only accounts for about 29 per cent of the total climate impact during a fifty-year period. The best insulated scenario is the renovation scenario S2. Here, the operational energy use only accounts for about 20 per cent of the total climate impact. This is due to the relatively high energy efficiency, which keeps energy use and subsequent impacts low, combined with the increased impacts from additional production and treatment of mineral wool for insulation.

In terms of restoration contra renovation, we see that S1 and S1b perform generally better than S2. This is mainly because the restoration scenarios retain more of the original materials and repair or add small improvements rather than simply replacing them with new materials. This higher degree of material reuse, together with a larger reliance on bio-based materials, such as thatching or wood fibre insulation, means that environmental impacts embodied in the materials can be kept relatively low (also illustrated for climate change in Figure 4). On the other hand, the energy efficiency in the restoration scenarios is slightly lower than that in the renovation scenario. But this does not outweigh the better performance related to materials. Indeed, the heating is based on electricity as a heat source, and the electricity generation is here considered to be increasingly based on renewable energy during the assessment period, especially for one hundred years.

A potentially important parameter for calculating heat loss (and thus energy consumption) that was not considered in this study was the heat lost from ventilation. Quantitative data for estimating the air exchange rate of the building for the different scenarios was not available, making it impossible to differentiate the heat loss in the specific case of building transformation. According to the calculation methodology proposed by Danish standards for heat loss calculation in buildings, the heat lost from ventilation depends on the gradient of temperature between indoor and outdoor air, the heated floor area, and the airflow per heated floor area.³³ For the later parameter, an estimated value of $0.3 \text{ L.s}^{-1}.\text{m}^{-2}$ of air circulation is proposed for usual rooms. When heat loss from ventilation is included, using the proposed air exchange value in the four scenarios of this study, an additional yearly energy consumption of around 24 MJ is found. This corresponds to between 8 per cent (for Scenario 1c) and 60 per cent (for Scenario 2) of the yearly energy consumption originally calculated. More research is therefore required to assess how a differentiated air exchange rate resulting from the different level of transformation and the choice of different materials can affect the impact results of transformation scenarios.

Importance of Materials Lifetime Estimates

The importance of the material lifetime estimates was in general found to be larger for the fifty-year assessment period compared to the one-hundred-year assessment period. This is because the two material lifetime sets in our study vary around the fifty-year mark (see Table 2). Thus, for a fifty-year period, an

additional material replacement is needed depending on the selected material lifetime set. For instance, the new window and door frames need to be replaced after forty years according to LT2 even though the building only has a total lifetime of fifty years. This type of variation is less frequent with the one-hundred-year assessment period, where the actual difference between LT1 and LT2 is less pronounced. An option for extending the lifetime of the replacement beyond ten years could be to perform selective demolition followed by reuse of the materials. In this situation, the relatively new materials should be carefully removed from the building and then be reused as part of new construction.

The overall conclusions about the two scenarios were not found to change substantially as a result of the two sets of lifetime estimates used in this study, for the results generally remain in the same order of magnitude. However, the gap between the renovation and the restoration scenarios is generally wider with LT2. Indeed, considering LT2 gives an advantage to traditional materials, which have a similar or higher lifetime compared to LT1 (e.g. lime mortar or secondary glazing glass), whereas it is the opposite for new materials (e.g. wood/aluminium frames, gypsum, mineral wool). It is therefore quite possible that the selection of material lifetimes could affect conclusions and subsequent decision-making. This holds especially true for cases with materials that have a large environmental footprint and that involve large uncertainty about the actual material lifetime. This aspect is also expected to become even more important in the future as the decarbonization of the heat and electricity use during building operation implies that the impacts embodied in materials become increasingly important.

The estimation of material lifetimes is inherently uncertain since the actual time a particular material is in use depends on a multitude of factors, such as material properties, production quality, handling, exposure to weather and climate, user behavior, or wishes and ability to maintain and repair. One method to improve these estimates is to apply different approaches for determining material lifetimes based on various sources of expertise. Different results can then be calculated using the lifetime sets to get the range in which the actual results are expected to lie. Here it would be relevant to consult different expert groups within the building sector, such as engineers, architects, construction workers, and waste handlers, to get their opinion about the lifetimes of the different materials and to provide the final decision-makers with comprehensive and reliable information.

Building Transformation Compared to New Build

Restoration and renovation are generally seen as an environmentally preferable alternative to demolition and construction of new buildings. This is because the reuse of the existing building and the kept materials avoids the production of new materials, which would need additional resources and lead to emissions of additional substances into the environment. Based on a recent LCA study by the engineering group Rambøll,³⁴ the results for four renovation scenarios were compared with results for a newly built single-family home. Two new houses were used, one based on contemporary materials (called the 'Brick house'), such as light concrete, bricks, and tiles, and one based on timber materials (called the 'Timber house'), which is seen to perform better climate wise. The climate impacts pertaining to the materials as calculated by Rambøll were used. Based on the energy calculation provided in the report, the heat use for the two buildings over a fifty-year period with the same heat source as in our transformation scenarios was estimated. It should be noted that the heat use for the new houses is only based on energy calculations for the exterior wall and roof. Hence, it does not take into account heat losses through the ground, doors, and windows, which account for 12 per cent and 13 per cent of the total climate impact in S1 and S2, respectively. Thus, the actual heat loss will most likely be substantially larger for the new houses. However, data on the complete heat loss was not available.

The total climate impact for the Brick and Timber houses was found to be 318 and 253 kg CO₂-eq/m² over a fifty-year assessment period, respectively. In comparison, the results for S1 and S2 using LT1 with a fifty-year assessment period were found to be 216 and 250 kgCO₂eq/m², respectively. Those results indicate that restoration and renovation are therefore climate wise preferable compared to building a new house, even if the house is constructed using more climate friendly materials, such as timber. Again, it should be noted that the impacts of the new buildings are likely to be larger if energy use during operation is fully taken into account. Moreover, the results from Rambøll do not include any initial demolition, removal, and treatment of the old building that would be needed before the construction of a new house. These processes will also impact the climate, further driving up the impact related to demolition of old buildings and the construction of new ones.

In this sense, our results are in line with other studies that show the benefits of restoration or renovation instead of building new.³⁵ Indeed, the restoration or renovation of an existing building is an obvious way to increase

circularity and use circular economy principles to provide new economic value to old buildings, while reducing impacts on climate and the environment in general. In particular, the results of this study show that restoration where the original appearance of the historical building is retained can be also preferable in terms of protecting the climate. Thus, the restoration of historically important buildings could be a focus area as this is likely to help maintain aesthetical and cultural value while reducing impacts on the climate. However, the findings of this study can not be generalized to all traditional buildings before more research is carried out: although the study of similar buildings in Denmark are likely to lead to similar conclusions, this LCA was indeed specific to the situation of this building. More studies on building transformation should therefore be done to corroborate—or not—the present conclusions.

CONCLUSION

In this study, we conducted a full LCA on four different scenarios for restoring an old historical house with the intention of making it suitable as a single-family home. Three scenarios were, on different levels of restoration, taking different approaches with regard to the extent of the restoration and the maintaining of the original appearance of the house. In a fourth scenario, a renovation was modelled using modern contemporary materials and in line with current standards for energy efficiency in project renovation. The evaluation of the building was undertaken using different assessment periods (i.e. fifty and one hundred years) and different material lifetime estimates. The results show that the two restoration scenarios which combine restoration and energy efficiency (S1 and S1b) generally perform best. In fact, S1b was found to perform best in thirteen out of fifteen impact categories. Overall, we find that the change in material lifetime estimates affects the results and has a noteworthy effect on materials with medium-long lifetimes (e.g. around fifty years) and especially on the renovation scenario. Indeed, the impacts of the latter scenario were seen to change by 30 per cent on average across all impact categories depending on the material lifetime determination. Finally, we compared our results with similar findings for the construction of new buildings. Here, restoration and renovation were found to perform better than the construction of new buildings. This aligns with other studies in showing that the reuse of existing buildings and materials, via restoration or renovation, is likely to be environmentally preferable compared to demolition and construction of new buildings. Thus, this study recommends more focus on the restoration of historical buildings as a means of maintaining

aesthetics and cultural heritage without increasing environmental, especially climate, impacts. However, more research on the transformation of similar buildings is needed to corroborate the findings on this specific house.

ACKNOWLEDGEMENTS

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APPENDIX

Examples of scale 1:50 drawings

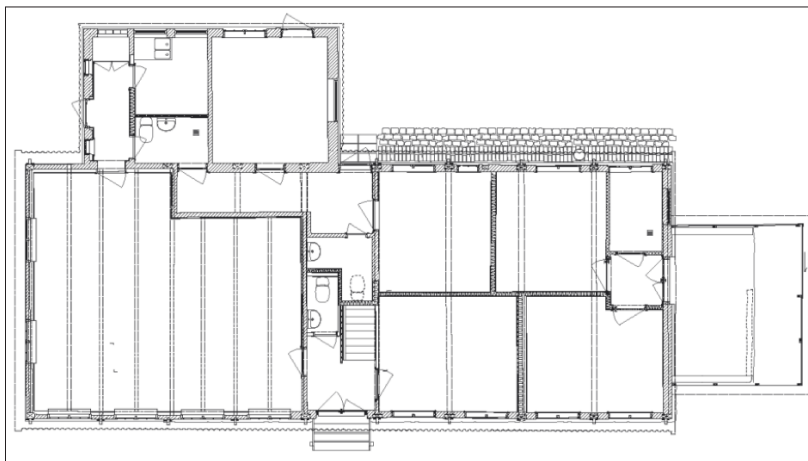


Figure A.1. Plan of ground floor, measured by Kristin Groos Kilen, Katrine Frølich Kristensen, Anna Elizabeth Rosendahl and Mia Baltzer Nielsen

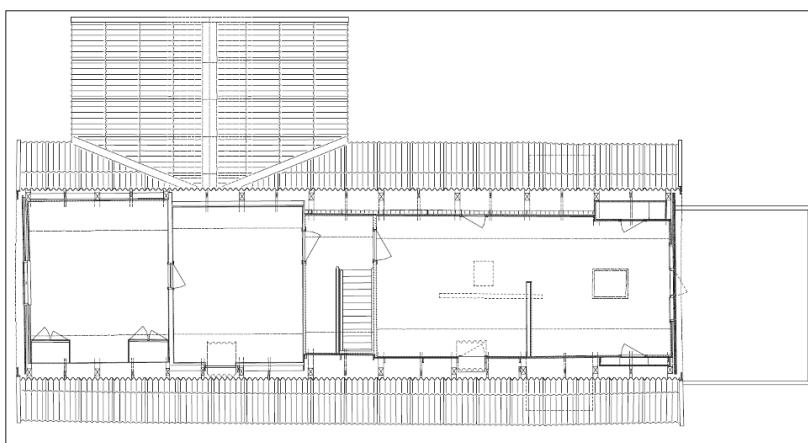


Figure A.2. Plan of first floor, measured by Kristin Groos Kilen, Katrine Frølich Kristensen, Anna Elizabeth Rosendahl and Mia Baltzer Nielsen

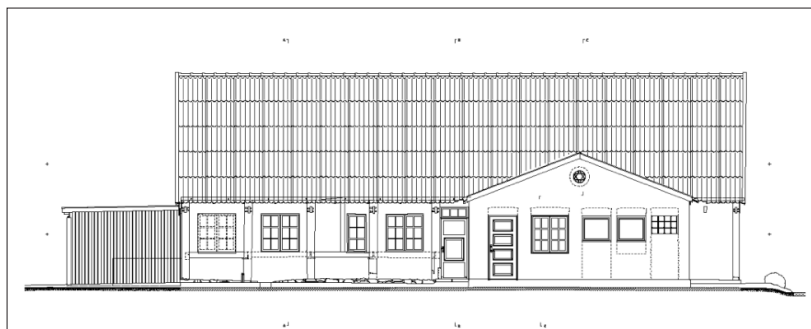


Figure A.3. Southwest elevation, measured by Freja Bang Dahl and Nanna Dahl



Figure A.4. Cross section BB, measured by Maria Vang, Caroline Crüger Ahm

Examples of scale 1:10 drawings



Figure A.5. Measured by Kristin Groos Kilen and Katrine Frølich Kristensen



Figure A.6. Historical picture of the house viewed from the west. Private photo from Martin Silbersteins archive on Bornholms Ø-arkiv, BØA 1980-20-2.



Figure A.7. Historical picture of the house viewed from the north. Private photo from Martin Silbersteins archive on Bornholms Ø-arkiv, BØA 1980-20-2.

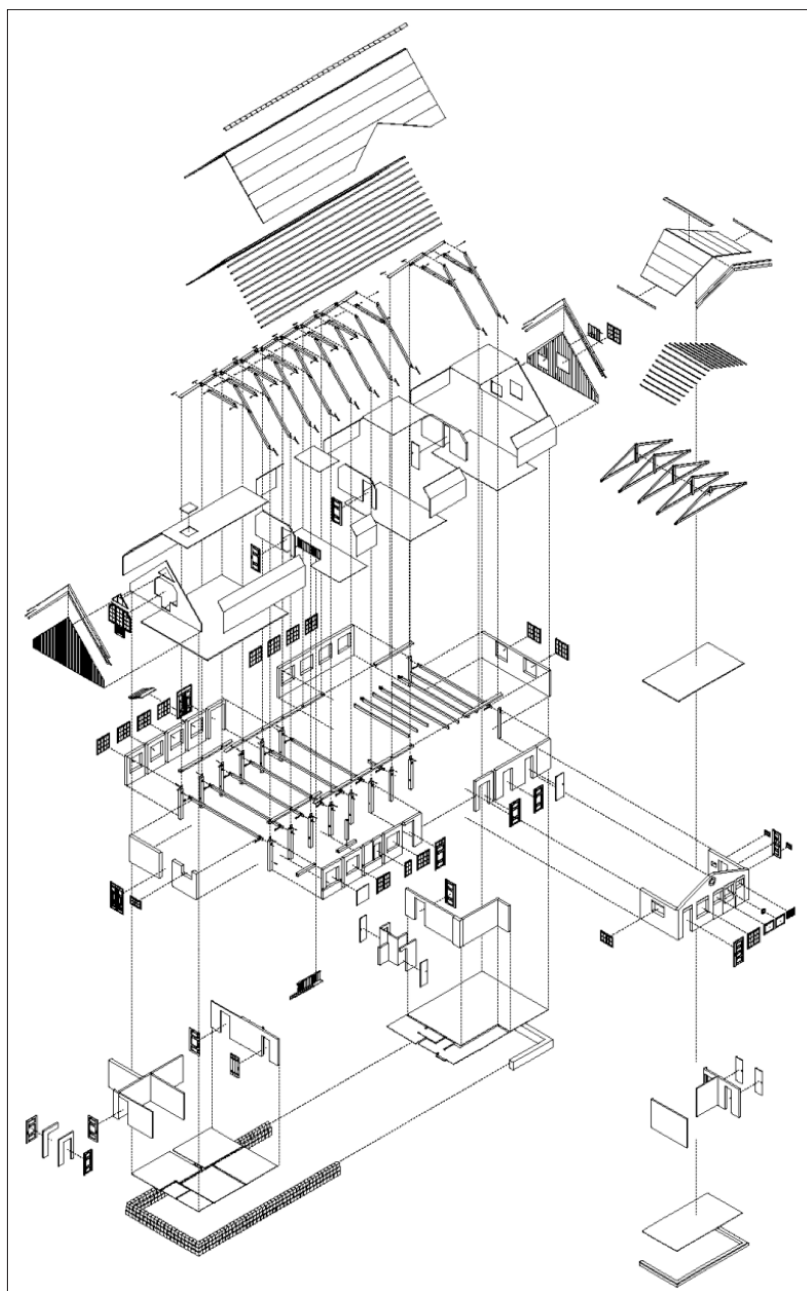


Figure A.9. Exploded axonometric viewed from the west showing the house in 2019. Drawing by Rasmus Helleskov Weileman

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Magnus Rönn, associate professor, is affiliated to building design in the Department of Architecture and Civil Engineering at Chalmers University of Technology. He is editor-in-chief of *The Nordic Journal of Architectural Research*. From 2004 to 2016, Magnus held the position of research leader in the School of Architecture, teaching at an advanced level. Together with colleagues, he has been the theme editor for publishing four special issues on competitions in two scientific journals (2009, 2012, 2013, 2014). He has also published five books on architectural competitions: three anthologies in English (2008, 2013, 2016) and two monographs in Swedish (2005, 2013). In cooperation with two colleagues, Magnus has edited three anthologies (2014, 2015, 2020) dealing with compensation measures in comprehensive planning and detailed planning in areas with cultural heritage.

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SECTION I

Mo Michelsen Stochholm Krag is an architect, educator, and researcher born in Aarhus, Denmark, in 1975. He earned his PhD, titled 'Transformation on Abandonment: A New Critical Practice?', in architecture at the Aarhus School of Architecture, Denmark, in 2017. He holds a Master in Architecture. He has seventeen years of experience in the private sector as a building architect. He was co-founder of the architectural office Krag de Ridder ApS in 2006. He has been teaching and researching in the areas of adaptive reuse, transformation of depopulating rural villages, and radical preservation since 2010.

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Tom Nielsen is an architect and professor of urban and landscape planning at the Aarhus School of Architecture, where he has been teaching and researching landscape architecture, urban design, and urban planning since 1997. His research focuses on the transformation of the Danish welfare city. This has included research into urban landscapes and public space (*Formløs*, 2001), suburban transformation, urbanizing territories (*Det urbaniserede territorium*, 2009) and *The Eastern Jutland Millon City* with Boris Brorman Jensen (2017–19), *Byen Danmark* (2023), and the values and ethics of contemporary models of urban transformation (*Gode intentioner, uregerlige byer* 2008). Nielsen has also contributed to practice as an urban design consultant in projects both in Denmark and internationally.

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SECTION II

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Camilla Brunsgaard is the creative and sustainability director at BK NORD – Architects and Engineers. Along with classic architectural work, she manages several development projects with the overall purpose of implementing more sustainability in the sector of agricultural buildings. Before the year 2022, Camilla was an associate professor in the Department of Architecture, Design and Media Technology at Aalborg University. For more than fourteen years, she has been teaching and doing research within the context of sustainable architecture, including strategies for the design of energy-efficient architecture, evaluation of energy use and indoor environments, user experiences within sustainable architecture, sustainability certification (DGNB), and design processes.

Francesco Cauda is a landscape architect who graduated from the Aarhus School of Architecture. He is currently based in Paris, France. Thanks to his studies and practice, he nurtures an interest in the educational potential of landscapes to help improve people's awareness about the environment. All

of his projects are deeply guided by a sensitive approach to the site and its cultural history. He believes that landscape architecture should be conceived through an open-ended design in order to engage in dialogue with the ever-changing living milieu. In the long term, this attitude is useful in welcoming spontaneous and unplanned elements into the project. Francesco has received international recognition, such as the 2020 Danish Nationalbankens Jubilæumsfond and the 2021 WLA award of excellence in the graduate category. In 2023, he was shortlisted for the LILA – Landezine International Landscape Award in the portfolio category.

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Katrine Majlund Jensen lives and works in Berlin as an architectural researcher. Her research concerns the experimental preservation of recent architectural heritage and the aesthetics of decay of modern materials. She holds an MA in world heritage studies from Brandenburg University of Tech-

nology (BTU) and a BA in aesthetics and culture from Aarhus University and Vrije Universiteit Amsterdam. She has been a project coordinator for the Contemporary Uses of Historic Buildings 'CineEast Short Film Festival Berlin' and her museum work includes 'Neolitische Kindheit, ca. 1930' at Haus der Kulturen der Welt in Berlin and at AROS Aarhus Art Museum. She has been a recipient of the Women's Advancement Initiative scholarship at BTU Cottbus, European Commission Funding Youth in Action and Gwärtler Stiftung. She is currently a PhD Candidate at the DFG Research Training Group 1913, 'Cultural and Technological Significance of Historic Buildings' at BTU Cottbus.

Thomas Kampmann, Architect m.a.a., MSE: cand. Polyt., associate professor at the Royal Danish Academy, Copenhagen, at TRANSFORMATION, the Master's programme in Cultural Heritage, Transformation and Conservation. Thomas is responsible for teaching building surveying, building archeology, and sustainability. Teaching building surveying is done with total station, laser scanner, and traditional surveying methods. The thorough measurements form the basis for the building archeological investigations. The teaching of sustainability is based on these studies in order to calculate life cycle analysis (LCA) on a credible basis. Previously, Thomas has worked with windows at the Centre for the Restoration of the Built Heritage, Raadvad, Copenhagen, through practical renovations, as consultant for The Agency for Culture and Palaces, and has published articles on heat loss, sound insulation, total economy, and LCA.

Ursula Kozminska is an architect, researcher, and educator with a PhD in circular material practices from the Faculty of Architecture, Warsaw University of Technology. Her previous practice and research experience include multiple interdisciplinary and multi-scalar collaborations in Poland, the Netherlands, Norway, Spain, and Portugal. She is currently an associate professor in sustainable architecture at the Aarhus School of Architecture in Denmark. In her research and teaching, she focuses on circular design and reversible tectonics, designing with reused materials, for maintenance, repair, disassembly, and future reuse. She explores these topics through an ecological thinking approach, investigating broader eco-systemic entanglements of material flows and life-cycle design strategies. Currently, she is developing two research projects, *Time Matters: The Prospects on Future of Architecture* and *The Ecologies of Stone*, and she runs the master studio called *Studio 3A CARE*.

Nacho Ruiz Allén is an architect from the Barcelona School of Architecture and a PhD architect from the Madrid School of Architecture. Professional practice, research, and education are equally fundamental in his approach to the discipline. He has taught at several schools of architecture, both in Spain and Denmark. Among his research projects are *Learning from Las Cuencas*, EU Prize for Cultural Heritage in 2015, and *Escandinavia: An Architectural Dialogue Between Denmark and Spain*.

Morten Ryberg, PhD, is a senior sustainability specialist in the building division at Sweco Denmark. Morten works with quantitative assessment and evaluation of sustainability in relation to buildings and the built environment. His primary focus is on defining sustainable target values for activities in the building sector and on performing life-cycle assessment of buildings and building materials to aid developers and material producers in improving the environmental performance. Previously, Morten has worked as an assistant professor at the Technical University of Denmark focusing on the development of methods for assessing and relating the environmental impact of products and systems to planetary boundaries.

Teddy Serrano, MSc, is a PhD student in the section for Quantitative Sustainability Assessment at the Technical University of Denmark. The goal of his PhD is to develop methods to improve the definition of absolute environmental targets at a product and company level, and to investigate the possibilities of engineering to help companies create products and services aligned within environmental and geophysical boundaries. He is also, as part of his PhD, teaching life-cycle assessment at a MSc level. Previously and at the time of the writing of the present article, Teddy worked as a research assistant in the same research group on several projects related to the quantification of environmental impacts, including the application of life-cycle assessment to the building sector.

Annika Tuominen is an architect driven by a commitment to empowering civic life through egalitarian design. Graduating from Tampere University in 2020, she has had the privilege to further enrich my education at Bauhaus University Weimar and Brno University of Technology. Her specialization lies in public architecture, urban planning, and architectural retrofits. Infused with a profound passion for train systems, both her research and her designs prioritize seamless movement and functionality. As a committed practitioner and independent researcher, she champions discussions on accessibility and

excellence for all users. Moreover, Tuiminen firmly believes that anything designed for use should exude top-tier performance and enduring quality. She is gratified to have received research grants from the US Embassy in Finland and the Finnish Cultural Foundation, which have further fuelled her mission to improve the impactfulness of urban spaces to not only inspire but also empower communities to thrive.

Kemo Usto holds a Master of Science degree in architecture, which entails an interdisciplinary approach between technical and engineering aspects, as well as social science considerations. Since then, he has been working at several architectural firms in the Copenhagen area before returning to academia in a teaching and research capacity. Kemo Usto has recently defended his doctoral dissertation, which deals with gaining a different theoretical perspective on the pertinent issues within the building industries and its material consumption—in which a critical, tectonic, and metabolic (industrial ecology) understanding of the building industry explores a much-needed slowing of the metabolism of the built environment.

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