Shalini Sahoo

harmonising Human-Material-Interaction (hHMI) within Transit Spaces

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Contents

This thesis represents the submission for the degree of Doctor of Philosophy at the Royal College of Art. I confirm that the work presented here is my own. During the period of registered study in which this thesis was prepared I have not been registered for any other academic award or qualification. The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

Despite the key relevance of the industry to this project, the thesis content is not in any way beholden to them. The project is autonomous in its research and findings. It has been funded by the Heinrich Böll Stiftung and the London Doctoral Consortium. My work is greatly indebted to these institutions, with whose generous financial and ideological support I have been able to exercise my research and disseminate my findings without bias and with utter honesty.

Shalini Sahoo, 15 th November 2020

"It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to heaven, we were all going direct the other way – in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only."

Charles Dickens,
A Tale of Two Cities, Book the First, Chapter I.[1]

1 Dickens, Charles (2020) *A Tale of Two Cities* (San Diego, CA: Canterbury Classics)

Acknowledgements

This PhD research has been a great learning experience, which would not have been possible without the support of, and exchange and collaboration with, experts across various disciplines. I would like to thank the Finnish architect Dr Juhaani Pallasmaa for discussing and guiding my research work at various stages and sharing with me his experience in designing public spaces. Pallasmaa is also an architectural theoretician and a visionary: my exchanges with him ensured the importance of an idealistic foundation in my work. He also introduced me to architectural phenomenology.

Between March 2017 and March 2018, I attended part-time a one-year course on sacred architecture, organised and conducted by Harald Jordan. Jordan has been a practising civil engineer in Germany and is an expert on cathedral and traditional architecture. His courses helped me in understanding how traditionally the craft of architecture was used to create built environments that evoked the sense of sacredness in the user. In the summer of 2018, on his advice, I visited the cathedral at Chartres to experience the uplifting quality of a shared public space.

My first contact in the public transportation sector was Yo Kaminagai. Kaminagai is the Head of Design at RATP.[2] I met him first during the initial phase of my research. He was very supportive of my work and extremely helpful in connecting me internationally to key transportation providers. Kaminagai also introduced me to the Design and Culture Platform at UITP,[3] Brussels. This is an insider's club, and being able to attend their meetings and present my research there was essential in building my knowledge about transportation providers internationally and also enabled me to gather expert feedback on my work.

I am also very grateful for the cordial support from Evelien Tenelse and Mark van Hagen from NS[4] Netherlands. Tenelse and Hagen sympathised immediately with my research topic. Hagen had just finished his PhD, entitled Waiting Experiences at Train Stations.[5] The exchange with them was very valuable in building up my research. Andrew Mead from MTR[6] Hong Kong has been important for my field research. Mead has worked as an architect with public transportation providers in Toronto, Singapore and Dubai. He had an instrumental role in building the Dubai Metro. I benefited greatly from his rich and varied experience – he was very helpful, and kindly replied to all my queries.

The work I did on the U5 project with Hochbahn AG Hamburg between 2018 and 2019 constitutes the praxis part of my research. For this I would like to thank Stephanie Holk and Jan Hendrik Schmidt. Early in 2017, I met Holk in an UITP conference in Montreal; she expressed interest in my research and invited me to visit them in Hamburg. Later in the U5 project I worked closely with Schmidt. I am grateful to them for being open and always supportive of my point of view. During this phase of the work, amongst other aspects, I appreciate most the many candid and constructive interactions we had. The project with Hochbahn also gave me the opportunity to work closely with the Hadi Teherani architectural studio and with the Seamless Mobility team at IXDS, Berlin.

The Immersive Behavioural Observation (IBO) method was developed with the theoretical reflections of the Heideggerian philosopher Dr Stefan W. Schmidt, who is an expert in the phenomenology of built environments. The draft of the IBO method benefited immensely from the detailed feedback of the anthropologist and designer Marcos Soares. The German anthropologists Dr Claudius Giese and Gerda Giese kindly supplied me with reading recommendations. Prof. Timothy Ingold's feedback and comments on the IBO method were also very valuable.

The Greek typographer, activist and semantic expert Iordanis Stylidis helped me understand the Greek etymological meanings of various key terms used in my research. The Greek typographer Kostas Bartsokas also provided me with etymological information and references. I would also like to thank Cathy Johns for her very meticulous and careful proofreading.

During the undertaking of this PhD I lost two of my very important design teachers: the late Shri Hemant Kumar Vyas and the late Shri M.P. Ranjan. Kumar Vyas instilled in me the foundations of design ethics and Ranjan was my very first systems teacher. In the years before commencing the actual PhD research I had spent hours discussing this with both of them; in many ways they have closely accompanied the spirit of this work.

I have been very blessed with my supervisors, Dr Stephen Boyd Davis and Dr Chris Thorpe, who have believed in this work and sincerely supported me in doing it. They respected my decisions and never ceased to challenge me on several fronts. Without their support this work would not have been possible in this form. I thank Prof. Catherine Dormor, Prof. Ashley Hall, and Rachel Mc Donagh for all their support, throughout the PhD. I would also like to thank my friends and family for standing beside me during this phase. My deepest gratitude goes to my son, Sasha Sahoo, who actively supported this work, which involved a lot of travelling and time away from him. Along with this he was always eager to know what I was up to and never ceased to argue against my views. It is to him that I dedicate this work.

2 *Régie Autonome des Transports Parisiens* (RATP) or, Autonomous Parisian Transportation Administration, is a state-owned public transport operator and maintainer headquartered in Paris, France.

3 *Union Internationale des Transports Publics* (UITP) is the International Association of Public Transport in Brussels, Belgium.

4 Nederlandse Spoorwegen (NS) is a Dutch state-owned company, the principal passenger railway operator in the Netherlands.

5 Hagen, Mark van. (2011). *Waiting Experience at Train Stations* (Delft: Eburon Academic Publishers)

6 Mass Transit Railway (MTR) is a major public transport network serving Hong Kong. Operated by the MTR Corporation Limited.

7 „Ein Kind hat drei Lehrer: Der erste Lehrer sind die anderen Kinder. Der zweite Lehrer ist der Lehrer. Der dritte Lehrer ist der Raum."
"A child has three teachers: The first teacher are the other children. The second teacher is the teacher. The third teacher is the physical space."
Seydel, Otto (2009) 'Pädagogische Überlegungen zum Thema Schulbau', <https://www.zukunftsraumschule.de/pdf/information/schulgestaltung/Der_dritte_Lehrer.pdf>

Image 0.1
The built environment plays an important role in this research, these have been the third teacher for me.[7] Glacière metro station, Paris, 2017

Image 0.2
During my field work I met several people who helped this research with their warmth, curiosity, ideas and encouragement. Ide Railway Station, 2019

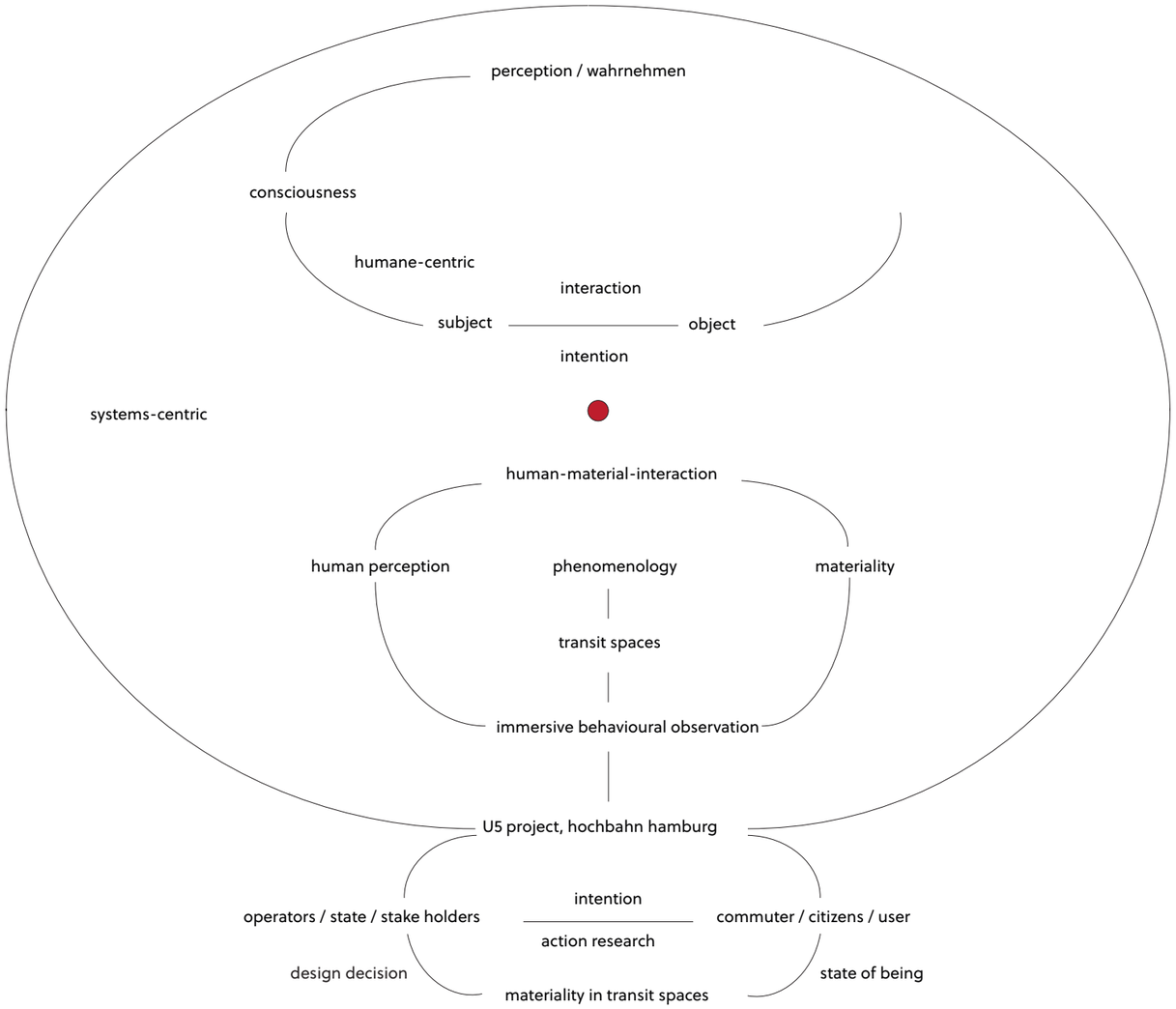


Diagram 1.1
A map of the PhD research

1 Introduction

1.1 Preface

Harmonising Human-Material-Interaction (hHMI) within Transit Spaces addresses the documentation, research and development of urban transportation systems (as represented in Diagram 1.1). It is an effort to analyse, understand and enhance the quality of Human-Material-Interaction in the interiors of public transportation, with the aim of generating a rational understanding of the elements that contribute to the wellbeing of humans in these shared public spaces. In this context, "wellbeing" is understood as balancing the physical, the psychological and the emotional state of commuters, providing a quality of life they otherwise reserve for leisure. Through self-driving cars, mobility apps and shared vehicles, society is moving towards a paradigm shift in the way we relate to mobility. Private vehicle ownership is disappearing from the urban landscape;[1] the future of mobility is collaborative utilisation.[2] The shared interiors of public transport will gain increasing importance.

This investigation, in moving forward from addressing the established issues of sustainability, is grounded in a vision of ethical design. It looks at the potential for design to enhance the qualities of the public realm. An enclosed space in movement is a complex composition of proportions, materials, surfaces, colour, lighting, sounds and smells. How can these elements be arranged in sensitive ways to create a space which positively influences the state of being? This research is an in-depth study of the semantics of these elements, indicating their symbolic functions and their connection to formal aesthetic aspects.[3] The outcome includes a set of design principles – defining parameters to create a "quality-of-life" experience in urban mass transportation systems.

This research is practice-based, building on my widely contrasting experience: developing Phaeton interiors for Volkswagen and being a barefoot designer, working with craftspersons in India and Pakistan. Personal work experience on many automotive projects made me realise that the "idea of luxury" in the styling of automobiles is oriented less towards the wellbeing of the end user or the environment and more towards impressing others and increasing sales,[4] "Thus making the automobile exercise power on society, more than any other utilitarian object of the industrial revolution".[5] In contrast to this, "interiors of public transportation continue to be largely designed on the basic rule of anti-vandalism",[6] with the selection of neutral colours and the materials and clinical lighting which define the environment of public transport.

1 Boulange, Claire et al. (2017) 'Examining Associations between Urban Design Attributes and Transport Mode Choice for Walking, Cycling, Public Transport and Private Motor Vehicle Trips', *Journal of Transport & Health* 6, pp. 155 – 66, <doi:10.1016/j.jth.2017.07.007>

2 Boarnet, Marlon and Randall Crane (2001) *Travel by Design: The Influence of Urban Form on Travel* (New York: Oxford University Press)

3 Steffen, Dagmar (2012) 'Design als Produktsprache: Der "Offenbacher Ansatz"' in *Theorie und Praxis* (Frankfurt am Main: Verl. Form)

4 Sachs, Wolfgang (1992) *For Love of the Automobile: Looking back in the History of Our Desires* (Berkeley, CA: University of California Press)

5 Aicher, Otl (1984) *Kritik am Auto: Schwierige Verteidigung des Autos gegen seine Anbeter* (Callwey Verlag)

6 Tietz, Thorsten and Shalini Sahoo (2014) Interview with Stephan Schönherr, Vice President MAN Truck & Bus AG, Munich on colour & material selection for public transport interiors

7 Dr. Claudius Giese and Gerda Giese, Ethno Textil Gallery, Bremen, Germany. Marcos Soares, School of Design, Royal College of Art, London, UK

8 Dr. Stefan W. Schmidt, Department of Philosophy, Bergische Universität Wuppertal, Wuppertal, Germany

9 Upholstery Boxmark, Feldbach, Austria; Konrad Hornschuch AG, Weißbach, Germany; Concrete LCDA, London, UK

10 Dr. Juhani Pallasmaa, Helsinki University of Technology, Helsinki, Finland. Harald Jordan, Worpswede, Germany

11 IXDS Labs, Berlin

I set my research activities within the tradition of "designing for a better world", questioning at the same time the idea of "better". Along with this my enquiry focused on a more systems-centric approach to design practice. This influenced the nature of the research in the way that I travelled in several directions over a wide field of disciplines, charting landscapes to understand them at various levels. These journeys have been enduring, involving and at times tedious. To enable them to bear fruit I had to back them up with a sound structure and discipline my approach. I have attempted in this work to find a balance between my natural inclination to work with the bigger interconnected picture and what may be realised in a restrictive framework of time resources. In the systems-centric approach, interiors of transit spaces are the nucleus, and the system around it is mapped, analysed and dissected in its various complexities. The ideal situation / solution is negotiated within a systems context. The multidimensionality of this work was supported by working with experts in fields of architectural theory, phenomenology, anthropology, material technology, interaction design and transportation policy making.

The anthropologists[7] helped me deepen my insights into fieldwork. They guided the development of the Immersive Behavioural Observation (IBO) method by regularly critiquing it and comparing it with existing field research methods. The expert on phenomenology[8] guided my use of phenomenological concepts to develop and understand the theoretical foundations of the work. This project has been enriched by my increasing awareness of Heideggerian phenomenology and its terminology. For material expertise I have been in contact with various suppliers,[9] who supported my research by generously supplying me with material samples and updating me about the state of the art in materials, processes and techniques. The work on material semantics was carried out by documenting the textures of different natural materials of plant, animal and mineral origin with a Spectro-microscope at the Nature Lab, Rhode Island School of Design, Providence (a total of 317 scans were collected from 117 different natural materials). To understand architectural phenomenology in particular, I have been in constant exchange with an architectural theoretician and an expert on traditional cathedral architecture.[10] Their guidance was important as they helped me gain an insight into the vast field of research in this area. They also introduced me to various projects and supported several of my research investigations.

For a period of eight weeks I worked very closely with specialists in UX and UI design[11] for the Hochbahn Hamburg project. This helped me identify the nuances of a technology-centred interaction between human and material, within the context of a smart station. In this same phase of work, I worked with

12 Morrison, J. S. (1989) 'Names and things in Greek maritime contexts', *Mediterranean Language Review* 4 – 5, pp. 47– 61, <http://www.jstor.org/stable/10.13173/medilangrevi.4 – 5. 1989.0047> [accessed 7 September 2020]

the architectural office of Hadi Tehrani, who had won the initial tenders for the first stations on the Hochbahn Hamburg U5 line. This revealed to me the real-life restrictions within which architectural offices work on projects. The main praxis part of the work was carried out on the U5 project, Hochbahn Hamburg. This work extended over a period of one year and has been very valuable for the development of this research. Otherwise, this project has benefited significantly from exchange with UITP, Brussels; RATP, Paris; NS, Netherlands; and MTR, Hong Kong, amongst others. (Please refer Appendix: Research Collaborations)

Apart from this, the work has also been enriched from my three main geographical and philosophical standpoints – India, where I was born and brought up; Germany, where I have primarily lived and worked for the past decade and England, where I physically undertook this PhD. Along with this, my personal background of growing up with three languages – Oriya, Hindi and English, and later, as an adult, learning German – means that language has played an important role in this research. It became for me a tool for investigation, for discovering what was communicated with it now, and the more subtle information that words have carried within themselves, both since their origin and in different cultures. In this work I have often followed the ancient meaning of words in order to rediscover their nuances and understand them in their totality. One such word has been 'harmony'. During a masterclass with Stylidis, he meticulously pointed out all the words in my research and shared with me their meanings in an etymological context.

The word "harmony" originates from the Greek word *harmos*. As Stylidis pointed out, the word *harmos* means "joint", referring to the space between two planks of woods that are brought together in boat-building or the space that is between pieces of rock that are placed upon each other during architectural construction.[12] On Stylidis' advice I went to Delphi and spent a day at the temple ruins understanding the *harmos* (see Image 1.1). This was an important experience. I was working with the word harmony from the beginning of my research, and it was only in the third year with Stylidis, at Delphi, that I had the satisfaction of having grasped the deeper meaning in the word. On this I agree

Image 1.1
Delphi Temple ruins,
Delphi, 2019

with Martin Heidegger, who writes, "The way is a way of thinking. All ways of thinking, more or less perceptibly, lead through language in a manner that is extraordinary".[13] Following languages and immersing myself in a word to discover its breadth of meaning has been a valuable experience during this PhD. The seminal readings in this work move through a wide topography, ranging from philosophy, architecture and design to biology, management studies and sociology. In the selection of the works I followed the Norwegian mathematician Niels Henrik Abel's strategy: to study the masters and not their pupils. I have spent many slow hours engaging with the original writings of Heidegger in German and their English translations. I found Heidegger's writings to be an amazing mental stimulus. I read him with fervour and doubt, knowing that he supported the Third Reich's ideology and never fully broke with it. Despite this conflict, I have made my peace with him, and Heidegger has indeed been an important influence in this work. This I primarily owe to Emmanuel Levinas' work on alterity. Levinas had been a student of both Edmund Husserl and Heidegger, and after realising the ethical conflicts his teachers' philosophy brought with it, he devoted an important part of his work to understanding the ethical implications in dealing with the Other. Levinas' work builds the ethical foundation in my research. Apart from this I also read the later work of Ludwig Wittgenstein to understand how language influences our shared inter-subjective perception of the world.

Although developing new knowledge is integral to the PhD research tradition, this work was never motivated by the idea of novelty, but rather by the search for answers to questions I had been carrying in me as a practising designer in the German automotive industry. This is elaborated further in Section 1.3. The one constant in this research has been the veracity in (re) searching. The work at the meta-level investigates the interaction between the Self and the Other and at the object-level the interaction between the human and the material within transit spaces. The human and her perception is thus the starting point for all the interactions and all the interpretations. Thus in many ways the Other, that is the materiality that surrounds us in the first place, is investigated by the perception of it via the sensory and cognitive apparatus of the human body. That is, starting from where we are in the human body. This is in no way an irreducible anthropocentricism, but rather, as Ezio Manzini refers to it, "an acknowledgement of a limit: humbly recognizing that whatever we think and do, we cannot but think it and do it from the point where we find ourselves",[14] and, as Emmanuel Levinas writes, alterity is how we find (our) Self.[15]

13 Heidegger, Martin (1977) *The Question concerning Technology, and Other Essays*, trans. and with introduction by William Lovitt (New York: Harper and Row), p. 3

14 Manzini, Ezio (2019) *Politics of the Everyday: Designing a Collaborative Democracy*, trans. Rachel Anne Coad (London: Bloomsbury), p. ix

15 Davis, Colin (2007) *Levinas: an Introduction* (Cambridge: Polity Press)

16 Wiener Linien is state owned and runs most of the public transit network in the city of Vienna, Austria.

17 Bremer Straßenbahn AG (BSAG), is the public transport provider for Bremen, Germany, offering tramway and bus services.

1.2 Synopsis

In this work I pursue two levels of enquiry, discussed in detail in Section 1.4. The first is the object-level question where I investigate how materiality within transit spaces informs and subconsciously influences commuter behaviour. The second is the meta-level enquiry. This investigates how design research and practice can negotiate to eventually create products, services and spaces that create in our society an environment of sustainability, democracy, equality and the fulfilment of basic needs. This PhD research is divided into three main parts, as seen in Diagram 1.2. The first part involved studying and documenting existing public transportation spaces with respect to the Human-Material-Interaction in these spaces. Material here is understood as everything we perceive via our sensory apparatus like: colour, olfactory encounters, aural quality, colour temperature, humidity, amongst others. Though this research largely focuses on urban rail systems in the context of Western Europe, it was not limited by it. During this phase public transportation systems were studied in London, Paris, Bremen, Hamburg, Berlin, Tokyo and Hong Kong. The study greatly benefited from the active support of public transportation providers such as RATP, Paris; Wiener Linien, Vienna[16]; NS Netherlands; MTR Hong Kong, BSAG[17] Bremen and from UITP, Brussels. For the field research the method of Immersive Behavioural Observation (IBO) was developed and used.

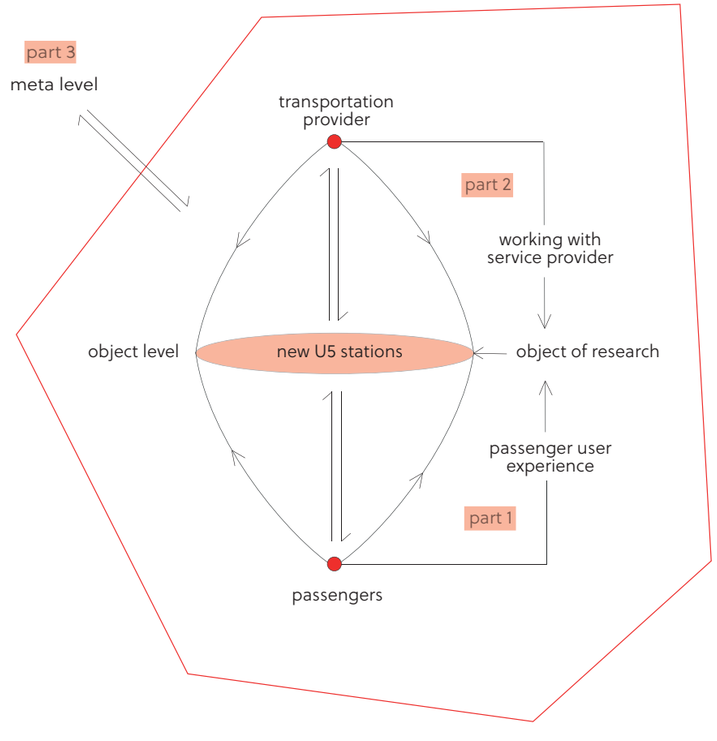


Diagram 1.2
The 3 main parts in my PhD research

The second phase of the work involved deliberating on the findings of the fieldwork via working closely as an external consultant to Hochbahn Hamburg A.G. on the new U5 project, for this I developed the framework for Dissecting Organisational System. The work with Hochbahn constituted the praxis part of the research. This continued over a period of one year, punctuated by two intensive phases of work with mid-level managerial staff from Hochbahn, the city of Hamburg and other external experts on user experience, architecture and digitalisation. The task was to develop a design and architectural handbook that would serve as a guide for the smart stations to be built on the new metro line. This phase of the work helped me understand the context of the research – that is, transit spaces from a top-down perspective.

The third part of this work consists mostly of the meta-level reflections that have been an integral part of the research. Therefore, this work is not only object-centred but is more systems centred. The meta-investigation aimed to understand what separates a desired situation from an existing one, and how a systems intervention may correct it. This research thus oscillated between understanding the needs of users (bottom-up) and the higher-level goals of policymakers (top-down). Through this work, I investigated how design research at a systems level may be carried out by investigating the system at micro and macro level, by learning the language of the system and by implementing a method of recursive interaction with the object of knowledge.

Although a PhD is about generating original knowledge, my approach to it was founded more on an epistemic curiosity. Along the way I have generated six new terms (refer section 1.3 Terminology), one new method (discussed in section 2.1) and one new framework (discussed in section 3.1). Each of these was initially created to facilitate my work, but over the period of this PhD they were elaborated, explained, given a form and made more explicit. Like Gordon Pask, I agree that "originality is something of a snare if not a positive delusion".[18] The main rationale for my "new" created words, method and framework was not a sense of novelty but to emphasise a more ethical and systems-centric way of working. The research contributions in this PhD have been at three levels – ethical, methodological and in terms of the "content".

18 Pask, Gordon (1976) *Theory: Applications in Education and Epistemology* (Amsterdam: Elsevier), p. x

Image 1.2
Material collage for Neoplan XT, Shalini Sahoo, MAN SE, Munich, 2014

1.3 Terminologies

The following is a list of terms that are particularly important in this thesis. I use these terms in a specific way, and this will be explained in greater detail within the thesis at the relevant points. These terms are largely associated with the methodology and the theoretical context of the work. The glossary below may also be treated as a set of keywords that briefly introduce the higher-level discussion in this work. The expressions marked with asterisks are the ones I have created during this research.

Agile Dialogue*: A tool developed by me using the Participatory Design method, in which important phases of the research development are simultaneously disseminated or shared with various groups to open the research to the gathering of feedback and validation.

Ahimsa: {/əˈhɪmsɑː/ Sanskrit} At a basic level this may be translated as non-violence, but *ahimsa* at a philosophical level suggests the acceptance of violence rather than the negation of it. The process of transformation may take place only when we accept the non-functioning, or *Himsa*, which is violence, and consciously decide to transcend it. *Ahimsa* may be seen as a concept of positive peace.

Alterity: This means otherness, in contrast with the Self: the state of being other, or different. The problem of alterity also occurs in homogeneous societies. In the phenomenological tradition Emmanuel Levinas developed this concept further.

Appearance: The act of appearing, or what appears to be. A formal and conscious act of becoming visible or noticeable to the Other, that is not the Self. This is used as a methodological tool in Section 3.1.

Artificially Organised System*: An artificial system is a socially organised system that is never fully knowable or fully predictable. It is a part of a continuously fluctuating socio-economic system and its "wicked" (explained below in this section) repercussions.

Atmosphere: The aesthetic and the phenomenological qualities of space. This is often used to describe the ambience of a space that is born out of the collective quality of the space, that may not be reduced to one particular object.

Autopoiesis: From the Greek αύτο- *auto-*, meaning 'self', and ποίησις *poiesis*, meaning 'production'. Francisco J. Varela, in *Self-Organising Systems* (1981) used the notion of autopoiesis to describe the property of a living system that allows it to maintain and renew itself by regulating its composition and conserving its boundaries.

Behavioural: Relating to the act of behaving, the way one conducts oneself with respect to or as a reaction to the environment, a social situation or in response to a particular stimulus.

Chronotope: A term I have borrowed from Mikhail Bakhtin. The chronotope describes the patterns of orientation and perception of those who find themselves in a place at a certain time. In the phenomenological sense, places are chronotopes.

Circular: Circular is used to describe the nature of the IBO (Immersive Behavioural Observation) method. At a direct observational level, it implies that the observer (sharing the same chronotope with the observed) experientially comes back to herself to understand or relate to a particular observed phenomenon in the field. A secondary meaning of the term is the recursive interaction with the field of knowledge.

Common Good: Refers to those facilities – material, cultural or institutional – that the members of a community provide to all members in order to fulfil a relational obligation they all have to care for certain interests that they have in common. Some examples of the common good are the road system, public parks, police protection and public safety.[19]

Conversation: (from the Latin *conversari* 'keep company (with')*,* from con- 'with' + versare, frequentative of vertere 'to turn'.) An exchange, usually of words, between two or more people. Ideally, it is an interaction between equals, and continues informally over a period of time.

First-level Construct: "Construct" here does not mean "making up" the phenomenon we want to analyse but rather demarcating it, to accentuate it and bring it into the foreground. The first-level construct is about pulling together data from the perceived phenomena.

Second-level Construct: The collected information is processed to generate the second-level construct of sense-making and the generation of meaning.

Critical Consciousness: This is greatly influenced by the work of Paulo Freire. Freire used the Portuguese term *conscientização*, "conscientisation", to express the concept of "consciousness raising" in his education work with farmers in Brazil between 1961 and 1963. Critical consciousness deals with the identification of "generative themes", which Freire identifies as "iconic representations that have a powerful emotional impact in the daily lives of learners."

Second-order Cybernetics: Also known as the cybernetics of cybernetics, this is the recursive application of cybernetics to itself. It was developed between approximately 1968 and 1975 by Margaret Mead, Heinz von Foerster and others.[20]

Demarcation: The act of defining boundaries to limit or define one from the rest. It serves the purpose of bringing attention to the marked area by drawing a clear separation – that is, demarcation from the rest.

Distinction: Borrowed from George Spencer Brown's work, distinction, like demarcation, is the act of drawing a boundary around something, thus separating it from everything else – that which becomes distinct from everything else by drawing a boundary.[21]

19 Hussain, Waheed (2018) 'The Common Good', in: Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy* , <https://plato.stanford.edu/archives/spr2018/entries/common-good/>

20 Glanville, Ranulph (2002) 'Second order cybernetics', in: F. Parra-Luna (ed.) *Systems science and cybernetics*, in: *Encyclopaedia of Life Support Systems (EOLSS)* (Oxford: EoLSS), <http://www.eolss.net/>

21 Spencer-Brown, George (2011) *Laws of Form* (Leipzig: Bohmeier)

22 Ahmed, Sara (2017) *Living a Feminist Life* (Durham: Duke University Press)t

23 Morrison, J. S. (1989) 'Names and things in Greek maritime contexts', *Mediterranean Language Review* 4 – 5, pp. 47– 61, <http://www.jstor.org/stable/10.13173/medilangrevi.4 – 5. 1989.0047> [accessed 7 September 2020]

Diversity Worker: A term borrowed from Sara Ahmed,[22] this refers to the worker who is external to an otherwise normative institutional system.

Fluid Phenomenon: This refers to a transient phenomenon that occurs in a fleeting interaction between the user and the environment and may not leave any traces.

Harmony: (from Latin *harmonia* 'joining, concord', from Greek, from *harmos* 'joint'.) *Harmos* is the space that holds various elements together in order to create a functioning unity. In boat-building it is the in-between space holding various pieces of wood together. In wall construction it is the joining element that holds the stones together.[23]

Human Users*: Emphasises the human element when referring to users, shifting the focus from profit-oriented goals to a more ethical approach in designing.

Humane-centric*: Humane-centric, as opposed to human-centred, emphasises the ethical and societal aspects of designing for humans. Ontologically it moves away from the objectification of the user and consciously focuses on the designer's obligations to serve the *humane* more broadly.

IBO Method: This refers to the Immersive Behavioural Observation (IBO) method. The IBO method is built on the more traditional participatory observation approach from ethnology and direct observation as practised by, amongst others, social scientists and urban planners.

Immersive: A key element in the IBO method. "Immersive" refers to the act of immersion in the shared chronotope of the observed, making the observer a decisive part of the observed system that is the aim of study.

Intention: A way of reflecting/redescribing what one is doing in terms of a "primary reason". An action becomes intentional by virtue of its primary reason.

Interaction: A reciprocal action or influence.

Loose-Fit Design: An approach to designing products, spaces and services that understands the process of designing as a continual process – that is, largely formed and modified by the user during the process of use.

Meta-Level: Reflective enquiry into the object-level intervention. Meta-level enquiries extend over a longer time frame. The quest here is not necessarily to find a quick solution, but to understand issues in their wider interconnectedness. To answer the meta-questions, one needs several object-questions whose answers eventually feed into the meta-enquiry.

Object-Level: The object-level deals with investigations that intervene in concrete design issues and engages with the object of experience: this may be a product, a service or a system.

Objective Subjectivity*: An oxymoron, referring to subjectivity based on a shared notion of objective reality or truth.

Object of Knowledge: Refers to the main context of investigation. For example, in this research the main Object of Knowledge are train stations.

Other: The one that is not the Self; this exists in differentiation from the Self.

Perception: The ability to perceive the other via the Self's sensory apparatus.

Place: Refers to a specific area or location in space.

Recursive Conversation: A conversational exchange that occurs in a recursive pattern, involving the sharing of information, the receiving of information and the validation of the perceived information.

Satyagraha: {/satyāgraha:/ Sanskrit, *satya*: truth, *āgraha*: insistence} A term coined by M. K. Gandhi during the Indian independence movement. It represents a resolute and peaceful insistence on truth as a way to overcome all that is false and evil.

Self: This is the foundational being that distinguishes the person from others. It may refer to one's essential being.

Situational Context: This describes the occurence of a certain behaviour, or actions, situated within the context. This context defines a specific setting in which events occur and may be understood only in reference to the specificity of the context.

Space: A free expanse or physical area in which a particular activity or non-activity takes place.

Spaces in Flow*: Transit spaces, such as stations, airports, streets and highways.

Somatise: The effect of the soothing, relaxant drug Soma. Soma as a drug to suppress unwelcome emotions was first referenced by Aldous Huxley in his novel *Brave New World* (1932).

Subjective Objectivity*: Similar to Objective Subjectivity; this is an oxymoron, referring to subjectivity based on a shared notion of objective reality or truth.

Subvertisements: Subvertising (subvert + advertising) is a form of guerrilla activism. It refers to the use of satire and humour to spoof or parody ads in ways that call attention to their troubling underlying assumptions and messages.

Systems-Centric: Refers to privileging the concerns of the system above any individual or private gain, the system here is understood as a variable constant.

Tacit Knowledge: (From the Latin *tacitus*, past participle of *tacere* 'to be silent'.) A form of embodied knowledge understood or implied without being stated.

Theoria: An Aristotelean term, theoria refers to philosophical or contemplative reflections on the object of research or production.

24 Rittel, Horst W.J., and Wolf D. Reuter (1992) *Planen, Entwerfen, Design: Ausgewählte Schriften zu Theorie und Methodik*, (Stuttgart: Kohlhammer)

Third Place: Ray Oldenburg, in *The Great Good Place* (1989), classified three types of spaces needed for community building. The first place is the domestic environment; the second is the workplace, and the third place is the social surroundings that are neither home nor work, but function to facilitate social interaction within the life of the community.

Tight-Fit Design: The concept of design that considers that the product, space or service is 'finished' or 'complete' on the day it leaves the production area. It is a top-down approach in designing.

Transit Spaces: Spaces that in their inherent quality support the transitory.

Wahrheit: (From German) Veracity or truth. While the English word truth suggests something static to be perceived or found, *Wahrheit* seems to imply an active process.

Wahrnehmung: (From German *Wahr* 'truth', *nehmung* from *nehmen*, 'to take'.) Perception. While the English word perception suggests merely to perceive, *Wahrnehmung* seems to imply a rather inherent subjectivity to the process of perception.

Wellbeing: Here, wellbeing refers to a eudaemonic approach. It looks at meaning and self-realisation, as opposed to a hedonic approach that relates to happiness approached from the perspectives of increasing pleasure and mitigating pain.

Wicked Problems: "Wicked problems" is a term coined in a 1973 article by Horst Rittel and Melvin M. Weber.[24] They contrasted "wicked" problems with problems that are relatively "tame" and soluble in mathematics, chess, or puzzles. In wicked problems the solutions are complex, iterative and cannot be reduced to being right or wrong.

Image 1.3
These terms were initially collected to guide me in the research, but over the period of this PhD they became instrumental in facilitating and expressing this work. Bremen, 2017

Image 1.4
Interior of a Phaeton, Volkswagen A.G., 2015

Image 1.5
Interior of a Bombardier coach, BVG Berlin, 2015

25 Personal work experience on many automotive projects made me realise that the "idea of luxury" in the styling of automobiles is less oriented towards the wellbeing of the end user or the environment and more towards impressing others and increasing sales.

26 All the 12 Design Directors at Volkswagen Group are white middle-aged men. Press Reader (2018) Guy Bird 'Mauer's Men', <https://www.pressreader.com/uk/car-uk/20180901/281586651426261> [accessed 8 September 2020]

27 Manager Magazin (2018) Wilfried Eckl-Dorna 'Volkswagen kündigt Lieferverträge: Der Niedergang des Zulieferer Prevent', <https://www.manager-magazin.de/unternehmen/autoindustrie/volkswagen-kuendigt-prevent-der-niedergang-des-zulieferer-rebellen-a-1201361.html> [accessed 21 October 2020]

28 Augé, Marc (2008) *Non-Places: An Introduction to Supermodernity* (London: Verso)

29 Die Zeit (2019) 'Abgasskandal: Gericht legt VW Vergleich mit Diesel-Kunden nahe', 18 November 2019, <https://www.zeit.de/wirtschaft/unternehmen/2019-11/abgasskandal-volkswagen-muster-prozess-vergleichsverhandlung-diesel>

30 Disclaimer: I realise that the Eichmann Process is a contentious example and can be interpreted in various directions. In no way do I make a comparison between the Third Reich, which was the 'employer' of Adolf Eichmann, and the current German automobile industry. Nor am I similarly comparing the atrocities inflicted on the victims of the Third Reich to anything in the current German automobile industry context. I am merely using the Eichmann Process to re-question our individual autonomous ideas about morality and how far these must go before we take responsibility for our actions in the larger system that provides for us.

31 Arendt, Hannah (1963) *Eichmann in Jerusalem: A Report on the Banality of Evil* (New York: Viking Press), pp. 99 – 140, p. 135

1.4 Research Question

1.4.1 The Research Background and the Motivation

The initial motivation for my research arose from my inner conflict between my work as a designer in the commercial vehicle industry[25] and my travel experience on public transport. First, I was largely working on privately owned vehicles, a product I did not completely believe in. Second, I was working for an industry whose ethical standards I did not subscribe to. The automobile industry in Germany is rooted in a patriarchal system,[26] oriented strongly towards profit generation, defying all sense of commitment towards the environment,[27] the state and Tier 1 suppliers (a Tier 1 supplier is a company that directly supplies an original equipment manufacturer). Added to this inner conflict was the corporeal discomfort that I felt in public transportation spaces. These spaces are largely designed and built according to the basic rules of functionalism and anti-vandalism. The periods I spent in these spaces were lengthy in duration, on seats that left me with serious backache; they have dysfunctional toilets, over-full dustbins, waiting areas with freezing temperatures and stinking corners … I realised the sharp contrast between my area of work as a designer in the privately-owned vehicle sector and the reality of the non-spaces[28] of public transportation. My decision to leave the automobile industry to embark on this PhD research investigating the quality of sojourn in shared transit spaces happened simultaneously with the emergence of the diesel emissions scandal associated with Volkswagen Group.[29] I elaborate below on the ethical conflict I had to deal with in my position as a colour and material designer for the automobile industry, and how this reflection has shaped the founding principles on which this PhD research is based.

This self-enquiry made me probe into how, and in what capacity, an individual could take responsibility for their actions within a wider system. To understand this, I am using the much-discussed Eichmann Process.[30] Adolf Eichmann, a senior SS officer in the Third Reich, was brought to trial in the District Court in Jerusalem on April 11, 1961. He stood accused on fifteen counts, "together with others", for crimes he had committed against humanity on the body of the Jewish people. To each of these accusations, Eichmann pleaded "Not guilty in the sense of the indictment." Eichmann followed the Führerprinzip ("leader principle"). He had abdicated his ethical responsibilities in favour of the larger dehumanised mechanism of the Third Reich. To this repressive system, in which members of "respectable society" endorsed mass murder, he gave his unquestioning loyalty and obedience. He was effectively released from his moral responsibility, like Pontius Pilate.[31] To compare my position in the German automobile industry with that of Eichmann might seem to many to be an exaggeration. This rather extreme comparison holds a nagging question, though: how much of our sense of discretion are we ready to compromise in a system that engages us, pays us and binds us with an oath or a contract?

32 *Wahrhaftigkeit*: (From German) The process of adherence on to truth.

33 Stanford Encyclopaedia of Philosophy (2018) Wilfrid Hodges 'Tarski's Truth Definitions', <https://plato.stanford.edu/archives/fall2018/entries/tarski-truth/>

34 Ibid.

35 De Brabanter, Philippe (2017) 'The Relations between Object-language and Metalanguage in Formalised and Natural Languages', in: V. Arigne and C. Rocq-Migette (ed.) *Metalinguistic Discourses 2* (Newcastle upon Tyne: Cambridge Scholars Publishing)

The enquiry, at the object level, was constantly reshaped along the research path: that is, the investigation built upon the inputs that it received during the process of seeking. As a result of this, the PhD research was not particularly goal-oriented, but rather sought the goal that seemed to be a veracious answer to the enquiry. Therefore, the path in this research plays an important role in forming it and needs to be understood as such. The conditions I laid down for myself for this path were based on working with founding ethics. These ethics that I defined for myself were simple: they were based on *Wahrhaftigkeit*[32] – that is, insistence on truth and privileging the concerns of the system above any individual or private gain (being systems-centric).

1.4.2 The Research Question

This PhD research comprises an object-question and a meta-question. The object-question deals with direct object related intervention. The meta-question is the reflective enquiry into the object-level intervention. The logician Alfred Tarski (1902-1983) used the bifurcation of object-language and metalanguage to describe several conditions that a satisfactory definition of truth should meet.[33] Without discussing Tarski's theories in detail here, I briefly use his definition of object-language and metalanguage to draw parallels with my use of the terms object-question and meta-question. According to Tarski, a definition in the object-language (L) should be given in another language, known as the metalanguage (M). The metalanguage holds a copy of the object-language, so that anything that can be said in L can also be said in M.[34] The metalanguage serves the purpose of formalising what is said in the object-language; L is thus the object under discussion in M, the metalanguage. Thus, M is used to understand the semantic properties of L, and to reflect upon L. M is thus of a higher order than L.[35]

Image 1.6
"Spaces in flow" refers to the transient nature of transit spaces. Liverpool Street Station, London, 2017

In this PhD research, the meta-question is the reflective enquiry into the object-level intervention. The object-question deals with investigations that intervene in concrete design issues and engages with the object of experience: this may be a product, a service or a system. Meta-level enquiries extend over a longer time frame. The quest here is not necessarily to find a quick solution but to understand issues in their wider interconnectedness. To answer the meta-questions, one needs several object-questions whose answers eventually feed into the meta enquiry (as depicted in Diagram 1.3). A design process is often a to and fro movement between the meta-level reflection and the object-level doing. The meta-level investigation engages with the object and reflects on the praxis in the object-level enquiry. The meta-questions include, but are not limited to, enquiries into ethics. To answer meta-questions one needs a set of object-questions which ground the enquiry in reality, and on the other hand object-questions need meta-questions to reflect and probe into the (ethical) consequences and dimensions of the doing.[36] The meta and object-level bifurcation have methodological significance for the design practice of shaping things and environments, as well as for design research which informs the practice.

The context of this work is the interior spaces of public transportation. As I shall show, these spaces are largely built to the basic rules of functionalism and anti-vandalism.[37] The materiality that defines this environment is selected on its capacity to withstand the worst excesses of (ab)use.[38] Compared to the privately owned vehicle sector I observed a strong discrepancy here, where design was being used as means to an end that was not human centred.[39] To bridge the gap between what should be and what is, and in the process damage the earth less,[40] is the main intention in this work.

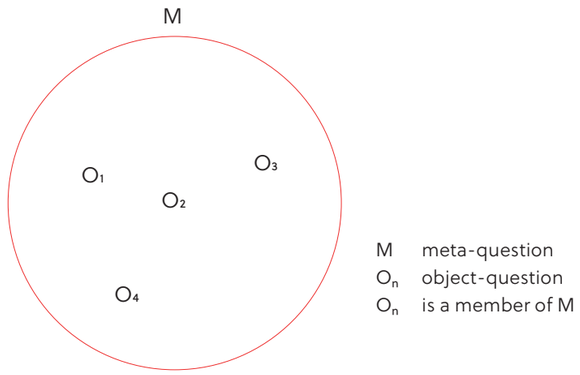


Diagram 1.3
The relationship of object-level and meta-level enquiries

36 "The terms 'object-language' and 'metalanguage' form an inseparable pair, so much so that there is no point in talking of one if there is no other." (Ibid.)

37 Sahoo, Shalini (2016) Interview with Yo Kaminagai on colour & material selection for public transportation areas. RATP, Paris, October 2016

38 Tietz, Thorsten and Shalini Sahoo (2014) Interview with Stephan Schönherr, Vice President MAN Truck & Bus AG, Munich on colour & material selection for public transport interiors

39 'Handle so, daß du die Menschheit sowohl in deiner Person, als in der Person eines jeden andern jederzeit zugleich als Zweck, niemals bloß als Mittel brauchest.' Kant, Immanuel (2008) *Kritik der praktischen Vernunft* [1788], § 7, AA V (München: dtv Verlag), S. 30

40 Mc Donough, William (1993) 'Design, Ecology, Ethics and the Making of Things' (Talk), *A Centennial Sermon. The Cathedral of St. John the Divine*, New York, 7 February 1993

41 Boarnet, Marlon and Randall Crane (2001) *Travel by Design: The Influence of Urban Form on Travel* (New York: Oxford University Press)

42 Furuhata, Masabumi, et al. (2013) 'Ridesharing: The State-of-the-Art and Future Directions', *Transportation Research Part B: Methodological* 57, pp. 28 – 46, <https://doi.org/.1016/ j.trb.2013.08.012>

43 Kalab, Martin. (2018) 'Tram, Metro, Bus in tendering process', *UITP Design & Culture Platform Meeting*, Vienna

44 Tietz, Tietz and Sahoo, Shalini. (2014) Interview with Stephan Schönherr, Vice President MAN Truck & Bus AG, Munich on colour & material selection for public transport interiors

45 Atmosphere here refers to the "affective turn" that unfolds through space, via the interaction of the subject and the object. Böhme, Gernot (2017) *The Aesthetics of Atmospheres: Ambiances, Atmospheres and Sensory Experiences of Space*, ed. by Jean-Paul Thibaud (London: Routledge)

46 Waterman, Alan S., et al. (2010) 'The Questionnaire for Eudaemonic Well-Being: Psychometric Properties, Demographic Comparisons, and Evidence of Validity' *Journal of Positive Psychology*, 5:1 (2010), pp. 41 – 61, <https://doi.org/10.1080/17439760903435208>

47 Ramduny-Ellis, Devina, et al. (2010) 'Physicality in design: An exploration', *The Design Journal* 13 (1), pp. 48 – 76

1.4.3 The Object-Question

Traffic congestion, growing environmental destruction and the increasing size of cities are forcing us to rethink the way we offer and utilise urban mobility.[41] It seems that the future of urban mass transit will be collaborative utilisation. Interiors of urban transportation systems are points of intersection for culture, society, technology and environment.[42] Although there is a long history of idealism in public service design, at the moment the architectural and design decisions within the public transportation domain are being made largely on the basis of functionality, ease of maintenance, durability and cost.[43] The material and design specifications issued for tenders always explicitly mention the need for materials and products in this domain to be easy to clean, maintenance-free and be vandal-proof.[44] With these intentions we end up creating an anonymous atmosphere.[45] Where reinforced glass, steel, concrete and ceramic tiles define a space with robust surfaces and products, they hold their sterility and form against the toughest (ab)use. This is elaborated further in section 2.

This PhD research is an effort to analyse, understand and enhance the quality of Human-Material-Interaction in interiors of public transportation interiors, with the aim of generating a rational understanding of the elements that contribute to eudaemonic "wellbeing" for humans in these shared spaces of mobility. The eudaemonic approach looks at meaning and self-realisation, as opposed to the hedonic approach to happiness from the perspective of increasing pleasure and mitigating pain.[46] The objective is to offer passengers a quality of life they otherwise reserve for leisure.

The first object-level enquiry was about understanding how materiality[47] within transit spaces informed and subconsciously influenced commuter behaviour (as shown in Diagram 1.4). This constituted the bottom-up approach

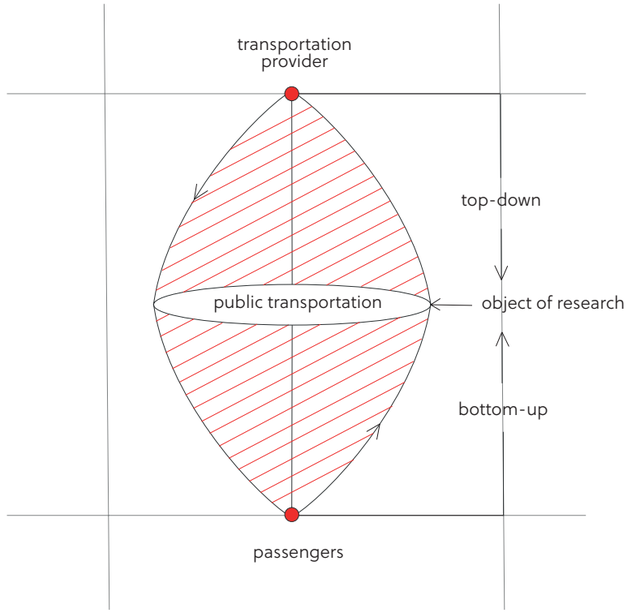


Diagram 1.4
The object of research

to the investigation. The second object-level enquiry is top-down. This aimed to understand how higher-level managerial policies influenced the quality of stay for commuters. I hoped, via design intervention, to negotiate between user needs and the constraints of policy makers, so as to transform transit 'non-spaces' into ones that are more *humane*-centred. For the benefit of the PhD framework, I decided to focus on urban rail systems and how design could improve the quality of stay for the commuter at the level of the Human-Material-Interaction.

1.4.4 The Meta-Question

After designing ways to communicate (first order design), designing artefacts (second order design) and designing activities and processes (third order design) we are now, according to Buchanan, in the fourth order of design.[48] "The fourth order of design is the design of the environments and systems within which all the other orders of design exist. Understanding how these systems work, what core ideas hold them together, what ideas and values – that's a fourth-order problem".[49] At the meta-level, shifting focus from the product to the process, I investigate these fourth-order aspects of design practice and theory.

Here I aim to understand how design research and practice can negotiate to eventually create products, services and spaces that create in our society an environment of sustainability, democracy, equality and the fulfilment of basic needs (refer Diagram 1.5). As Horst Rittel writes, in a particularly intractable problem it is important to distinguish an observed condition from a desired

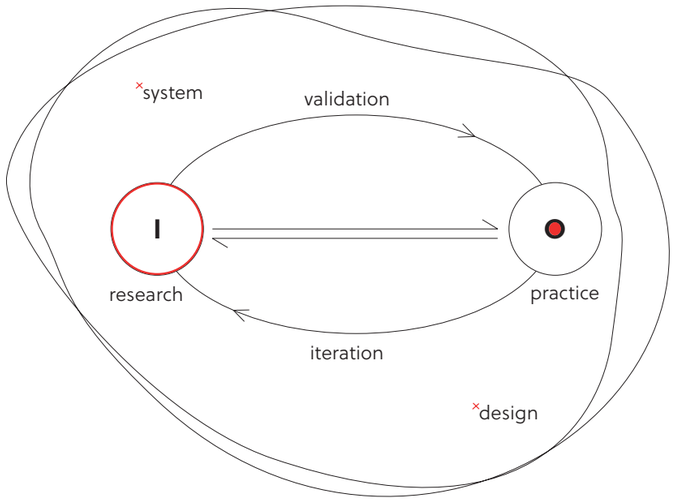


Diagram 1.5
The meta-level interaction between design research and practice

48 Buchanan, Richard. (2001) 'Design Research and the New Learning', *Design Issues*, 17:4, pp. 3 – 23

49 Ibid.

50 Rittel, Horst W.J., and Wolf D. Reuter (1992) *Planen, Entwerfen, Design: Ausgewählte Schriften zu Theorie und Methodik*, (Stuttgart: Kohlhammer, 1992), pp. 31 – 35

51 2nd SDN Design Research Winter Summit 2018, FHNW Academy of Art & Design Basel

52 Collingwood, Robin G. (1945) *The Idea of Nature* (London: Oxford University Press), p. 53

Image 1.7
Passengers inside a metro train in Tokyo, 2019

one, and to identify actions that effectively narrow the gap between what is and what ought to be.[50] This is precisely the meta-level enquiry of my research – to understand at a systems level the factors that influence, promote or prevent the desired condition from the observed one. I investigate how design can make a significant contribution here to form more just and sustainable living conditions without compromising bottom-up initiatives.[51] How can design intervene to engender political and social engagements that go beyond branding and merely aesthetic commitments? The meta-level enquiry also investigates how the scholarly reflexivity of design research can inform the workings of the real world.

The difference between the meta-level and the object-level enquiry probably deals with the same dichotomy as between the mind and substance. RG Collingwood assumes that Pythagoras might have instructed his disciples thus: "it makes no difference what the world is made of, and what we have to study is the patterns and changes of pattern which this primitive matter, whatever it may be, adopts and undergoes".[52] In this respect, the meta-level enquiry aims to understand the patterns that bring about change, and the object-level enquiry works with the physical substance in understanding these patterns.

53 Medawar, Peter B. (2013) *Induction and Intuition in Scientific Thought* (London, Routledge), p. 26.

54 Crotty, Michael (2015) *The Foundations of Social Research: Meaning and Perspective in the Research Process* (London: Sage), p. 3

55 Box, G. E. P. and N. R. Draper (1987) *Empirical Model-Building and Response Surfaces* (New York: John Wiley & Sons), p. 74

56 The New York Times (2018) Sheena Frenkel, et al. 'Delay, Deny and Deflect: How Facebook's Leaders Fought Through Crisis', 14 November 2018, <https://www.nytimes.com/2018/11/14/technology/facebook-data-russia-election-racism.html> [accessed 21 July 2020]

1.5 Epistemology

"That which leads us to form an opinion is also that which justifies our holding the opinion." Peter Medawar[53]

In the following I introduce the epistemological foundation for my research. I do this by briefly explaining my philosophical stance and how this makes up the theory of knowledge in this research.[54] This theory of knowledge lays the foundation for the theoretical reflections in this work, and how this eventually builds the context for the methodology selected and the methods used to carry out the main research. In selecting and building up the methods, my approach was one where I accepted the complexity of the situation I was working with and the practical possibility of what could be achieved within the given time and resource framework. I acknowledge my methodological approach as one of the many ways one could take to approach the research question. Like the statistician George E. Box, who claimed that "all models are wrong; the practical question is how wrong do they have to be to not be useful",[55] I have cultivated a critical and reflective attitude towards the methodology I have used to carry out the research.

The key elements that provided the context and eventually formed the epistemic base are as follows:

1.5.1 Objective Subjectivity
1.5.2 The Nature of Design Problems
1.5.3 The Self and the Other
1.5.4 Phenomenology
1.5.5 Second-Order Cybernetics
1.5.6 Action Research

1.5.1 Objective Subjectivity

In 2012 Volkswagen AG flooded the American market with the extensive promotion of Clean Diesel. This was the same year that Facebook Inc. entered the stock market, while still claiming "to make the world more open and connected". It took less than three years to dismantle the lies on which both these world-leading entities had built their foundation. Both Volkswagen and

Image 1.8
Central Station, Bonn, 2019

57 Mc Intyre, Lee C. (2018) *Post-truth* (Cambridge, MA: MIT Press)

58 Fry, Tony (2019) *Design Futuring: Sustainability, Ethics and New Practice* (London: Bloomsbury Visual Arts), p. 3.

59 Stanford Encyclopedia of Philosophy (2014) G. Hatfield, 'René Descartes', <https://plato.stanford.edu/entries/descartes/> [accessed 21 July 2020]

60 Ingold, Tim (2019) 'Art and Anthropology for a Sustainable World', *Journal of the Royal Anthropological Institute*, 25:4, pp. 659 – 675, <doi:10.1111/1467-9655.13125>

61 Ibid.

62 Ibid.

63 (*/satyāgraha/* Sanskrit, *satya*: truth, *āgraha*: insistence). A term coined by M. K. Gandhi during the Indian independence movement. It represents a resolute and peaceful insistence on truth as a way to overcome all that is false and evil.

Facebook[56] employed the best minds in design for their branding and user experience, and also to hide their lies and deceit. The designed, via the designer, was the interface both these companies used to manipulate the emotional and the experiential perception of the user. As I write this (Summer 2019) I realise that the crisis that plagued the earlier crusaders of scientific objectivity besets the contemporary post-truth era in a similar manner. Although throughout history there have been instances of a similar pattern, there has perhaps never been a time when truth has been manipulated so systematically in order to use it as a mechanism for asserting political or profit-oriented dominance.[57]

Tony Fry calls this a structural rather than an individual problem: designers have been consumed by their service to the industry and have "so far failed to recognise the ethical responsibility for the fundamental quality in design that assures that designed things go on designing".[58]

René Descartes' motivation for writing the first discourse on scientific methodology was to free knowledge from the authoritative dictates of the state and the church, to ground the knowledge-finding process in inductive reasoning and thus to democratise our search for truth.[59] This enables a pluralistic approach which is only possible when we objectively agree on the same (empirical) facts. Thus, the challenge I experienced in my research was, as Ingold writes, "an open-ended search for truth",[60] one that overflows the bounds of objectivity;[61] Ingold elaborates on this by asserting that in our research, objectivity cannot be simply replaced by subjectivity – it has to be something else.[62] This I refer to in my work as Objective Subjectivity. It is one of my ways to *Satyagraha*[63] or the insistence on truth. Diagram 1.6 represents the relationship between the subject and the object. Objective Subjectivity is an attempt to involve the quality of the observer in the observed by maintaining the rigour of scientific research.

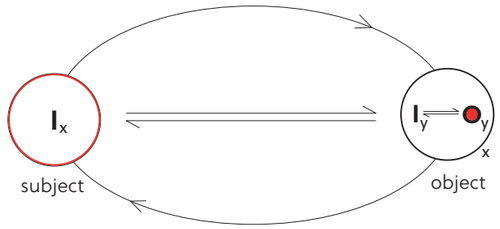


Diagram 1.6
Ix is the observing subject to Ox. Ox contains the interaction of subject Iy to the object Oy; thus, the subject and object exist only in an interaction with each other.

64 Von Foerster, Heinz (2010) *Understanding Understanding: Essays on Cybernetics and Cognition* (New York: Springer), p. 191

65 In the current trend to focus on immaterial aspects of design, one may not forget that even services are bound to the material world and the corporeality of the users. The effects of digitalisation would not have been possible without material references conveyed via material interfaces. The immaterial can exist only with the material.

67 Rittel, Horst W. J., and Wolf D. Reuter (1992) *Planen, Entwerfen, Design: Ausgewählte Schriften zu Theorie und Methodik*, (Stuttgart: Kohlhammer, 1992), p. 5

68 Ibid.

67 Ibid.

69 Rittel and Reuter, 1992, pp. 31 – 35

70 Ibid.

1.5.2 The Nature of Design Problems

"The hard sciences are successful because they deal with soft problems; soft sciences are struggling because they deal with the hard problems." Heinz von Foerster[64]

This PhD research is situated within the discipline of design. Design can be conceived as the conjunction between human users and the materiality of the world that surrounds them.[65] It is design's propinquity to the "real" human issues that has made it a branch of knowledge which is "not discipline-oriented, but mission- and process-oriented", collaborating with disciplines and skills to deal with "real" problems in their wicked context.[66] As the design theoretician J. P. Protzen[67] commented, design goes "beyond being an encyclopaedia of findings to becoming one Theory of Action".[68] Design has a direct impact on the *Leiblichkeit* (the bodily perception) of our lived world. A designed intervention exists through its interconnection to various systems and sub-systems. Thus the challenge that systems-oriented design intervention faces today is the recognition of its ethical implications.

In addition, design's proximity of purpose to the natural, formal and social structures of the world makes the nature of design issues inherently wicked. "Wicked problems" is a term coined in a 1973 article by Horst Rittel and Melvin M. Weber. They contrasted "wicked" problems with problems that are relatively "tame" and soluble in mathematics, chess, or puzzles.[69] What this means is that unlike these "tame", i.e., computable, problems, "wicked" problems are deeply connected to social processes which are tied to open systems entailing wider interconnected networks of systems and subsystems. In such a structural framework (as in Diagram 1.7) the problem centre becomes less apparent, as outputs from one become inputs to others.[70] Here solutions are complex, iterative and cannot be reduced to being right or wrong. In addition, there is usually no opportunity to test solutions against a "control" – a situation in which all conditions are identical save for the designed intervention, as used in classical scientific experiments. For example, one could not build two railway stations, as a feasible, or even desirable, test for ideas.

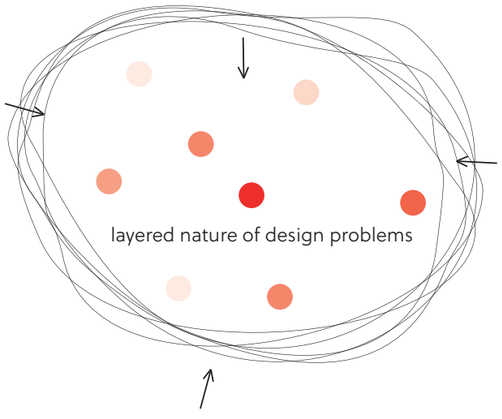


Diagram 1.7
The multi-layered and de-centred nature of design problems

71 "Bewusstsein von etwas" (Hut III/1, 188) zu sein. [Meaning of Intentionality]. Ebner, Klaus, and Helmuth Vetter (2005) *Wörterbuch der phänomenologischen Begriffe* (Hamburg: Meiner)

72 Crotty, 2015, p. 43

73 Freire, Paulo (1993) *Pedagogy of the Oppressed*, trans. by Myra Bergman Ramos (New York, NY: Continuum), p. 19

We can thus conclude that the nature of the design discipline is applied and systems-oriented. It deals with wicked problems, subjectivity, circularity and unpredictability. It is mission- and process-oriented, and operates at a poly-disciplinary level. The scholarship of my PhD research is situated in this topography of the design discipline and therefore benefits or is challenged by its salient features. These inherent dimensions of the research self-evidently guided the selection of the methods used to collect and interpret the data. The theoretical framework followed this, and helped me situate, reflect on and elaborate on the findings.

1.5.3 The Self and the Other

The first model of knowledge I have found most useful is one where the construction of meaning is done with the *Sein*, the being-in-the-world and the consciousness with which one approaches the Other.[71] The theoretical framework of this research bases itself in phenomenology within the existential concept of *Sein* and of intentionality.[72] Phenomenology gave me the necessary intellectual tools I needed to situate the lived experience (within transit spaces) into already acquired knowledge; this is in the process of unveiling new knowledge.[73] The second model I found helpful in understanding design's wicked problems, interwoven within their systems context, was second-order cybernetics. Second-order cybernetics enabled me to gain insights into the system under discussion through the method of recursive conversation. It helped me understand the circularity between the Self and the Other (as is Diagram 1.8) and the innate discussion of ethics in the interaction between the two. Like phenomenological understanding, second-order cybernetics recognises no objective meaning or truth, but the meaning generated by it cannot be simply called subjective. In both these models, meaning is not

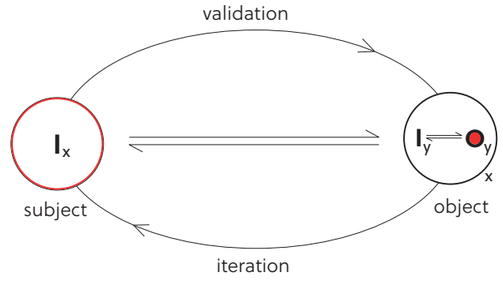


Diagram 1.8
The intrinsic-interactive relationship between the Self and the Other

74 Crotty, 2015, p. 44

75 Husserl, Edmund (1983) '§ 65. The Reflexive Reference of Phenomenology to Itself', in: Edmund Husserl *General Introduction to a Pure Phenomenology*, trans. by F. Kersten (The Hague: Martinus Nijhoff), p. 150

76 Fellmann, Ferdinand (2015) *Phänomenologie zur Einführung* (Hamburg: Junius)

discovered, but constructed, by human beings as they engage consciously with the world they are interpreting (Diagram 1.9, represents the same). Here, objectivity and subjectivity are brought and held together indissolubly.[74] Intentionality and consciousness play an important role in understanding the relationship between the conscious subject and the object of the subject's consciousness. The object is shaped by the subject's intended consciousness towards it, and does not exist independently of it.

1.5.4 Phenomenology

The conscious intentionality directed by the subject towards the object is the foundation of the phenomenological approach. Phenomenology strives to observe, analyse and respond to phenomena as they are, without trying to find a law or formula underlying them.[75] Phenomenology observes *Erscheinungen* (the world of appearances) only in context with the human experience, in its original form, before the objects (the world of appearances) were codified with terminologies.[76] With this, the existence of the object on its own is reduced to its existence only with respect to the perceiving subject – that is, the human, (please refer Diagram 1.9). This does not necessarily mean that the existence of

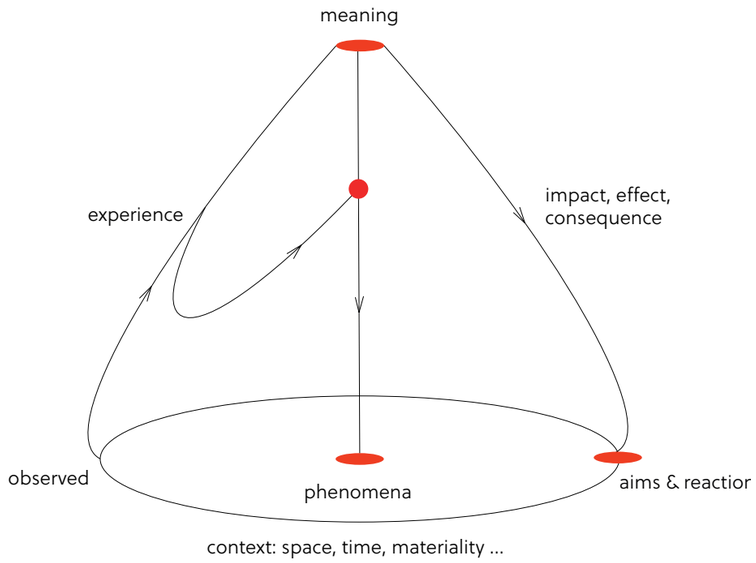


Diagram 1.9
How phenomena construct meaning and impact on our dealings in the world with the other

77 Levinas, Emmanuel (1999) *Alterity & Transcendence* (London: Athlone Press)

78 Glanville, Ranulph (2004) 'The Purpose of Second-Order Cybernetics', *Kybernetes* 33:9/10, pp. 1379–86, <https://doi.org/10.1108/ 03684920410556016>

79 Ibid.

80 Von Glaeserfeld, Ernst (n.d.) 'Cybernetics: Cybernetics and the Theory of Knowledge', Encyclopedia of Life Support Systems, <https://www.eolss.net/Sample-Chapters/C02/E6-46-03-00.pdf> [accessed 2 February 2020]

81 Ibid.

82 Fischer, Thomas, and Christiane M. Herr (2019) *Design Cybernetics: Navigating the New* (Cham, Switzerland: Springer)

83 Sweeting, Ben (2015) 'Conversation, Design and Ethics: the Cybernetics of Ranulph Glanville', *Cybernetics and Human Knowing*, 22:2/3, pp. 99–105

the object world free from the perceiving subject is being denied, it just shifts the focus of the investigation to the subject, and to the perceptive capacities of the observer. This brings us to an important aspect of phenomenology, that is, the Self's perception of the Other.[77] The phenomenological method brings with itself a heightened sense of reflexivity; it teaches the practitioner to confront the world whilst radically questioning the manner in which the world is presented to her. This principle of reflecting with the Self (the observer) via the Other (the observed) has also been an integral process in this PhD research.

Phenomenology builds the foundation of the object-level research enquiry, that lies in investigating how materiality in transit spaces informs and subconsciously influences commuter behaviour, triggered as a response to the built environment and the context. This work thus oscillated between two components — my perception of the human subject (i.e, the passengers in the space) and my experience of the perceived phenomena (i.e, the affordances of the space). I aimed to investigate the interaction between the two (the commuter and the materiality of the spaces of urban mobility) through the method of observing and experiencing phenomena. Since the body and its sensory repertoire is the locus of our perception, our sensorial *Wahrnehmung* or perception is the basis from which we express, articulate and disperse our sensory perception of the world around us in words and action.

1.5.5 Second-Order Cybernetics

Similar to phenomenology, existing within experience is a strong theme in second-order cybernetics.[78] The subject observing the phenomena is part of, and considered within, the cycle of the information generated. In second-order cybernetics, cybernetics is itself subjected to the critique and the understandings of cybernetics.[79] It was developed between 1968 and 1975 by unconventional thinkers challenging the established norms of their respective disciplines of physics, electrical engineering, neurophysiology, psychology, anthropology and mathematics.[80] Their analysis of phenomena was unique to their field of study, but what made the collaboration flourish was the foundational compatibility of their ideas.[81] Second-order cybernetics is thus a theoretical framework bridging disciplinary boundaries,[82] which resonate well with the poly-disciplinary nature of the design discipline. Ranulph Glanville, accepting Margaret Mead's challenge (1968) to practise cybernetics in accordance with its ideas, spent a large part of his later years bringing together design and cybernetics.[83]

84 Sketching, as Glanville writes, is a way in which the designer listens and converses with their surroundings.

85 Sweeting, 2015

86 Ibid.

87 Swann, Cal (2002) 'Action Research and the Practice of Design', *Design Issues* 18:1, pp. 49–61, <https://doi.org/10.1162/07479360252756287>

88 Bauman, Zygmunt (2018) *Liquid Modernity* (Cambridge: Polity Press)

89 Ackermann, Edith (2001) 'Piaget's Constructivism, Papert's Constructionism: What's the difference?', *Future of Learning Group Publication*

90 Dubberly, Hugh, and Paul Pangaro (2019) 'Cybernetics and Design: Conversations for Action', *Design Research Foundations Design Cybernetics*, pp. 85–99, <doi:10.1007/978-3-030-18557-2_4>

To pursue the meta-question, this research required a systems-oriented approach, to which second-order cybernetics was well suited as a first theoretical basis. Glanville identified a conversational circularity in the designerly way of working[84] and second-order cybernetics. Calling cybernetics *the theory of design* and design *the action of cybernetics*,[85] Glanville attempted to reconnect each field to the other, introducing cyberneticians to design and designers to cybernetics.[86] In his seminal work The Reflective Practitioner (1983), Donald Schön writes about the epistemology of design practice based on an examination of the way in which practitioners reflect on their actions during and following their work.[87] This reflection in practice produces an iterative model, ensuring a way of doing and interpreting[88] that evolves over time (as shown in diagram 1.10). Second-order cybernetics is thus based on the constructivist view of the world, in which learners learn by engaging in conversation with (their own or other people's) artefacts. The emergence of new knowledge happens through a progressive internalisation of action, in which the learner is constantly engaged in constructing an artefact, whether this "is a sandcastle on the beach or a theory of the universe."[89]

1.5.6 Action Research

Design as a profession has changed from its initial days as a form-giver, concentrating largely on the poiesis, to creating systems.[90] Design-for-systems implies not only the Internet of Things or product-service ecologies, but, further, design's role in forming socio-political frameworks. This involves working with theoria and implications of it in the praxis. The idea of novelty, in which the design profession was intrinsically assigned to "do something

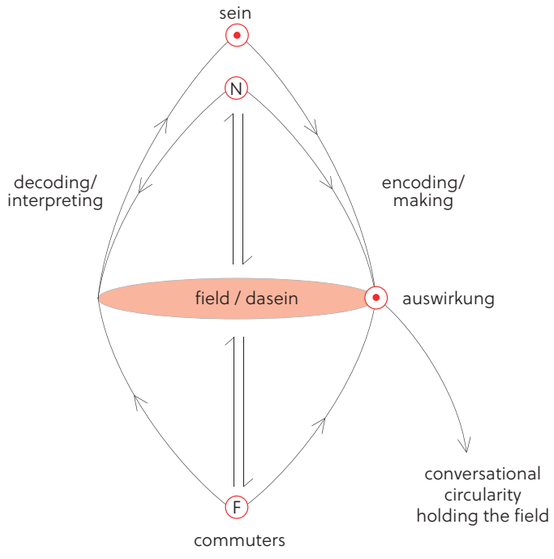


Diagram 1.10
N represents the natural world and F stands for the formal world, meaning is created by the sein in interaction with the two and is enacted in the field as the dasein.

91 Glanville, Ranulph (1999) 'Researching Design and Designing Research.' *Design Issues* 15, no. 2: 80, <doi:10.2307/1511844>

92 Balaram, S. (2011) 'The Barefoot Designer: Design as Service to Rural People', in: S. Balaram *Thinking Design* (New Delhi, India: SAGE), pp. 154–167

93 Feldmann, Allan, Patricia Paugh, and Geoff Mills (2004) 'Self-Study Through Action Research', in: J.J. Loughran et al. (eds.) *International Handbook of Self-Study of Teaching and Teacher Education Practices* (Cham: Springer), pp. 943–77, <https://doi.org/10.1007/978-1-4020-6545-3_24>

94 Ahmed, J. U. (2009) 'Action Research: a New Look', *Kasbit Business Journal*, 1:1&2, p. 19–33

95 Freire, Paulo (2018) *Pedagogy of the Oppressed: 50th Anniversary Edition*, trans. by Myra Bergman Ramos, ed. by Ira Shor and Donaldo P. Macedo (New York: Bloomsbury Academic), p. 19

magical" and to "find the new",[91] has given way to understanding designers as negotiators of intractable (wicked) systems. The designer moves between theoria and praxis, informing both the fields and (not) generating poiesis in the process.[92] This also characterises action research methodology, where praxis is used to narrow the gap between the generation of new knowledge and its application.[93] Action research methodology is one where knowledge is generated directly in the process of its enactment[94]. I find that action research methodology is well suited to dealing with wicked problems, as it involves framing, documenting, working with and reflecting on the problem directly in the process of addressing it. Due to the convoluted nature of wicked problems, a methodological precision is often difficult to adhere to, though an action research methodology offers the flexibility one needs to deal with it.

In this PhD, the research was based on a clear structure of an inner and outer circle (as shown in diagram 1.11). The inner circle constitutes the actual research in its academic context – that is, the theoria, or the theoretical part of the work. The outer circle consists of the praxis part of the work. This was implemented with industry partners and other stakeholders responsible for urban mobility. The outer circle contextualised, critiqued and validated the findings of the inner circle. This PhD research was an active and cyclic exchange between the two zones, the theoretical reflections and their practical implications. The poiesis was generated via the interaction between the theory and the practice. During the research I constantly moved between two worlds, my desk and my interactions with transportation providers. I moved out from the contemplating into the acting, constantly hoping that when I returned I would have a fresher insight into the systems context of the design task. The reflections via the theory thus came about through a continuous return to practice, and the practice was continuously informed by theory.

The aim was to pursue, out of an epistemic curiosity,[95] a design issue, in this case transit non-places, in its complexity and investigate, at a meta-level, how designerly ways of thinking may be used to deal with wicked problems – thus pursuing wicked problems in their systems context, not only to generate better solutions but also to identify better ways of finding solutions.

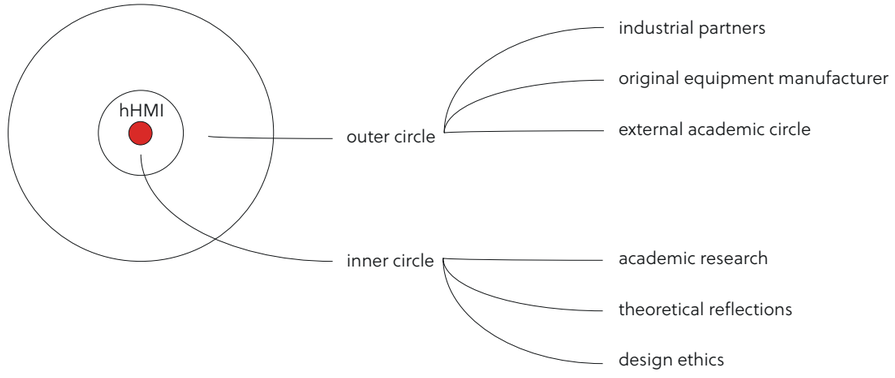


Diagram 1.11
The inner circle of theoretical work and the outer circle of action research done primarily with industrial partners

2 Field Work

2.1 The Method

2.1.1 Introduction

Any well-designed environment can have a significant influence on what people think and do. Interiors of urban transportation systems are intersection points for culture, society, technology and environment. Investigating the Human-Material-Interaction in these spaces has been the main objective during the field research. The aim was to gain an insight into the object of knowledge – that is, transit spaces as created by humans in interaction with the materiality of the space. The findings in this phase played an important role later in informing my consultation work with Hochbahn Hamburg, as discussed in Section 3.0. The value of these findings lay not only in the information that they carried but in the Immersive Behavioural Observation (IBO) that was involved in reaching them. This method was seminal in my consultation work with Hochbahn and other transportation providers, as it helped me support my understanding and views on transit spaces with a causal clarity, making it much easier for my views to be heard and understood, and in the process helping me establish myself as an expert.

I have developed the IBO method in order to analyse meaningful bodily relations to our environment, particularly in the use of transit spaces. Human beings constantly interact with their environment. But they don't just interact with their surroundings: they are often unconsciously guided by them. The aim of the IBO method is to understand relations that point to a background structure embedded in space which shapes the human interaction within it. The IBO method makes explicit an implicit, tacit knowledge that is part of our practical and purpose-driven understanding of and within a place. On the one hand, the IBO method has its foundations in traditional anthropological field research methods such as participant and direct observation. On the other hand, IBO is deeply influenced by phenomenology, especially Maurice Merleau-Ponty's analyses of the lived body experience and Heidegger's analysis of a functional environment, or "totality of involvements", which describes the embeddedness of artefacts and materials (as inherent elements of our actions) in purposeful structures. Observational fieldwork is an essential part of design research. In this section I introduce Immersive Behavioural Observation (IBO) as a new qualitative method for field research.

Image 2.1
The Shinjuku Station with more than 200 exits, is a carefully laid down labyrinth. Tokyo, 2019

The IBO method has the advantage of enabling "objective-subjective" field research. This seemingly paradoxical expression refers to subjectivity based on a shared or defensible notion of objective reality or truth. It has its foundations in traditional anthropological field research methods such as participant and direct observation. Thus I will first introduce the methodological considerations of the research. This is based on the design task and the epistemic basis of the work. In this section I analyse existing field research methods and discuss the nature of the new IBO method that retains the qualities of the traditional methods but also mitigates their failings. Second, I illustrate the application of the IBO method in six steps during the fieldwork. This is a practical introduction to the theoretical elements that constitute the IBO method. Third, the IBO method is further discussed in detail with respect to its nature, building elements and main process. Fourth, the IBO method is further discussed in comparison to other traditional methods. The last section draws final conclusions.

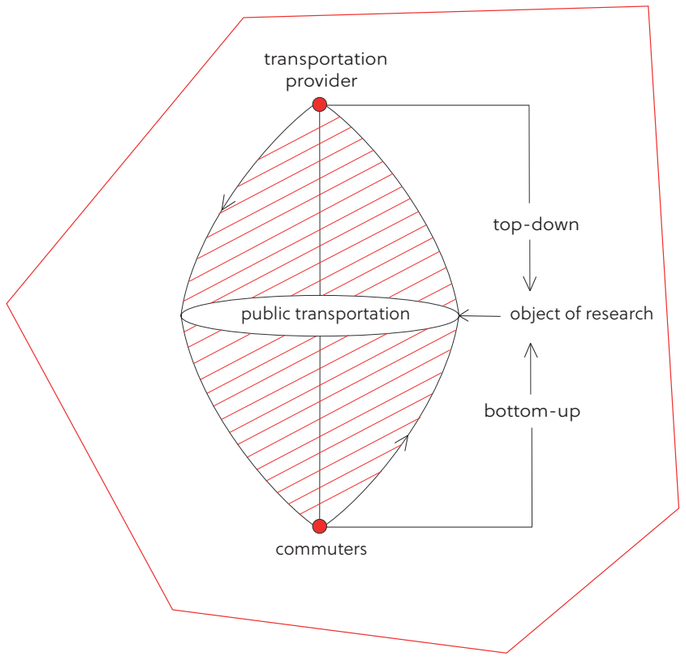


Diagram 2.1
The systems context of the object of research

1 Böhme, Gernot (2006) *Architektur und Atmosphäre* (München: Wilhelm Fink)

2 Merleau-Ponty, Maurice (2010) *Phenomenology of Perception* [1945], trans. by Colin Smith (London: Routledge), p. 161

3 Ibid., 117

4 Polanyi, Michael, and Amartya K. Sen (2013) *The Tacit Dimension* (Chicago, IL: University of Chicago Press), p. 10

5 Casey, Edward S. (2009) *Getting Back into Place. Toward a Renewed Understanding of the Place-world*, 2nd ed (Indianapolis, IN: Indiana University Press), p. 327

2.1.2 Methodological Considerations

2.1.2.1 Design Research Task

The built environment affects how humans behave and feel in a space, and the ways in which humans experience an environment also affects its "atmospheric"[1] qualities. Therefore, it is not just the architecture of the station that influences the commuter's state of being; the commuter herself also co-creates the atmospheric quality of the station. The IBO method was developed to carry out the investigation at an object level (as shown in Diagram 2.1). The aim was to understand transit areas such as stations, trains, bus stops and airports in relation to commuters and their embodied interaction with the materiality of the space. The task was to gather insights into how commuters interact within and with the space. This object-level enquiry thus aimed to identify, document and analyse the interaction between the commuter and the transit space. To understand how commuters in transit spaces behave at an embodied level while simultaneously achieving their goal, i.e., transiting from point A to point B.

As Merleau-Ponty points out, the lived body movement is the pivotal element in understanding the body-place-relationship, because our body exists neither just in space nor just in time, but inhabits both space and time.[2] "By considering the body in movement, we can see better how it inhabits space (and, moreover, time) because movement is not limited to submitting passively to space and time, it actively assumes them[3] [...]." Movement reveals a more fundamental form of intentionality. Thus, Merleau-Ponty understands motility as basic intentionality, as motor intentionality.

The intentions of the users of public transportation are articulated in their corporeal orientation and behaviour within the space (as can be seen in Image 2.2). Through bodily movement, space bears meaning and significance. Over time the body becomes acquainted with space, and places are shaped. As far as bodily space is concerned, it is clear that there is a knowledge of place that co-exists with that place, but this knowledge cannot be simply converted into descriptions. This bodily knowledge is what Merleau-Ponty calls habit. Michael Polanyi calls it tacit knowledge, "... of which I have knowledge that I may not be able to tell".[4] What Merleau-Ponty calls habit and Polanyi calls tacit knowledge I refer to in this thesis as behaviour – that is, the embodied interaction of commuters towards the materiality of the space based on the task they aim to fulfil within the space. The body belongs to place as much as place belongs to the body. Therefore, transit spaces can be said to exist only in the lived presence of the commuters who sustain and vivify them.[5]

Image 2.2
Underground Station, Tokyo

2.1.2.2 Epistemological Foundation

The field research involved mainly object-level investigation with the aim of understanding the interaction between the human user and the materiality of the transit space. I needed to gain insights into the grey area between the intended use, as determined by the planners (often a top-down approach), and how users adapt the interaction between them and the space for better comfort, security and other needs. This human-material-interaction is tacit, temporal and often leaves no trace behind.

For example, in Image 2.3 we see passengers congregating towards the only source of daylight in the waiting area. Clearly, for most of these passengers access to daylight is more important than the comfort of sitting down. Another reason is that most passengers, if they are not very old or disabled, prefer to stand, as taking a flight requires prolonged sitting. Though most planners assume that sitting is a prerequisite for designing a departure lounge, this example shows us how access to daylight and standing up are probably more important before a long flight, where both of these are largely missing. We see here that the nature of the information is transient and often exists only in the transitory interaction between the human user and the materiality of the built environment, as meaning is generated only in the interaction between the two,

Image 2.3
Hong Kong international airport

by the mere positioning of the bodies in the space: see also Image 2.5. Thus, the sources of the information I required were tacit and transient in nature. The nature of knowledge I was aiming to gather during the field visit was not human-, architecture- or material-centric but was essentially an understanding of the interaction between the human user and the materiality of the built environment.

The aim of the collected field data was to free the design and architectural decisions from mere considerations of styling and to understand the more authentic requirements of humans in interaction with the built environment. My approach here is Human-Material-Interaction centred, rather than simply user centred. Material here is everything we perceive via our sensory apparatus, such as olfactory encounters, the tactility of surfaces, the aural quality within the space, light, humidity, temperature – primarily everything that we perceive via our senses. A study based on Human-Material Interaction documents precisely how the human body interacts with a dominant material quality of the built environment in a given context. For example, in Image 2.4 we see a commuter in interaction with a bench on a cold winter morning. He is seen making use of a copy of the free *Metro* newspaper to make his seating on the damp, cold bench more comfortable.

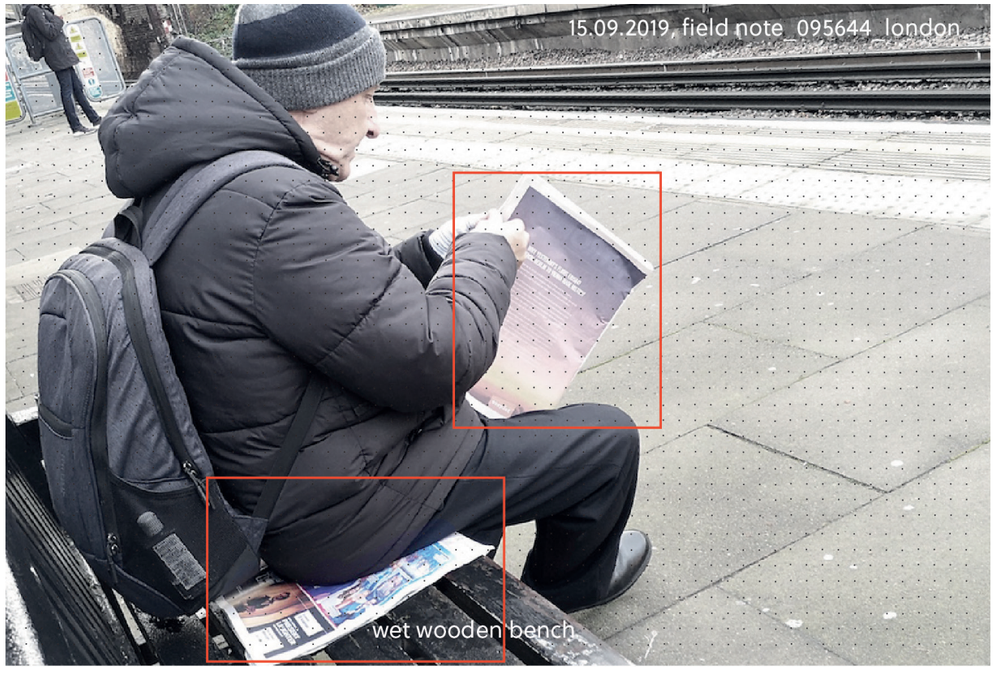


Image 2.4
North Ealing, London

6 Zeisel, John (2009) *Inquiry by Design: Environment, Behaviour, Neuroscience in Architecture, Interiors, Landscape, and Planning* (New York, NY: W. W. Norton), p. 136

Image 2.5 shows the steps leading to a sports park in Hong Kong. This park area is temporarily closed for cleaning. The shaded steps leading to the sports complex are used as seating not only by members waiting for the park to open but also by others who need a quick break from the humid heat. Both of these examples show us how people redesign the built environment by merely using it, either alone with a prop, as in Image 2.4, or by physically locating themselves in a particular relation with the place, as in Image 2.5 and 2.3. Thus, we see that the data we are trying to collect exists in the interaction between the human user and the materiality of the built environment.

The information gathered in the field is intended to contribute to improving the interaction between the user and the built environment of the transit space. Since the world is given to us in the medium of our lived bodies, we are by the very act of living exposed to places and their materiality. As John Zeisel states, "to design environments suited to what people do in them, we must understand environment behaviour".[6] It is precisely here, in the shaping of the materiality, that designers lay the foundations for a more harmonious interaction of people with place. In a way, one could say that design shapes not only a place but also the place-body relationship. Any approach to designing architectural spaces can be seen as typical of either of two extreme models: the top-down, more prescriptive 'tight-fit' model or the bottom-up, more collaborative 'loose-fit' model.

Image 2.5
Sports Complex Central, Hong Kong

The shortcomings of a 'tight-fit' architectural solution are many,[7] from the Gropiusstadt[8] in Berlin to the sixteenth-century planned city of Palmanova.[9] The tight-fit, top-down approach to the built environment results in ephemeral utopias and enduring ghost cities. No matter how planners, architects and designers imagine the place will be used, the people who use it redetermine its character. Zeisel, amongst others, talks about the potential for designers in learning from this adaptive redesigning.[10] This redesigning of the built environment is often a sign of a sense of identity and responsibility towards the space.[11] Richard Sennett calls this phenomenon "the open city".[12] For him, the open city is an ethical space that tolerates differences and promotes equality; such a city "would more specifically free people from the straitjacket of the fixed and the familiar, creating a terrain in which they could experiment and expand their experience".[13] Sennett's ideal of the open city is in many ways similar to those of Jane Jacobs, who challenged the ideas of Robert Moses, and of Le Corbusier; as planners and architects they had a fixed idea of "the better",[14] and operated only with a top-down tight-fit model. Healthy cities, active communities and an inclusive cityscape cannot be designed, but are enacted by their citizens.[15] The role of city planners, architects and designers, I believe, is in facilitating this adaptive redesigning of the city and its transit spaces for and by the citizens.[16] The field research aimed to facilitate this. Summarising the discussion above, the requirements of the field data and the nature of information to be collected in the field are as shown in Table 2.1.

Thus, we see that the quality of the information to be gathered is contextual and ephemerally bound to the situation. Since this information exists in the corporeal interaction of the user with(in) the place, one may also call it tacit information. Tacit information exists in the embodied perception of the world, via the experiencing body. This sort of knowledge, according to Polanyi, is difficult to articulate clearly.[17] But at the same time, unlike the younger Ludwig Wittgenstein,[18] he believed that even when tacit knowledge is difficult to articulate there is no adequate reason to be silent about it.[19] It is at the physiognomic level: as gestalt psychology also asserts,[20] the active shaping of experience happens in the pursuit of knowledge. In the context of a transit space, I was aiming to collect embodied information about Human-Material-Interaction. For this purpose, data collection procedures such as surveys, questionnaires, etc., may not be effective,[21] first because they interrupt the flow of activity of the commuter, thus becoming obtrusive to the conditions of observation,[22] and second because asking users about their experiences might not always produce a valid and accurate reply. The nature of the information to be collected can be summed up as follows: the body has an intelligence of its own; the process of converting this tacit information to explicit knowledge is usually time- and energy-intensive, and would strain the limits of a questionnaire or interview method – even more so within the stressful context of a transit area. On the other hand, non-verbal embodied reactions, expressions and movements are often direct manifestations of tacit information. Jurgen Reusch and Weldon Kees explain how this corporeal data can be reliably used to explain how people communicate without verbal articulation.[23]

7 Mitchell, Maurice, and Bo Tang (2018) *Loose-Fit City: The Contribution of Bottom-up Architecture to Urban Design and Planning* (New York, NY: Routledge), pp. 3 – 22

8 F., Christiane et al. (1981) *Wir Kinder vom Bahnhof Zoo* (Hamburg: Gruner Jahr)

9 Brock, Bazon (2008) 'On the Parallelization of Discourse and Parcours', in: Michael Erlhoff, Philipp Heidkamp and Iris Utikal, *Designing Public: Perspektiven für die Öffentlichkeit – Perspectives for the Public* (Basel: Birkhäuser), pp. 22 – 29

10 Zeisel (2009), p. 103

11 Ibid.

12 Sennett, Richard (2018) *Building and Dwelling: Ethics for the City* (London: Penguin)

13 Ibid., p. 9

14 Ginsberg, Daisy A. (2018) *Better* (PhD thesis, Royal College of Art, 2018), <https://daisyginsberg.com/work/better> [accessed 19 February 2020] This is not the full thesis, which I believe is still embargoed.

15 The New Yorker (2018) Justin McGuirk 'Can Cities Make Us Better Citizens?', <https://www.newyorker.com/books/page-turner/can-cities-make-us-better-citizens>

16 Zeisel (2009), p. 103

17 Polanyi and Sen (2013), pp. 3 – 25

18 Wittgenstein, Ludwig (2015) *Tractatus Logico-Philosophicus* [1921] German and English (Abingdon: Routledge)

19 Polanyi and Sen (2013), p. xiv.

20 Koffka, Kurt (2014) *Principles of Gestalt Psychology* (Milan: Mimesis International)

21 Holmes, A. (2013) 'Direct Observation', in: F. R. Volkmar (ed.) *Encyclopedia of Autism Spectrum Disorders* (New York, NY: Springer)

22 Murray, P. (1999) 'Fundamental Issues in Questionnaire Design', *Accident and Emergency Nursing* 7 : 3, pp. 148 – 53, <https://doi.org/10.1016/s0965-2302(99)80074-5>

23 Ruesch, Jurgen, and Weldon Kees (1956) *Nonverbal Communication* (Berkeley, CA: California University Press)

Table 2.1
The nature of the information to be collected in the field

	Requirements on the field data	Nature of the information collected in field
1	To capture an elusive moment existing briefly between the user and the built environment.	*Contextual information:* The information we need from the field research is generated in the transitory interaction between the human user and the materiality of the built environment. This information is situational and context dependent.
2	The information is perceived and articulated by the observer in the field and needs to hold its ground against the usual accusations about self-collected data.	*Observer inclusion:* To be able to collect rigorous field data, the observer plays an important role. The perspective through which the observer observes the observed is an important factor that influences the quality and the nature of the field information collected.
3	An Objective Subjectivity that may be used to generate a more rigorous set of field data.	*Recognises subjectivity:* The inclusion of the observer in generating data also recognises the fact that the information cannot be purely objective. But the inclusion of the observer brings in a veracity to the collected 'subjective' nature of the field data.
4	It was aimed to support design and architectural decisions that are bottom-up. The collected data was meant to understand and facilitate adaptive redesigning.	*Bottom-up approach:* The field data orients itself to the user and their interaction with(in) the place. The collection of the data concentrates on the user without being overtly user centred in nature. However, one may say that the data concentrates on the interaction between the user and the place.

2.1.2.3 Analysis of Existing Methods

While looking for a valid method that fulfilled the requirements of the field data and supported the nature of the information to be collected in the field, as shown in Table 2.1, I realised that the tradition of participant observation as developed in the field of anthropology by earlier researchers such as Frank Hamilton Cushing, in 1879,[24] and Bronislaw Malinowski, in 1920,[25] would only partly fulfil the research criterion. Participant observation is a qualitative method, enabling researchers to collect field data by consciously participating in the field. This is achieved by studying people over a longer period of time in their natural setting, by observing and participating in their activities.[26] Field recordings are based on observations, and impinge on the system that one wants to understand and document. It is thus an obtrusive method. Since the observed are aware of the observer, it may change the quality of the information gathered, as seen in what is known as the Hawthorne effect.[27]

Direct observation is a sub-form of participatory observation, also known as observational study. It is also a qualitative method of collecting data in which the researcher observes subjects in their usual setting without altering it:[28] that is, without being in active contact with the subject of observation. This method is largely an unobtrusive method, though it may be at times variably intrusive. Direct observation is a bottom-up method and has been extensively used to study public life. The early documentation of this method is seen in several seminal texts about the urban landscape in the mid-twentieth century by writers such as William H. Whyte, Jane Jacobs, Kevin Lynch, Edward T. Hall, Oscar Newmann, Jan Gehl, Christopher Alexander, Allen Jacobs, Donald Appleyard, Erving Goffman and Robert Sommer. These were not just urban planners or architects but also sociologists (Goffman), anthropologists (Hall), activists (Jacobs, Whyte) and psychologists (Sommer). Thus, the first methodological approach to the study of the everyday life of the city was developed by experts across disciplines. The task for each of them was driven by the objective of collecting relevant field data to understand what influences the quality of humaneness in the cityscape and other spaces.

This movement was against the backdrop of the developments in city planning in Europe and America during the first quarter of the twentieth century. This was marked by the idea of a modern city development,[29] with straight lines, tall buildings, highways and large green spaces. The Athens Charter was drawn up in 1933 by the Congress International d'Architecture Moderne (CIAM), influenced by Le Corbusier's approach in The Radiant City, with the aim of defining the Functional City. It had a tremendous influence on urban planning throughout the world. The charter defined the Modernist ideology of the new functional city. Here the citizens were to be housed in high-rise standardised apartment blocks, with green zones separating various areas in the city and clearly defined areas for work, home and leisure.[30] The radical Modernist ideology in city planning was seen as very appropriate for, and was widely adopted in, the rebuilding of the post-war Europe. At one level it meant getting rid of old forms and starting anew in a city, thus enabling rapid urban growth, and it was seen as healthy, safe and efficient.[31] Jacobs called this the positivist hegemony in urban studies.[32] According to Gehl, despite the Modernists' claim of a humane vision for people's lives, Modernist architecture was mostly "considerably more form than life".[33]

Unlike the approach with which the Modernist cities were built in the first half of the twentieth century, direct observation was clearly a bottom-up approach, where mundane everyday settings in city squares, parks, residential areas and streets were studied to understand what contributed to community building and defined the quality of life in the urban landscape. Whyte, while working with the New York City Planning Commission in 1969, began to investigate how newly planned spaces in the city were being adaptively redesigned by its citizens. This led to the *Street Life Project*, in which pedestrian behaviour was documented within the city's dynamics. Whyte's documentation of his project was later published, and became one of the first texts in the field of urban studies.[34] Whyte, like Jacobs, had no professional training in urban studies or research; journalism was what they had in common. Nevertheless, according to Gehl, the work of both Whyte and Jacobs was important in the initial development of the direct observation method for studying public life. Zeisel writes about a similar method that he calls "observing environmental behaviour". This method also uses an approach of systematically watching how people use their environments in various scenarios.[35] Zeisel's description of the method draws significantly from Hall's classic description of how people behave in and use space[36] and Whyte's direct observational insights.[37]

The qualities of these methods that fulfilled the field research criteria were as follows: qualitative research; prolonged stay in the field; empathy towards the observed; humility towards the field; acceptance of the subjectivity[38] of data collection by observation ‹ and sharing the same space-time context as the observed. The characteristics that made these methods less than completely compatible with the research requirements were as follows: both participant and direct observation methods have been criticised for their structural lack of clarity. This brings in the common accusation of a lack of rigour in self-reported behaviours outside a laboratory setting;[39] also, the irregularity of the collected information based on researchers gaining different understandings of the same topic has been criticised. According to Zeisel, direct observation has been used and developed in various forms, such as observing environmental behaviour, to collect information for practical purposes, including policy making and architectural planning. These methods have lacked what Zeisel calls a foundational standardised procedure for observing and a theoretical framework for interpreting observations.[40] In Table 2.2 and 2.3 I compare the pros and cons of the more tradition field research methods.

24 Kawulich, Barbara B. (2005) 'Participant Observation as a Data Collection Method', *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 6:2, art. 43, ‹http://nbn-resolving.de/urn:nbn:de:0114-fqs0502430›

25 Malinowski, Bronislaw (1977) *A Scientific Theory of Culture: and Other Essays*, with a preface by Huntington Cairns (Chapel Hill, NC: University of North Carolina Press)

26 Ibid.

27 "The Hawthorne effect concerns research participation, the consequent awareness of being studied, and possible impact on behaviour. It is a widely used research term. The original studies that gave rise to the Hawthorne effect were undertaken at Western Electric telephone manufacturing factory at Hawthorne, near Chicago, between 1924 and 1933." Mc Cambridge, Jim, John Witton, and Diana R. Elbourne (2014) 'Systematic Review of the Hawthorne Effect: New Concepts Are Needed to Study Research Participation Effects', *Journal of Clinical Epidemiology* 67:3, p. 267–77, ‹https://doi.org/10.1016/j.jclinepi.2013.08.015›

28 Gehl, Jan, and Birgitte Svarre (2013) *How to Study Public Life* (Washington, DC: Island Press), pp. 269–280

29 Ibid.

30 Le Corbusier (2014) *Towards a New Architecture*, trans. by Frederick Etchells (Mansfield Centre CT: Martino Publishing)

31 Gehl and Svarre (2013), pp. 269–280

32 Jacobs, Jane M. (1993) 'The City Unbound: Qualitative Approaches to the City'." *Urban Studies* 30:4–5, pp. 827–48, ‹https://doi.org/10.1080/00420989320081931›

33 Ibid.

34 Whyte, William Hollingsworth (2018) *The Social Life of Small Urban Spaces* (New York: Project for Public Spaces)

35 Zeisel (2009), pp. 110–127

36 Hall, Edward T. (1992) *The Hidden Dimension* (Gloucester, MA: Peter Smith)

37 Whyte, William Hollingsworth (2009) *City: Rediscovering the Center* (Philadelphia: Pennsylvania: University of Pennsylvania Press)

38 Brenner, Philip S., and John Delamater (2016) 'Lies, Damned Lies, and Survey Self-Reports? Identity as a Cause of Measurement Bias', *Social Psychology Quarterly* 79:4 pp. 333–54, ‹https://doi.org/10.1177/0190272516628298›

39 Ibid.

40 Zeisel (2009) p. 113

Table 2.2
Comparing the pros in more traditional field research methods

	Pros	Direct Observation	Participant Observation
1	Non-obtrusive	yes / maybe	no
2	Qualitative research	yes	yes
3	Prolonged stay in the field	yes / maybe	yes
4	Empathy towards the observed	yes	yes
5	Humility towards the field	yes	yes
6	Sharing the same spatio-temporal context as the observed.	yes	yes

Table 2.3
Comparing the cons in more traditional field research methods

	Cons	Direct Observation	Participant Observation
1	Obtrusive	no / maybe	yes
2	Structural unclarity	yes	yes
3	Lack of rigour in self-reported behaviours outside a lab-setting	yes	yes
4	Irregularity of the collected information based on researchers gaining different understandings of the same topic	yes	yes
5	Lack of foundational standardised procedures for observing	yes	yes
6	A theoretical framework for interpreting observations.	yes	yes

41 Gerhardt, Volker (2016) 'Der Wert der Wahrheit wächst', in: J. Nida-Rümelin and J-C. Heilinger (eds.) *Moral, Wissenschaft und Wahrheit* (Berlin: De Gruyter), pp. 131 – 144

2.1.3 The Immersive Behavioural Observation (IBO) Method

2.1.3.1 The Method

The IBO method is qualitative and subjective in its approach. It has been developed to collect data about passenger experience within transit spaces. The aim is to gain a closer insight into the research problem's wicked context. The epistemic foundations of the method lie in phenomenology, particularly in the analyses of Merleau-Ponty and Heidegger. Merleau-Ponty's work provides insights into bodily experience that enables tacit knowledge; at the same time this also enables the researcher to share the spatial experience with their own lived body, i.e., to immerse themselves in the spatiotemporal situation (see Section 2.2). Heidegger's writing, on the other hand, contributes to an understanding of the practical context in which the commuters and the researcher act. In a way, this means that IBO can be considered as a form of practical phenomenology. Its goal is not just to analyse transit spaces, i.e., to gain insight into Human-Material-Place Interaction, but also, eventually, to change and redesign these places based on the insights provided by IBO, so that these places become more human oriented.

The IBO method identifies, observes and works with phenomena. These phenomena constitute the field data that is collected through this method. The subjectivity in the IBO method is grounded in a shared perception of the world. Through the IBO method we work with an 'Objective Subjectivity', i.e., a subjectivity not rooted in fantasy or musing, but in the objective understanding of a joint domain of truth which accepts the diversity of individual experiences while still presupposing one shared reality.[41] IBO is used to study the behavioural and tacit patterns of users in their natural environment. It is used when other obtrusive methods like questionnaires and dialogue, that involve direct participant contact, are not helpful for data collection. The IBO method generates 'circumstantial evidence'.

The three stages that build the process in the immersive behavioural investigation are demarcation, documentation and decoding. Of these, the first two, demarcation and documentation, help us to develop the first-level construct of pulling together the data. Even though observation is a natural phenomenon, to be a skilful observer one needs structural clarity. This is what the first two stages, demarcation and documentation, aim to achieve. The collected information is processed in the third step, decoding, to generate the second-order construct of sense-making and meaning-generation. The final process involves validating the field findings by the agile dialogue.

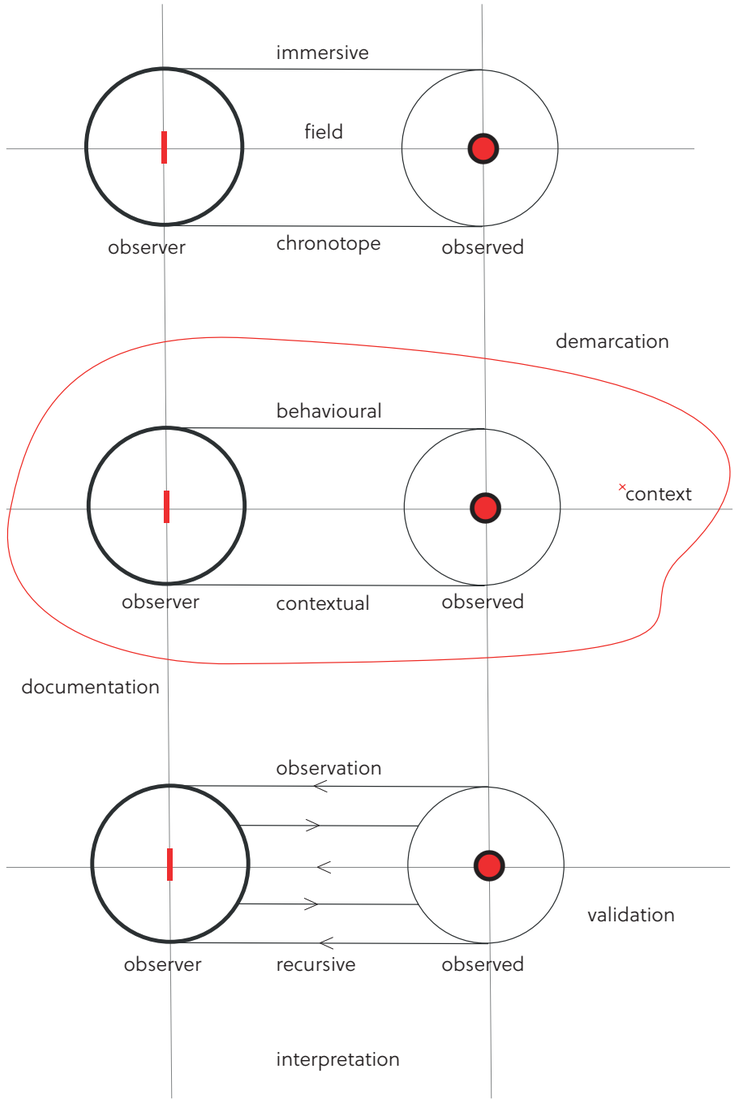


Diagram 2.2
The various components, elements and processes in the IBO method

In IBO, the research is focused on the object (i.e., the observed); the observer here demarcates the field of observation (i.e., that which is to be observed). The three major components in which the practice of the IBO method is anchored are the shared chronotope, the context and the circularity of perception between the observer and the observed. These are elaborated respectively in the next sections.

Before we delve into the more theoretical explanations of the IBO method, I present below in six steps how information about the Human-Material-Interaction in train stations is collected using this method. The Diagram 2.2 depicts the important components and stages in the IBO method. These are also depicted in Table 2.4.

Table 2.4
Representing the character, major components and the practice in the IBO method

1	Nature: The essential character that defines the foundation of the method.	Elements: This refers to the major components defining the basic structure.	Process: This is the chronological listing of the practice.
2	Immersive	Chronotope	Demarcate
3	Behavioural	Context	Document
4	Observational	Circularity	Decode

1. In the field, we tune into the space, being attentive to our sensory perception of it. These are, amongst others, its temperature, light intensity, olfactory encounters, and its aural qualities.

2. In a world of excessive sensory input, demarcating the field before the actual observation brings a sense of consciousness to our perception. This also contributes to a greater perceptual accuracy towards the task.

3. We orient ourselves in the space in order to map it. In the case of train stations, we locate the exits and entry points, note the busiest zones and seek an optimal area to position ourselves for the documentation.

4. Once we have positioned ourselves, we observe the passengers around us. The observation focuses on the following aspects:

   a. Appearance: This is everything that might indicate a category of study, such as gender, age and physical appearance.
   b. Corporeal movement: how do commuters enter and orient themselves in the space? Is their gait confident and quick? Is it hesitant? Is it slow and relaxed?
   c. Corporeal positioning: How and where do people position themselves when waiting? How is the distance from others maintained? How is seating used? Are there artefacts like train timetables, lighting, dustbins, infotainment screens, whose proximity is sought by passengers while they wait?
   d. Interactions and gestures: How do passengers interact with each other and the artefacts surrounding them in the transit space?

5. The observation is oriented on the above demarcation, as stated in point 2. The information collected is documented with notes, sketches or candid photographs.

6. The documentation is the only phase that happens in the field. The other two phases, demarcation and decoding, happen largely away from the field.

Image 2.6
Ealing Broadway Station, 2018.
The IBO method gathers transient phenomena — that occur in a fleeting interaction between the user and the environment and may not leave any traces.

2.1.3.2 The Nature of IBO

2.1.3.2.1 Immersive

The "immersive" in IBO means sharing experiences. This is achieved by the act of co-location, where the observer shares the same spatial experience as the observed. The passenger is doing the experiencing. The researcher is doing the observing by immersing themselves in the same place or chronotope (see Diagram 2.3). This enquiry by immersion in the chronotope generates a sense of identification (both consciously and unconsciously) with the context and the observed. This makes it easier for the researcher to use empathy when sharing the traveller's experience vicariously.

2.1.3.2.2 Behavioural

The term "behavioural" indicates the bodily actions through which space is appropriated, since the everyday person is considered to be an agent rather than a theoretical observer or a mere travelling object. Experiencing space is never merely a passive exposure but always an active appropriation of space. With IBO we aim to understand how humans in shared social contexts, in this case transit spaces, structure their environment in a meaningful way. The observation, documentation and analysis of this 'ordinary' interaction between the subject and the object in its natural context of space and time builds the foundation of the IBO method, viewing things from the subject's perspective in the interactional context of their life world.

2.1.3.2.3 Observation

The "observation" in the IBO method involves the documentation of human tasks conducted naturally in their specific space and time context. This involves experiencing by observing intently the everyday tasks of the subjects in real space and time. Sight is the most immediate of all our senses; however, it is the totality of our sensory apparatus that navigates and orients our perception and experience through and in the space. Unlike the positivist claims to objectivity, where the observer is essentially excluded from the experiments, the IBO method includes the observer through their frame of reference and their motion relative to situations under consideration. The relationship here between the observer and the observed is via observing. What makes this rather tautological phenomenon circular is the fact that the researcher (the observer) is perceiving what she observes via the tool of her perceiving body and the experiences she has gathered with it. This circular interaction of the observer with the observed is represented in the following Diagram 2.3. This will be discussed again later in this text.

42 Late Middle English (in the sense "live among, be familiar with"): from Old French *converser*, from Latin *conversari* "keep company (with)", from *con-* "with" + *versare*, frequentative of vertere "to turn". The current sense of the verb dates from the early 17th century. Pearsall, J., and P. Hanks (2006) 'Conversation', in: *Oxford Dictionary of English* (Oxford: Oxford University Press)

43 Casey, Edward S. (2009) *Getting Back into Place. Toward a Renewed Understanding of the Place-world*, 2nd ed (Indiananapolis, IN: Indiana University Press), p. 321

44 Ibid

45 Ibid., p. 340

46 Ibid., p. xiii

47 Ibid., p. 367

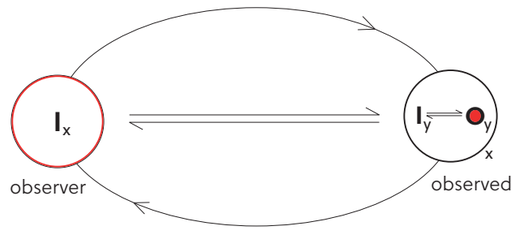
48 Bakhtin, Mikhail (1981) 'Forms of Time and of the Chronotope in the Novel', in: Mikhail Bakhtin *The Dialogic Imagination* (Austin, TX: University of Texas Press), pp. 84 – 258

2.1.3.3 The Elements of IBO

2.1.3.3.1 Chronotope

"[W]e are always already in a place, never not implaced in one way or another."[43] Starting from this observation Casey analyses our "Being-in-place". "We come to the world – we come into it and keep returning to it – as already placed there".[44] And that which places us is our lived body. Implacement entails embodiment, and vice versa.[45] "Implacement" is Casey's term for "immediate placement".[46] "The im- of implacement stresses the action of getting in or into, and it carries connotations of immanence that are appropriate to the inhabitation of places".[47] In IBO the observer and the observed share the same "implacement". This implacement is what Mikhail Bakhtin calls a "chronotope".[48] This term denotes the entanglement of time and space similar to the Minkowski space, which describes the four-dimensional space-time continuum used in theoretical physics. But the term chronotope points to the experiential entanglement of time and space as it was originally used in literary theory. The chronotope entails patterns of orientation and perception of those who find themselves in a place at a certain time. Places, in the phenomenological sense, are chronotopes. The term chronotope, however, has the advantage of including a temporal aspect in spatial experience as well, which is particularly important for the understanding of transit spaces.

Diagram 2.3
The conversational[42] nature of observation, also refer Diagram 1.6 and Section 1.5.1



49 Heidegger, Martin (2001) *Being and Time* [1927], trans. by John Macquarrie & Edward Robinson (Oxford: Blackwell), p. 116

2.1.3.3.2 Context

The researcher shares the chronotope with the researched by the act of immersion. This contributes to the documentation and understanding of the phenomena in the larger context of the space. Transit areas are increasingly becoming places that serve the needs of diverse cultures and sub-cultures. These are increasingly being designed by architects working internationally. Thus, airports and train stations have become similar to each other throughout the world. But since built environments exist only in an interaction with their users, as discussed earlier, the local socio-cultural context of transit spaces still plays a significant role in forming the place. In IBO, "context" refers to what Heidegger calls the "totality of involvements" [*Bewandtnisganzheit*].[49]

Image 2.7
Helsinki International Airport, Helsinki, 2018

Image 2.8
Daumesnil Station, Paris, 2018

50 Blumer, Herbert (1969) *Symbolic Interactionism: Perspective and Method* (Englewood Cliffs, NJ: Prentice-Hall)

51 Gibson, James J. (1979) *The Ecological Approach to Visual Perception* (New York: Houghton Mifflin Harcourt), p. 127

Involvement here describes the practical meaning, i.e., the role that things or material play in our actions. In a way, Heidegger's concept of *Bewandtnisganzheit* is the foundation of Herbert Blumer's "symbolic interactionism".[50] To think about chronotope and context together means to understand how lived body experience plays an essential role in understanding the practical meaning of Human-Material-Interaction. The ascribed meaning of things and materials in our interaction in transit spaces is understood though bodily action. James J. Gibson described this connection with the notion of "affordance",[51] which denotes ways in which objects or – in the case of IBO – even places, offer certain behavioural possibilities. For example, Image 2.7 shows us a man lying down to rest in the airport waiting lounge in Helsinki. The Image 2.8 also shows us a man lying down to rest, this time in a metro station in Paris. Despite the similarity of their actions, the context makes the difference to the way these two men are treated and how their actions are perceived. The sleeping man in Image 2.7 is treated as a tired passenger and the airport authorities tolerate his action, but the sleeping man in Image 2.8 is treated as a homeless man, and in most instances the station staff would call the security to get rid of him.

2.1.3.3.3 Circularity

The term "circularity" is used here at two levels (see Diagram 2.4). At the direct observational level, it implies that the observer (sharing the same chronotope with the observed) experientially comes back to themself to understand or relate to a particular observed phenomenon in the field. The second implication is the recursive interaction with the field of knowledge. This helps the researcher identify low-frequency observations with high impact and distinguish these from high frequency observations with low impact. This is an important criterion for the ability to carry out rigorous fieldwork: often a low-frequency observation, like a vandalised glass door, seen once in several months or years, has a lasting impact on our perception. A high-frequency situation, on the other hand, like rubbish thrown down next to the dustbin, may escape our attention because of its regularity and its less dramatic impact on our senses. Recurring visits to the field, and being conscious of the observational demarcations, may train us to be a more thorough and fair observant in the field. The time factor and field research spread over a longer period ensures the reliability of our interpretations.

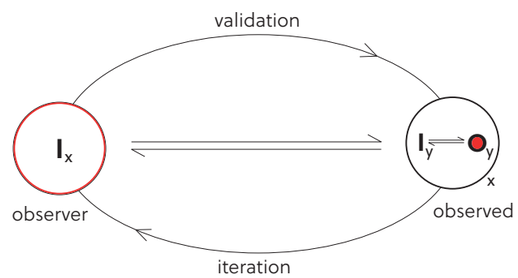


Diagram 2.4
The circular nature of observation between the observer and the observed

52 Ibid., p. 113.

53 Ibid., p. 124

54 Zeisel (2009) p. 101.

2.1.3.4 The Process in IBO

The three steps, demarcation, documentation and decoding, chronologically define the processes that build the IBO method.

2.1.3.4.1 Demarcation

Even though the method of observation is a common tool that humans use daily, observing in the field without omitting details, or transferring untested feelings[52] towards the field data, is an act that requires a conscious effort. This is where demarcation plays an important role (refer Diagram 2.5) Though the act of demarcation happens in the field in which the researcher shares the same chronotope as the researched, it is determined by the main research objective that requires the fieldwork. The process of demarcation followed by documentation generates information that constitutes the first-order construct. "Construct" here does not mean making up the phenomenon which we want to analyse: rather, it demarcates it, accentuates it and brings it in the foreground. Also, when a clinical objectivity is unattainable when we collect field data, demarcation does contribute to a more organised subjectivity. Demarcation helps us structure the way we look at something;[53] it guides our observation in a social field that is by nature complex, qualitative and heterogeneous. Though an unbiased, objective collection of data in the field is in principle impossible, the drawing of distinctions helps us bring a transparency to the process and the collected data. Regardless of the familiarity to the field (which might at times make us overlook details), laying down the demarcations guides our attention, namely directing our bodily perception to the defined task.

The world is submerged in a plethora of activities. We are constantly using our sense of distinction at various levels to navigate us through this plenitude of information. For example, if my objective is to locate a salesperson in a supermarket, I would only look for people in the shop's particular uniform. What we choose to observe depends upon the objectives with which we direct our consciousness.[54] This is what demarcation deals with. It is about the articulation of our objectives, based on asking the right questions. These are 'why' questions, as opposed to 'how' questions. The answers to the 'how' questions deal with the execution of that which has been laid down by the

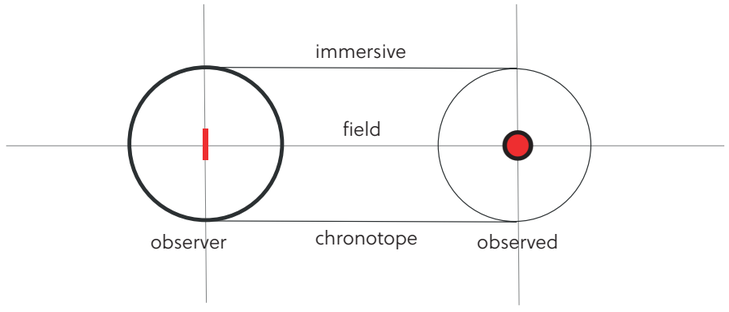


Diagram 2.5
The demarcated field of observation between the observer and the observed

55 One of the key proponents of the notion of active perception was Richard Gregory, who wrote the well-known book *Eye and Brain: The Psychology of Seeing* (New York: McGraw-Hill, 1968), as well as many scientific papers.

56 Glanville, Ranulph (2009) *The Black Boox, Vol 3: 39 Steps* (Vienna: Echoraum), p. 229

57 Müller, A.W. (1979) 'How Theoretical is Practical Reason?' in: J. Teichman and C. Diamond (eds.) *Intention and Intentionality: Essays in Honour of G. E. M. Anscombe* (Brighton: The Harvester Press), pp. 91 – 109

58 Husserl, Edmund (1983) '§65. The Reflexive Reference of Phenomenology to Itself', in: Edmund Husserl *General Introduction to a Pure Phenomenology*, trans. by F. Kersten (The Hague: Martinus Nijhoff), p. 150

intentions of the research. This inherent sense of distinction constantly governs our cognitive interaction in the perceived environment, influencing our discernment of form against non-form and information against discord. A world comes into being or dissolves based on the demarcation we subject it to. This act of structuring is primal to our perception and builds the foundation of our cognitive experience in the material world.[55] Demarcating the field for a particular piece of research is about defining boundaries based on a particular set of reasoning.[56] This reasoning is the intention that defines the objectives in the fieldwork. Intentional actions are built on chains of reason.[57] The phase of demarcation is, as Edmund Husserl writes, the "preliminary and preparatory deliberations on its subject-matter and method",[58] without which no new science could ever be projected.

Since this PhD research investigates Human-Material-Interaction within transit spaces, when I embark on the field, my task is defined by this research aim. I demarcate the field based on this purpose of action – that is, investigating the interaction between the human user and the materiality of the transit space. Everything that falls outside this demarcation is usually filtered out, enabling the focus to be held on the demarcated task. Other information, such as train delays or a drunken row, may come into effect in our field research only when they impinge in some way on the demarcated area of research.

2.1.3.4.2 Documentation

In the IBO method, the collection of data happens essentially within the chronotope shared with the observed. A focus of the documentation lies on the particular cognitive and symbolic ordering of space and how the users orient themselves in those spaces. In the process of IBO, the observer's sharing of the chronotope with the observed is integral to the process of documentation, as in Diagram 2.6. The distance to be maintained from the observed is based on the intended task. By documenting the interaction of the object in its natural chronotope, we accept knowledge born out of lived interactions, which are shared bodily experiences in the everyday world. IBO deals with embodied observation, where the body of the observer is used as a navigational and perceptual tool. The perception of the observer is informed by the whole of her sensory apparatus: that is, the visual in relation to the other senses.

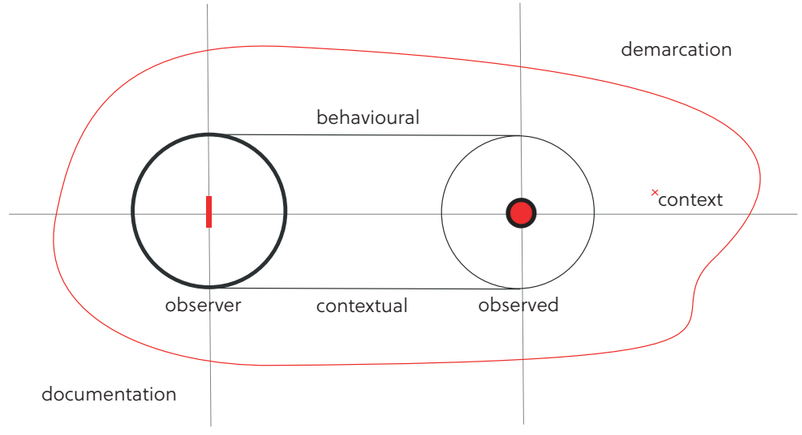


Diagram 2.6
The documentation undertaken in the demarcated field of observation

59 Collier, John, and Malcolm Collier (2009) *Visual Anthropology: Photography as a Research Method* (Albuquerque, NM: University of New Mexico Press), p. 6

60 Zeisel (2009), p. 95

The documentation of the embodied observation is achieved in particular by candid photographs, taken over a prolonged period of time. Unlike visual anthropology, where the use of the camera to gather visual information is essential for capturing everything otherwise overlooked by our limiting perception,[59] the IBO method uses the candid photography to make a quick note of what has already been registered by the senses. Time is a crucial factor for documentation, and the observer spends ample time acquainting herself with the place. A recursive engagement with the object of knowledge is essential. Apart from this, field information may be gathered as sound recordings, field notes, sketches, floor plans, maps etc. The information collected in the field is maintained as observational notes, with clarity of time, schedule and content; comments and emotional descriptions in the field notes are not included at this stage.[60] The candidly taken photographs and other materials are only objects for future retrospection, and are not meant to be in themselves an act of contemplation. These documented materials are to be regarded as an impression of the lived experience, and not as the experience itself. This means that only the researcher in the field can analyse the documentation, because the analysis must be done by the observer who has been previously immersed themselves. The researcher in this case is in experiential dialogue between themselves and the documentation they carry out in the field.

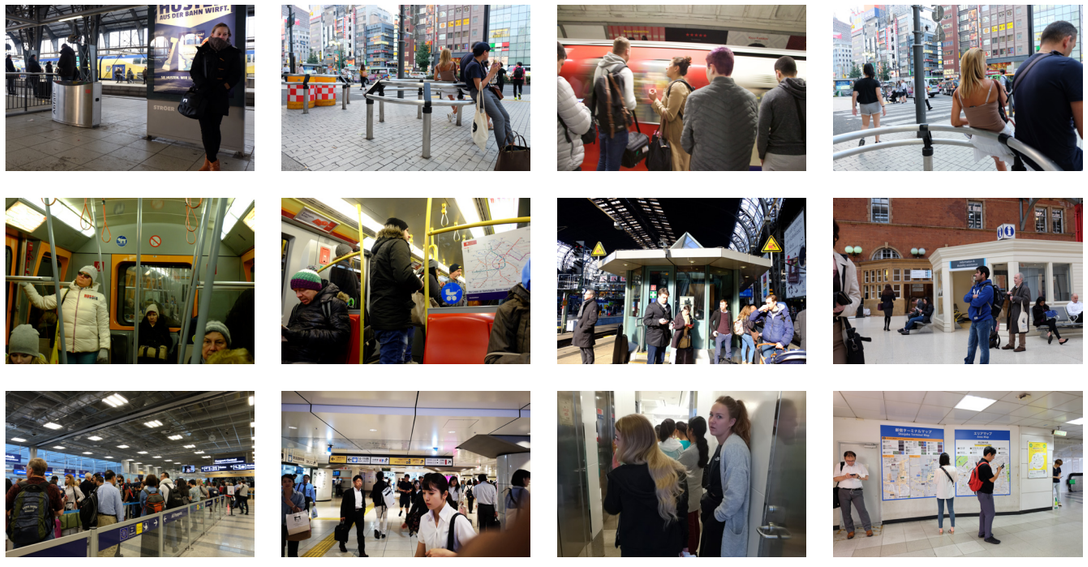


Image 2.9 –2.20
The IBO method is conducted over a prolonged period of time to assure that the observed phenomena holds ground in various situations.

61 Cartier-Bresson, Henri and Clément Chéroux (2018) *Images à La Sauvette: Photographie par Henri Cartier-Bresson* (Göttingen: Steidl)

62 'Decode, verb [with object] convert (a coded message) into intelligible language: he put down the phone and decoded the message. Analyse and interpret (a communication or image)', in: Pearsall, J., and P. Hanks (2006) 'Conversation', in: *Oxford Dictionary of English* (Oxford: Oxford University Press)

Candid photography, as the name suggests, is the act of freezing spontaneous moments in photographs discreetly, without the active knowledge of the people being photographed. The IBO method uses this method of taking snapshots to document a complex moment, which is otherwise difficult to express in words and too ephemeral to be noted down in sketches. It is about freezing a decisive moment like the fleeting images integral to Henri Cartier-Bresson's work.[61] This method of candid photography captures commuters in their natural reactive patterns, as opposed to people behaving in a certain way when they are aware of being observed. Filming has been consciously avoided, mainly for two reasons: the first is that a significant amount of material is generated – i.e., filming is resource intensive. Second, the process of filming in a "snapshot" style, is more cumbersome and attracts attention, making it difficult to maintain the imagery's candid quality. Where situations could not be reduced to a single photograph, time-lapse photography has often been put to use. My experience has been that the tools for documentation are important for communicating the field findings but are secondary to the observer's conscious act of perception.

2.1.3.4.3 Decoding[62]

In the IBO method we first demarcate the specific phenomenon which we want to analyse. The second phase deals with documenting the shared experiences. The process of demarcation and documentation helps us gather data of the first-order construct. The third step of decoding entails the interpretation of the data, as in Diagram 2.7. This interpretation is the second-order construct. The IBO method allows us to record behaviours within their original unadulterated context and natural time-frame. Our inferences, induced directly from these embodied observations in the shared chronotope, is the second-order construct. The second-order construct also involves understanding and elaborating the experiences we shared in the field in carrying out the immersive observation. The IBO method documents phenomena: "circumstantial evidence" coming into existence in the Human-Material-Interaction. This information is the first-order construct and is the material we work on in the decoding process. Here we follow inductive reasoning to arrive at inferences and generate the second-order construct.

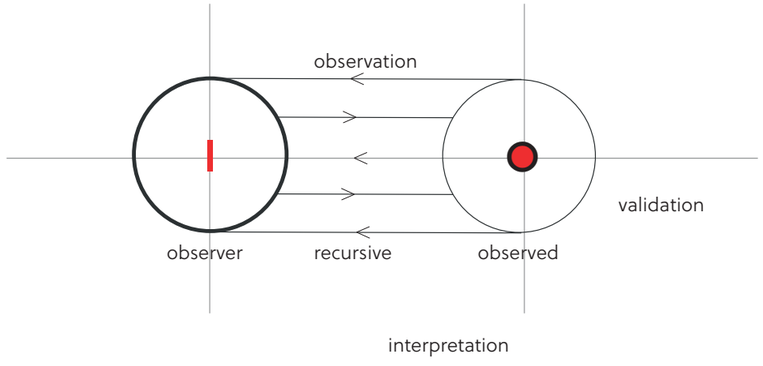


Diagram 2.7
The process of interpretation is a recursive interaction

63 Hall (1992)

64 Zeisel (2009), p. 113

Both the first-level and the second-level constructs are largely influenced by the conscious demarcation with which the field research was originally embarked on. The collected field materials, such as candid photographs, sketches, sound recordings and field notes, are used to revisit the field experience. The documented material is used to elaborate on patterns, clues, disruptions or oddities that give us more insight into the Human-Material-Interaction within transit spaces. It is important to distinguish that decoding is not an exercise in the visual processing of data. The context of the collected data plays an important role in drawing out meaning from it. When (visual and other) data are pulled out of their context, they are easy to misinterpret. Since the inherent power in imageability is strong, removing visual data from their context may cause ample scope for misinterpretation. The second-level construct is carried out by pitching oneself within the structure of meaning of those studied. This is based upon the space, time and functional context of the built environment, in this case the transit space. The space defines the context of the users. In the context of the transit space these are not individuals with diverse preferences and needs, but commuters with a common goal. The regional context of the field also plays an important role in understanding observed behavioural phenomena. In the second-order construct the traveller is studied in relation to their functional connection to the architectural space and their purpose within the space.

As mentioned earlier, the IBO method abstracts users into categories defined by their purpose, their gender or their age. For example, if the IBO method is used to understand the Human-Material-Interaction in a hospital, the actors in the field of observation would be classified into patients, nurses, doctors, other staff and visitors. In IBO the individual's history and his/her (current) emotional or motivational states is taken into account, although IBO does consider the stimulus-response procedures of social conditioning. The IBO investigations, though detailed, are made by considering the general categories and not by registering situations at individual level. This level of abstraction is important in the study of public life, as it makes working with large amounts of data manageable. The generalisation also helps in preserving the privacy of the individuals in this space. An important factor in understanding observed phenomena is to distinguish them as either situational or cultural. Amongst others, Hall[63] and Zeisel[64] write that most people separate their actions between situational and cultural contexts. International transit spaces are constructed to accommodate a diverse range of users, therefore making it a place which involves more situational interaction. For example, in a train station anywhere in the world, we would first look for a place to buy a ticket, a waiting area and the boarding area. Nevertheless, since users equally help to define the quality of the built environment, the cultural aspect of a particular region may also influence a situation (Image 2.21 shows us the platform scene in Tokyo and Image 2.22 shows us the platform scene in Mumbai). Deciphering between situational and cultural contexts may help the researcher understand users' behavioural patterns and give more insight into a particular phenomenon.

The circumstantial evidence generated in the IBO method refers to the directly observed and documented phenomena in the field. Unlike direct evidence, circumstantial evidence allows for more than one explanation. It follows inductive reasoning to come to inferences. In decoding, the inductive method implies finding a certain reasoning and then observing whether the same reasoning also functions in other cases (refer Image 2.9 – 2.20). As mentioned earlier, the context of the recorded phenomena and the demarcation with which one embarked on the field plays an important role here. This is also what allows circumstantial evidence to have more than one explanation. Therefore, context and demarcation of the recorded phenomena also corroborate in drawing conclusions, as together they may strongly support one par ticular inference over other alternative explanations that may be ruled out.

2.1.3.5 Validation of Insights via an Agile Dialogue

The final stage of the IBO process validates the inferences developed in decoding; these are the second-level constructs. The validation of these findings is achieved by discussing the initial analysis of the field data via the agile dialogue method. An agile dialogue process could be sub-categorised as a tool within the participatory design method, where important phases of the research development are simultaneously disseminated or shared with varied user groups. Agile dialogue is carried out to share key insights of the field research. This opens up the research and its developments to various stakeholders, users and expert audiences. The agile dialogue method consists of presentation and discussions. During an agile dialogue session, the presentation is structured according to the IBO method. It introduces the research task, the context of the work, the field and the demarcations. This is followed by the presentation of the observed phenomena and the inference categories that give us an insight into them. After the presentation, the field research inferences are opened up for critique and discussion. The reactions and the quality of the discussion vary widely depending upon the group in which the agile dialogue happens. In the case of the public transportation systems studied here, when the validation took place with transportation providers and policymakers the discussions did not challenge the field findings, but the participants continued to discuss, for example, how necessary anti-homeless benches were in transit spaces. The same presentation brought about a very different set of discussions with the audience in which most of the participants were citizens who actively involved themselves in the development of the city.

Image 2.21
Tokyo Station, 2019

Image 2.22
Mumbai Local Station,
2017

Here there was a sense of recognition of the phenomena depicted in the field-sheets, and many inferences were enriched by the experiences which these participants shared. The first process in the IBO method, demarcation, ensures self-scrutiny; agile dialogue, which is the last process, ensures external scrutiny and feedback.

Agile dialogue also plays an important role in validating field results within their respective cultural contexts. As explained earlier, the documented phenomena in the IBO method are to be understood within the nuances of the given context, and not removed from it. The researcher in the IBO method is an outsider, and a marginal participant; the benefit of this is that the field remains true to the usual way things flow. The downside to this is that the observer might document a particular phenomenon accurately but not understand it in its wider socio-cultural context. This might lead to varying degrees of misinterpretation of the field data. This is where agile dialogue complements the field findings. The principal lead in the agile dialogue discussions is the researcher in the field; they are obliged to report all the conflicts and assertions they receive during the sessions, but nowhere are they obliged to abide by any of them. Agile dialogue is an explicit procedure that increases the likelihood that different explanations for a certain observed phenomenon in field are comparable, enabling a more grounded interpretation and evaluation of the field findings.

For example, in one of the agile dialogue sessions the Bur Juman metro station in Dubai was discussed, in the context of the rather questionable beautification of transit areas. The ornamentation here covers up the more authentic needs of the space and reduces the users to the role of outsiders admiring the place but not necessarily developing a feeling of ownership towards it. During one of the agile dialogue sessions a long-time citizen of UAE and resident in Dubai remarked that in the city of Dubai many basic city facilities do not function properly, and that compared to them the public transportation is the most reliable service. This aspect gives the users of public transportation in Dubai a positive sense of gratitude towards it. This shows us that along with the IBO method, to understand a particular phenomenon in its various aspects, the agile dialogue session with local users and cultural experts is important, as they add what researchers, as marginal participants, may not have access to.

65 'Photographers' Rights and The Law In The UK – the Law and Photography'. Urban75, available at: http://www.urban75.org/photos/photographers-rights-and-the-law.html. (Accessed February 19, 2020).
"Die Panoramafreiheit (§ 59 UrhG) erlaubt es Jedermann, Werke, die sich bleibend an öffentlichen Wegen, Straßen oder Plätzen befinden, durch Malerei, Foto oder Film zu vervielfältigen, zu verbreiten oder öffentlich wiederzugeben. Bei Bauwerken erstreckt sich diese Erlaubnis ausschließlich auf die äußere Ansicht!"Geschrieben von Janke, Marion (n.d.) 'Fotografieren in der Öffentlichkeit – Was Ist rechtlich zu beachten? – Kanzlei Janke Schult: Fachanwalt für Urheber- und Medienrecht', ‹https://www.medienrecht-urheberrecht.de/fotorecht-bildrecht/159-fotografieren-in-der-oeffentlichkeit-panoramafreiheit.html› [accessed 19 February 2020]

66 Zeisel (2009), p. 113

2.1.4 Discussions

The IBO method was developed to gather information in a rather complex socio-cultural context, that of urban transportation spaces. The method requires the unobtrusive participation of the observer in the field: this means that information is collected by observing users without their knowledge and consent. Nevertheless, the method for this purpose places users in categories defined by their purpose or by their gender and age. Also, most of the candid photographs are taken in public spaces,[65] for academic research purposes only. The other issue is that since the researcher is only a marginal participant, their fieldwork may miss the finer details that a qualitative interaction may bring with it. In some ways the agile dialogue process is designed to counterbalance this shortcoming.

The IBO method attempts to compensate what Zeisel and others call a foundational lack of standardised procedures for observing and interpreting by building in a theoretical framework.[66] This is achieved by bringing a procedural clarity to the method by identifying and defining the major components and the processes of the method: demarcation, documentation and decoding. The results then need to be validated through agile dialogue. The researcher demarcates that which is to be documented from that which may be ignored in the observation. Demarcation is based on the articulation of the intention with which the researcher defines her task in the field. Documentation helps us collect the information that constitutes the first-level construct. Decoding involves building the second-level construct from the field material gathered. The final process is the agile dialogue of the analysed material. This assures the validation of the second-level construct through external scrutiny.

The IBO method, does not just make the tacit knowledge that implicitly underlies our actions explicit, it also aims for methodological transparency, i.e., to make its steps and the result from each step explicit so that researchers are enabled to reflect on the process. Table 2.5 and 2.6 compare the pros and cons of the IBO method with the traditional methods.

Table 2.5
Comparing the pros in more traditional field research methods with the IBO method

	Pros	Direct Observation	Participant Observation	IBO method
1	Non-obtrusive	yes / maybe	no	yes
2	Qualitative research	yes	yes	yes
3	Prolonged stay in the field	yes / maybe	yes	yes
4	Empathy towards the observed	yes	yes	yes
5	Humility towards the field	yes	yes	yes
6	Sharing the same spatial-temporal context as the observed.	yes / maybe	yes	yes

Table 2.6
Comparing the cons in more traditional field research methods with the IBO method

	Cons	Direct Observation	Participant Observation	IBO method
1	Obtrusive	no / maybe	yes	no
2	Structural unclarity	yes	yes	no
3	Lack of rigour in self-reported behaviours outside a lab-setting	yes	yes	no / maybe
4	Irregularity of the collected information based on researchers gaining different understandings of the same topic	yes	yes	no / maybe
5	Lack of foundational standardised procedures for observing	yes	yes	no
6	A theoretical framework for interpreting observations.	yes	yes	no

2.2 Field Research

The following studies were done in the field using largely the IBO method. These were conducted in: London, Paris, Berlin, Hong Kong, Tokyo, Bremen and Vienna, amongst others. The following collection of field notes was made during the fieldwork between 2016 and 2020. The field research was mostly planned and conducted at two levels (as shown in Diagram 2.8). The Field Study 1 (to be discussed in Section 2.2.1) investigates the passenger experience to understand, document and analyse their Human-Material-Interaction within transit spaces. The Field Study 2 (to be discussed in Section 2.2.2) examines the service provider's perspective to identify their main intentions in designing these spaces. In approaching the field from these two viewpoints I followed the research pattern (see Diagram 2.8) that investigated the object of knowledge, that is, transit spaces – from the top-down perspective of transportation providers and the bottom-up approach that enquired into the users' sense of being in these spaces.

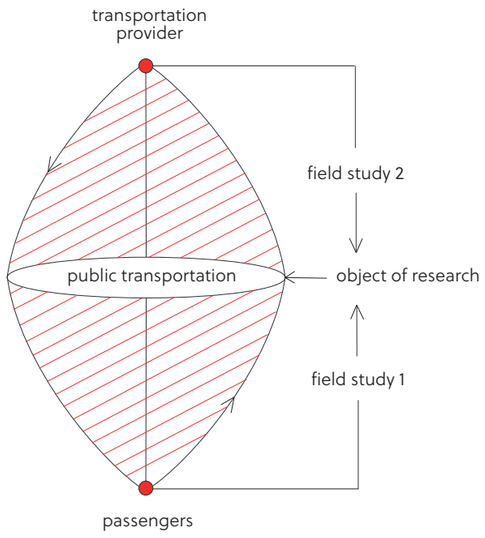


Diagram 2.8
The bottom-up (Field Study 1) and top-down (Field Study 2) approach towards field research

2.2.1 Observing Commuters in Transit Spaces

The Field Study 1 (refer Diagram 2.9), which is the subject of discussion in this section, investigates commuters, their behaviour in interaction with the materiality of the transit space. The presentation below is similar to the structure of the field notes. The images, used to draw a certain inference, are also, of course, open to other interpretations. The inferences drawn are from the observed Human-Material-Interaction within transit spaces – they are brief, object-oriented observations and do not involve (at this stage) a deeper reflection on the issues. Sections 2.2.2 and 2.3 involve more nuanced discussion based on these field observations.

Aim: The first aim was to acquaint myself to urban mobility space and second, to observe how materiality in transit space inform, and therefore sub-consciously influence, commuter behaviour. With this I aimed to generate a rational understanding of architectural and design elements that contribute to the eudaemonic "wellbeing" for humans in these shared spaces of mobility. This constituted the bottom-up approach to the investigation.

Tools: Sketches, candid photography and note-taking

Method used: IBO method.

Procedure: 1. *Demarcating the field.* Before a more precise field demarcation

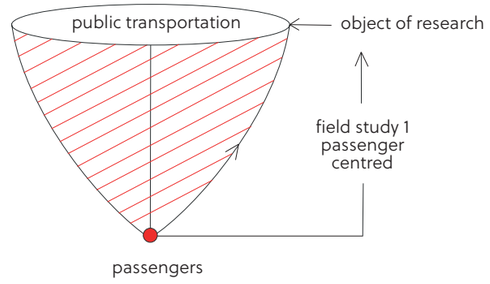


Diagram 2.9
The Field Study 1 is done bottom-up and concentrates on understanding passenger experience

could be executed, at least a day or two was spent getting to know the field. This was done not only in the main urban mobility areas such as stations, bus stops, mobility hubs, trains and buses, but also in the interstitial areas of the city that connect the transportation nodes and contribute to a more passive experience, but which nevertheless constitute an important part of the urban mobility system. This was important to understand the urban mobility space in its cultural and social context. This pre-exercise for the actual field research was also important for organising the more mundane details of rules and regulations that needed to be followed in the field. After various terrorist attacks, such as the Tokyo gas tragedy in 1995, and the London Underground terror attack on 7 July 2005, public transportation areas such as stations and trains are often places of high security. Therefore, absolute care was taken to conduct the field research in a way that respected these norms, and wherever possible the transportation providers were informed about the field research. Often, a prolonged stay in a particular area was avoided and replaced by a regular visit to observe and document the intended phenomena in the demarcated field.

2. *Documenting in the field.* During this phase candid photography was largely used, though at times quick sketches were made to note down a particular phenomenon. This was only done when photography was not possible. As discussed in the earlier section, candid photographs were only taken in public spaces where photography was allowed, and only for academic purposes. I took care to document users referred to abstractly in categories, such as commuters ready to board, or waiting for the train, or at the ticket counter. With this approach I avoided documenting information that focused on the individual's identity, concentrating on a category like gender or age only when this clearly served a definite purpose for the study. The body of the individual commuter and the body of the mass of commuters were observed in order to understand their movements and positioning, with respect to each other, to the larger flow of people and to the materiality of the transit space. Apart from visual documentation, care was also taken to document other factors that influenced the documentation of the space, such as temperature, ventilation, olfactory encounters, aural quality and lighting, amongst others. For this the body was used as a perceptual tool. Sometimes, the documentation prompted insightful conversations, such as in the departure lounge of Stansted airport, discussed in Section 2.2.2.3 Beautification. These involved commuters curious to know about the work; this exercise was particularly helpful in explaining the PhD research in an easy, brief and comprehensible format.

The following are some of the observations which were gained with the above-mentioned aims, tools and procedure. The following observations were not solution driven, that is, I was not trying to find any answers, but merely to acquaint myself with the place and observe the Human-Material-Interaction within the transit space. As, already discussed in the Section 2.1, (also shown in Image 2.9 – 2.20) the images selected below are representatives of observations made over a time period of 2 – 3 years across several geographies.

Image 2.23
Chater Road, September 2017. Candid photography has been an important tool in documenting the circumstantial evidences collected during the field research.

2.2.1.1 Privacy in Shared Space

In public transportation spaces the issue of privacy and the need to build a communal space often contradict each other. See Image 2.24 (Richard Straus Strasse metro station, Munich), Image 2.25 (Kyoto Central Bus Station, Kyoto), Image 2.26 (Seating arrangement at Tokyo Station waiting lounge, Tokyo) and Image 2.27 (Saint Jacques metro station, Paris)

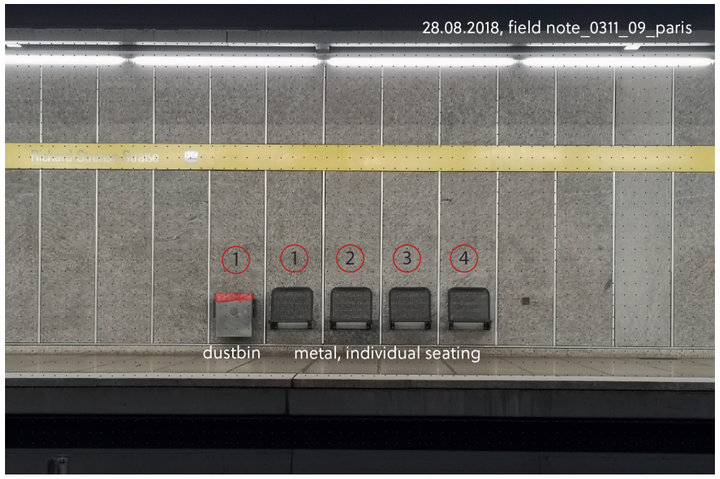


Image 2.24
Richard Straus Strasse metro station, Munich, 2019. Annotations added to the image. The image shows us a dustbin and four separated metal seats facing the rail tracks. These are the only seating in the middle of the platform.

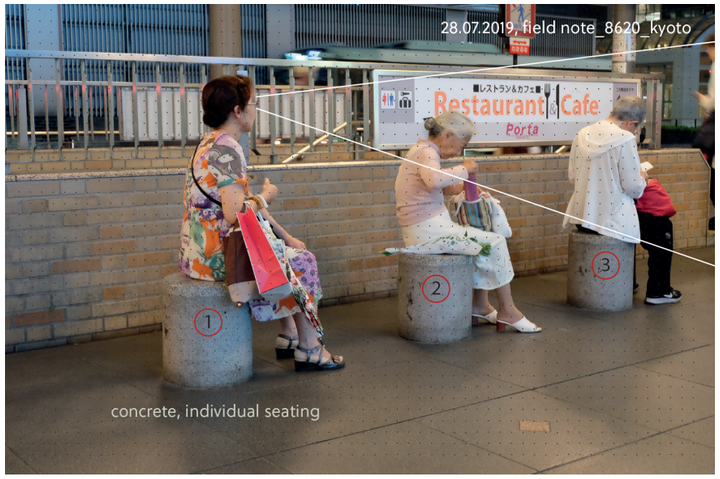


Image 2.25
Kyoto Central Bus Station, Kyoto, 2019. Annotations added to the image. We see passengers waiting for the bus in Kyoto central station, although no seating direction is given, the passengers prefer this formation, which gives them more privacy and space.

Inference: In public transportation spaces one of the main concern of service providers is the need to economise on waiting area space. In such a situation, providing the waiting travellers with privacy is a challenge. This is often solved by positioning closely packed individual seating next to each other, but with a larger gap between individual rows. By doing so, eye contact is avoided despite the close proximity to the neighbours sitting next to us, and easy conversation is impossible with those opposite as in Image 2.26. Baumann comments on a similar trend in the planning of urban spaces where "the well supervised, properly surveilled and guarded temple of consumption is an island of order, free from beggars, loiterers, stalkers and prowlers - or at least expected and assumed to be so. People do not flock to these temples in order to talk and sociate." Thus, I observed that in public transportation spaces the issue of privacy is often prioritised over the need to build a communal space.

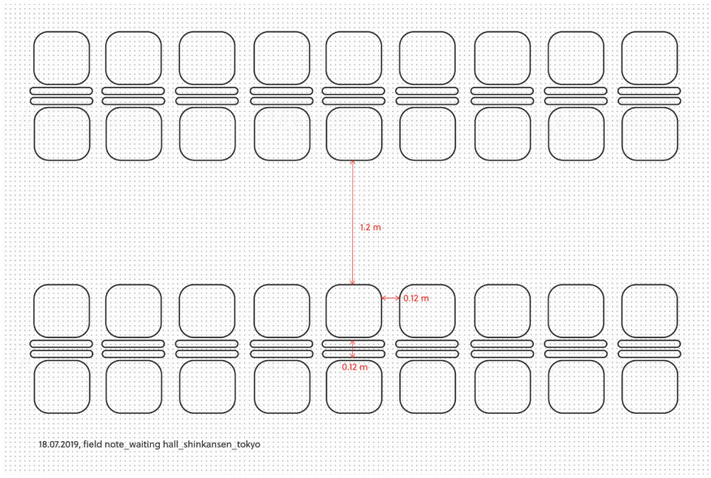


Image 2.26
Seating arrangement at Tokyo Station waiting lounge, Tokyo, 2019. The drawing shows the seating arrangement at Tokyo Station waiting lounge. This is a very busy area and the seats have been arranged prioritising maximum seating.

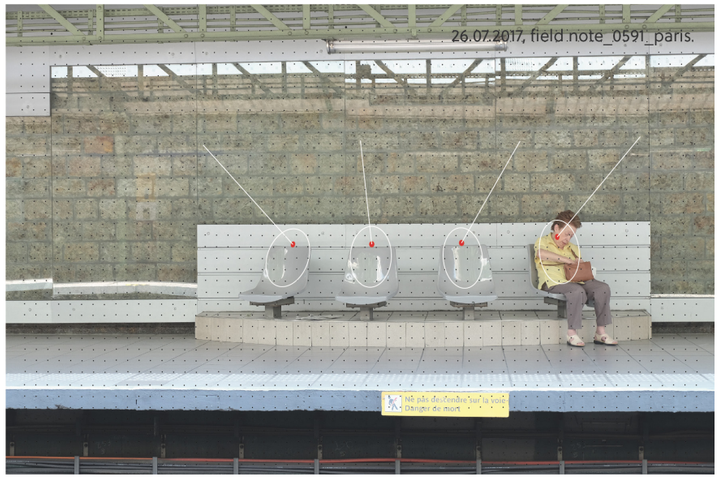


Image 2.27
Saint Jacques metro station, Paris, 2018. Annotations added to the image. In this image each of the four seats is laid out in a different angle, straining even a simple conversation between two friends seated next to each other.

2.2.1.2 Orientation within Transit Spaces

Navigating passengers through transit spaces is a task done in collaboration with tools of information design and the understanding of the user within built environments. It is a challenging task as it involves providing commuters with a navigational system that functions across cultures, demographies and geographies – an inclusive system functioning both for daily commuters and foreign visitors. See Image 2.28 (Shinjuku Station, Tokyo), Image 2.29 (Central Station, Bremen), Image 2.30 (Gatwick Airport, London) and Image 2.31 (Paddington Station, London).

Inference: The Image 2.28, shows us the Shinjuku Station. With more than 200 exits and entries this station is an extreme example of the labyrinthine quality of transit spaces. Creating navigational systems that are- functional, accessible and accurate is no easy task.

Image 2.28
Shinjuku Station, mezzanine floor, Tokyo, 2019. This is world's busiest transport hubs with 53 platforms and more than 200 exits. It serves as the main connecting hub for various rail traffics between Tokyo's long-distance trains, inter-city express and subway lines.

Image 2.29
Central Station, Bremen, 2018. Annotations added to the image. We see the waiting area in Bremen central station. Most of the commuters prefer to wait in zone 1 as it gives them a direct view of the train information board, in the top left corner of the sheet. Since the designated waiting area offers only a restricted view of the board, it was less preferred for shorter duration.

67 Koolhaas, Rem, and Hal Foster (2016) *Junkspace*: With *Running Room* (London: Notting Hill Editions)

When the metro construction started in Hong Kong (late1960s, early 1970s) a large percentage of the population was illiterate. To enable easy recognition of the stations these were colour coded. Today, just the light rail network in Hong Kong Metro (MTR) comprises of 12 routes and serves 68 stations, and the primary colours that provided easy recognition have long been exhausted. MTR's intention in colour-coding stations was a novel idea to fight the anonymity that is inherent to these spaces. Rem Koolhaas describes transit spaces as being like skin without a structure, making us lose our sense of orientation.[67] The orientation within these spaces takes place between the commuter and the architecture of the place. Thus, navigational systems are more than boards informing passengers: they are an integral part of the architecture and need to be constructed in consultation with the user.

Image 2.30
Gatwick Airport, main waiting area, London, 2018. The flight information board is constructed to make information accessible to passengers in wheelchair, the aged, blind and hearing impaired.

Image 2.31
Paddington Station, main hall, London 2017. The information is accessible to passengers not only over electronic display boards but also via the analogue chart system.

2.2.1.3 Why Standing is the Better Seating

There are many passengers waiting in the platform or inside the train who select standing places over sitting down. The following is a selected set of examples showing the nature of these standing places. See Image 2.32 (Central Station, Bremen), Image 2.33 (Humboldt Strasse, Bremen), Image 2.34 (Acton Town, London) and Image 2.35 (Inside a metro train, Vienna).

Image 2.32
Central Station, platform 2, Bremen, 2017. Annotations added to the image. We see a commuter leaning against the advertisement board while waiting for the train.

Image 2.33
Humboldt Strasse, tram stop, Bremen, 2018. Annotations added to the image. This was a day in February when the temperature in Bremen went down to -11°c. Although the three men are heavily loaded only one of them is sitting on the metal seat, with just minimal contact between his body and the seating.

68 Tremblay, Marc Stephen, et al. (2010) 'Physiological and Health Implications of a Sedentary Lifestyle', *Applied Physiology, Nutrition, and Metabolism*, 35:6, pp. 725–740, <doi:10.1139/h10-079>

Inference: During my field studies I noticed that during office hours a large number of commuters preferred a good standing spot to sitting down in the train. What made a good standing position was one with two axes – a vertical and a horizontal, preferably a corner position. Straps to grab were used only while moving from one point to another or when there was a disruption in the motion of the train. Our city lives have become increasingly sedentary;[68] the standing phenomenon was observed among younger office workers during peak hours and less by tourists or the elderly, who generally used the off-peak services.

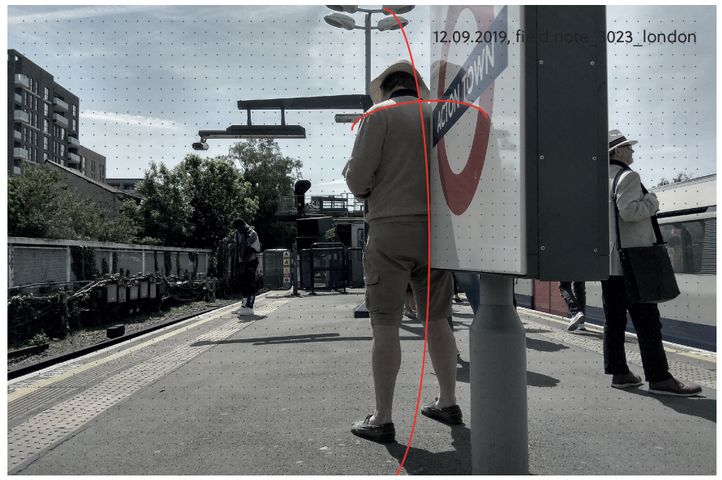


Image 2.34
Acton Town, platform for taking the Piccadilly line, London, 2019. Annotations added to the image. The waiting passenger is reading a newspaper and leaning on the station board.

Image 2.35
Inside a metro train, Vienna, 2017. Annotations added to the image. This train is filled mostly with younger passengers returning home after work. Although there were several seats free, quite a few passengers decided to stand during the duration of the travel (which was on average between 10 to 20 mins). These "standing places" were usually corners that provided the travellers with two support axis- horizontal and vertical. These places not only provided better support but also made the standing hand-free.

2.2.1.4 Aspects of Light(ing)

One of the elements that creates the non-place character of metro stations and other transit spaces like airports is the lack of daylight. Light plays an important role in creating the atmosphere within transit space. See Image 2.36 (Altes Landgut, Vienna), Image 2.37 (Baker Street Station, London), Image 2.38 (Yamanote Line, Tokyo) and Image 2.39 (Gare de Lyon, Paris).

Image 2.36
Altes Landgut, platform 1, Vienna, 2017. Annotations added to the image. The Wiener Linien in Vienna uses a strong light and dark contrast between a well-lit platform space, contrasted with the pitch-dark area of the train tunnel.

Image 2.37
Baker Street Station, platform for Circle line, London, 2017. Lighting is used to celebrate the architectural experience of the space.

69 BBC (2019) Chris Baraniuk 'Can Blue Lights Prevent Suicide at Train Stations?', <https://www.bbc.com/future/article/20190122-can-blue-lights-prevent-suicide-at-train-stations> [accessed 21 October 2020]

Inference: In my conversations with Wiener Linien about station design, they pointed me out the very specific lighting design they follow through all stations. In this, the platforms are brilliantly lighted, and the train tracks are kept in absolute darkness. The idea behind this they explained was to demarcate the "safe" area in light and the "unsafe" area in darkness. Like Wiener Linien number of service providers use light to communicate and direct commuter behaviour. The image 2.39 shows us the Gare de Lyon in Paris, where a brightly lit architectural element is used to guide the passengers through the narrow and long passage. The Yamanote Line in Tokyo uses the soothing effect of blue light on the human psyche to reduce the suicide rate in stations.[69] In image 2.37 we see the Circle line station part of the Baker Street station, built in 1863. The lighting, the architectural elements and the seating together create a very special atmosphere.

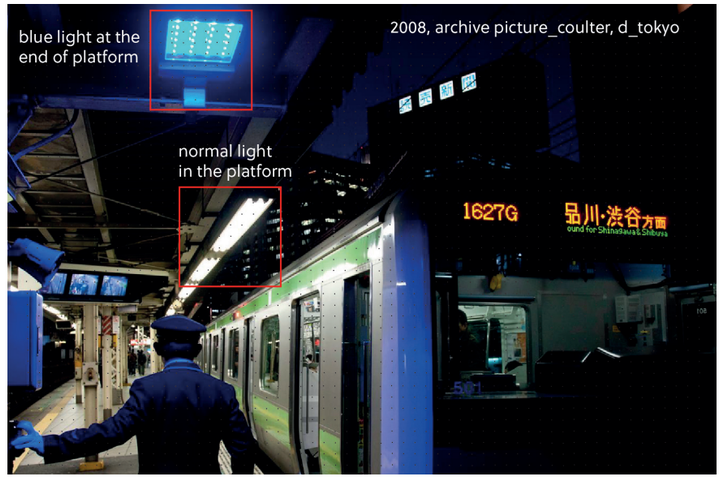


Image 2.38
Yamanote Line, platform, Tokyo, 2019. Annotations added to the image. The Yamanote Line in Tokyo uses blue light dominantly in certain parts of the platforms.

Image 2.39
Gare de Lyon, metro station, Paris, 2017. Annotations added to the image. We see a narrow exit passage guided by light.

2.2.1.5 Defensible Spaces

"Before I built a wall I'd ask to know
What I was walling in or walling out,
And to whom I was like to give offense."
Robert Forst, *Mending Wall*

The gentrification of our cities has made the nature of public transportation places become increasingly more exclusive and protected. See Image 2.40 (Glaciere metro station, Paris), Image 2.41 (Karlsplatz, Vienna), Image 2.42 (Station Gare du Nord, Paris) and Image 2.43 (Gare du Nord, Paris).

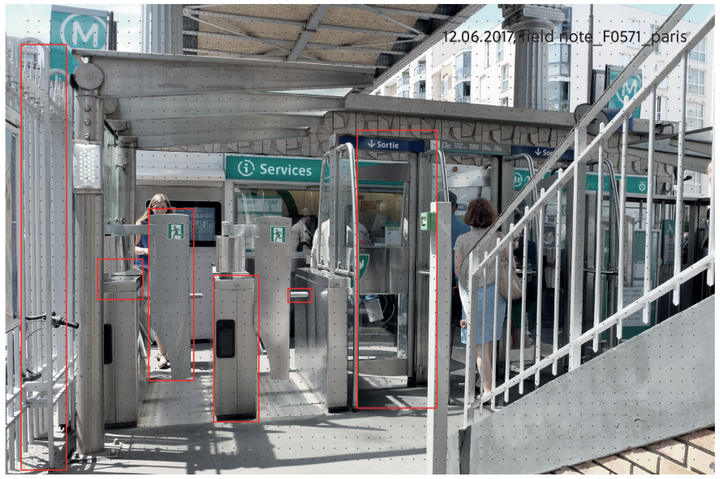


Image 2.40
Glaciere metro station, Paris, 2017. Annotations added to the image. This shows us the rather typical entry and exit to a RATP run station in Paris.

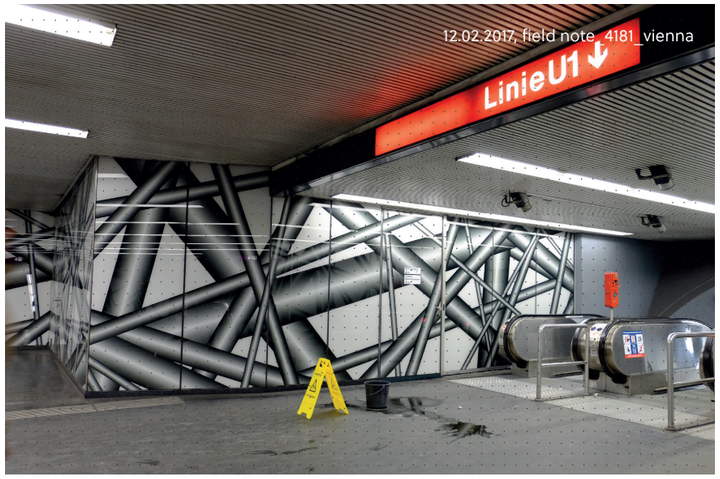


Image 2.41
Karlsplatz, metro station U1-U2 mezzanine floor, Vienna, 2017. The artwork seen on the walls is by Peter Kogler.

70 Graham, Stephen (2011) *Cities under Siege: The New Military Urbanism* (London: Verso), p.142

Inference: The Image 2.40 shows us the north entry point at the Glaciere, metro station in Paris. To enter the station, first, the commuters scan their pass or their ticket. Second, they squeeze themselves through the rotating metal bars (meant to prevent tailgating) and finally pass through the metal gate. Along with these measures, the station is also secured by tall metal fencing. The Image 2.41 shows us the computer-generated artwork of the artist Peter Kogler. I find Kogler's work depicts in a rather direct way the somewhat aggressive nature of transit non-spaces. Image 2.42 shows us a surveillance camera hanging on the bare ceiling. This is the symbol of the new militarism of urban spaces. Stephen Graham observes this as the normalisation of autocratic paradigms of thoughts, actions and policy in our social fabric.[70] At the material semantic level these examples demonstrate the normalisation of using the material and formal expression of the battlefield to gain control in civilian areas that are clearly not in a war zone.

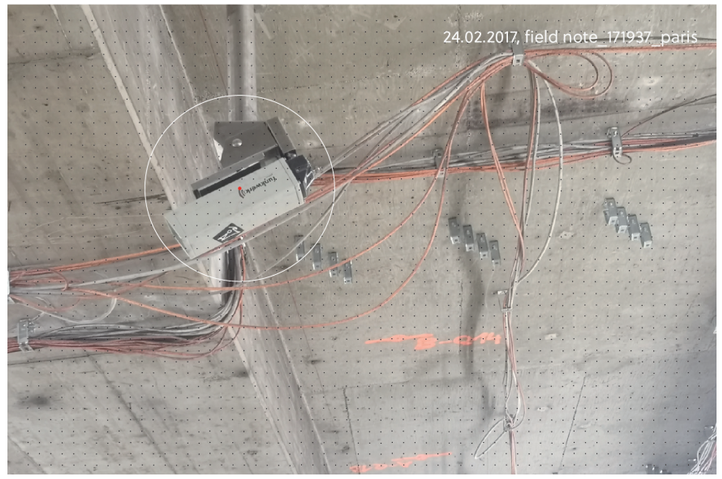


Image 2.42
Station Gare du Nord, Paris, 2017. Annotations added to the image. We see one of the many security cameras installed within the station.

Image 2.43
Gare du Nord, Paris, 2018. The heavily secured station space, mainly to hinder fare evaders and the homeless.

2.2.1.6 Material Semantics within Transit Spaces

Materials form us and constitute the world around us, they carry in them an inherent symbolic and emotional expression. This semantic expression of a material although largely influenced by the social, geographical and the cultural context of the user, create the atmosphere of the place and determine the behaviour of the user with(in) the place. See Image 2.44 (Central Station, Hamburg), Image 2.45 (Max Weber Platz, Munich), Image 2.46 (Entry to an underground station, Tokyo), Image 2.47 (Central Station, Bremen).

Image 2.44
Central Station, city exit Steindamm, Hamburg, 2018. Temporary structure built in the station during renovation work.

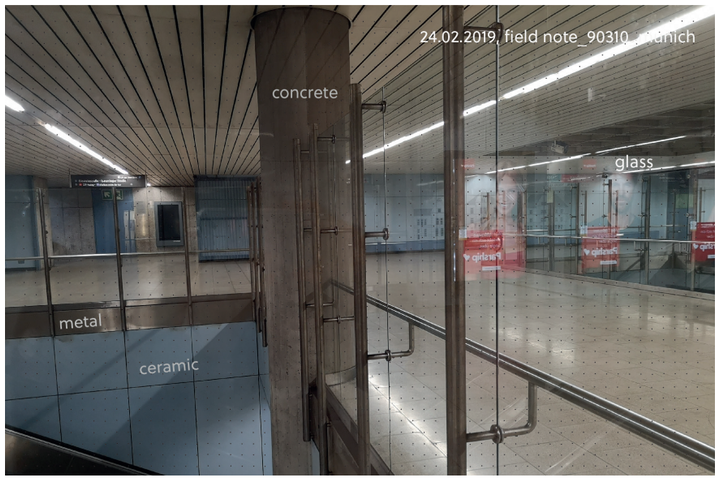


Image 2.45
Max Weber Platz, underground station, Munich, 2019. Annotations added to the image. The materiality in this image is representative of materials normally used in transit spaces across geographies.

71 Cooper, John O., Timothy E. Heron, and William L. Heward (2007) *Applied Behaviour Analysis* (Upper Saddle River, NJ: Pearson / Merrill-Prentice Hall), p. 30.

72 Skinner, B. F. (1966) *The Behaviour of Organisms: An Experimental Analysis* (New York: Appleton-Century-Crofts)

Inference: The materials that we see used here are concrete, steel, ceramic tiles and glass. The lighting is cold and white; the space is in neutral tones. The behavioural scientist B.F. Skinner accumulated significant evidence over several years to show that human behaviour is changed less by the stimuli that precede it (though context is important) and more by the consequences that immediately follow it (that is, consequences that are contingent upon it).[71] This respondent behaviour is conditioned by earlier experiences;[72] here the corporeal repertoire of material semantics is built by the human user and stored for later use. In Image 2.47, when the temperature sinks to -11°C, the reaction of not wanting to sit down on metal benches is based on our experiential memory.

Image 2.46
Entry to an underground station, Tokyo, 2019. As in the earlier image, the materials used here are ceramic tiles, metal and concrete; the colour is kept neutral.

Image 2.47
Central Station, tram stops, Bremen, 2018. Annotations added to the image. On a chilly winter morning, two women are squeezing over a plank of press-wood (here the ticketing machine was to be constructed), while the metal bench remains unoccupied.

2.2.2 Understanding the Service Provider's Intentions

In this section we discuss the findings of Field Study 2. This dealt with understanding the workings of urban transportation providers and the factors on which transportation policies were based. The nature of the collected information was primarily top-down. This was done via several exchanges with various transportation providers across the globe. This was important in understanding what influenced specific design and architectural decisions in transit spaces at a policy-making level. The following is an account of the field research carried out with the focus on service providers.

Aim: What intentions of transportation service providers influence the design and architectural decisions within public transportation spaces?

Tools: IBO method, qualitative interviews and note-taking.

Method used: The IBO method used to do the Field Study 1 (Section 2.2.1) built the foundation on which the interviews were conducted and the intentions of the service providers were validated.

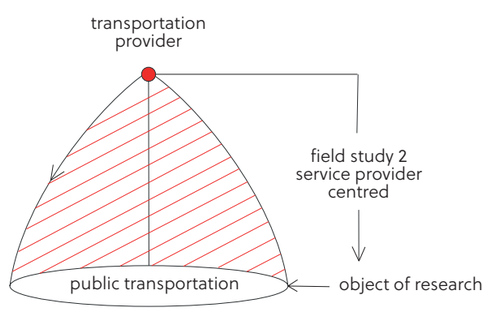


Image 2.48
Altes Landgut, Vienna, 2017
The main operations room in a station serves as a central space where the various physical facilities are monitored and controlled by the service provider.

Diagram 2.10
The Field Study 2 is done top-down and concentrates on understanding the intentions and limitations of the service providers.

73 Seidman, Irving (2019) *Interviewing as Qualitative Research: a Guide for Researchers in Education and the Social Sciences* (New York, NY: Teachers College Press), pp. 8 – 9

74 Ibid.

75 Transport for London (TFL) is a local government body responsible for the transport system in Greater London, England.

Procedure: The main process of executing the IBO method is as discussed in the earlier sections. Apart from this, a series of expert interviews were conducted in this phase. The experts selected for interview were usually senior-level managers from various transportation providers. These senior managers were best situated to answer my queries, as they were often involved in the creation of higher-level goals for the company and in supervising their execution. Meetings with these interviewees were carried out in an open, structured qualitative style. Though meeting notes were taken, no electronic recordings were made. The interviews were conducted in an extended phase between 2016 and 2019; during this there were certain transportation providers (like, RATP, NS, MTR, BSAG and Hochbahn) I met often, and it was possible to share my fieldwork findings and discuss and understand specific issues in detail. The information collected in these exchanges was worked into a comparative study with the field data collected via the IBO method. Thus, the overall approach to this aspect of the research was one of looking for matches/mismatches between the claims of transport providers and the actuality of what they deliver.

The nature of these interviews, I realise now, was largely determined by the way I gained access to those interviewed. In most of my interviews, contact was established on a collegiate basis, with transportation colleagues introducing me to their other partners. Although all my interview participants were new contacts, the fact that I was introduced by someone in the "club" meant that I was treated as "one of them". This made my relationship with the interview partners warm and friendly: we met at recurring events, went out together and had the chance to carry on our conversation in various settings. This made it different from the cold and formal nature of an interview and meant that it had more of the feel of an exchange. Interviewing, as Irving Seidman writes, is a very basic mode of enquiry.[73] Seidman states that the main purpose of interviewing is not to get answers to questions but to understand the lived experience of those interviewed and make sense of this experience in the form of a dialogue.[74] This was indeed the main driver behind my exchange with various service providers. The following is the list of organisations whose staff I interviewed in this context between 2016 and 2019.

BSAG, Bremen
NS, Netherlands
RATP, Paris
STM, Montreal
MTR, Hong Kong
Wiener Linien, Vienna
UITP, Brussels
TfL, London[75]

76 Heylighen, Francis (1992) 'A Cognitive-Systemic Reconstruction of Maslow's Theory of Self-actualization', *Behavioural Science*, 37:1, pp. 39 – 58, <doi:10.1002/bs.3830370105>

In the following I use four categories:

2.2.2.1 Functionalism
2.2.2.2 Commodification
2.2.2.3 Beautification
2.2.2.4 Anti-Vandalism

to discuss the main intentions on which public transportation providers base their design and architectural decisions. These categories are based on the insights I received from the field study 1 and the qualitative interviews I conducted with the service providers.

2.2.2.1 Functionalism

Functionality and efficiency form the base of Maslow's hierarchy of needs,[76] and this is the fundamental objective of public transportation operations: to securely and efficiently transport commuters from point A to point B. An efficient and functioning mobility system cuts across resources such as space, energy, technology and investment. The aim is to put in place a transportation network which works, and is reliable, effective, and above all, safe. Although there are no globally agreed standards for functionality, safety or efficiency, these requirements do build the foundation on which urban transportation systems can flourish.

But when mobility spaces are reduced to mere functionality, they omit the finer nuances that could eventually underline more clearly the functional aspect of the space. In Image 2.49 we see Liverpool Street station in London. It is the junction of the London Underground with the West Anglia Main Line to Cambridge, and the busier Great Eastern Main Line to Norwich, other commuter trains to east London and the Stansted Express service to Stansted Airport. Liverpool Street Station is one of the busiest railway and underground stations in Greater London. Immersive Behavioural Observation of commuters in the main hall (between London Underground and the mainline trains), and trying to travel myself (without navigational help from digital devices) between the Underground and the Stansted Express to the airport and back, I realised that despite all the information (on the railways) being available on the electronic display boards, navigating through the train-time-destination slots is a cumbersome process. The information about the London Underground (Hammersmith & City Line, Central Line and Circle Line) is unclear and difficult to find.

Another example of a function-dominated solution is the seating in the MTR trains in Hong Kong (Image 2.50). The seating is made of stainless steel; the surface of this is smooth and hard, and feels cold. The materiality evokes in the observer a feeling of sterility and anonymity. The seating is arranged in two rows, facilitating enough standing space during peak hours. The seating gives the commuter little stability when the train stops suddenly on the journey.
In the new fleets the depth of the seats has been increased by 3 – 4 cm. This has resulted in a noticeable change in the way people sit: since the stainless-steel seats are smooth, most of the passengers tend to slide deeper in the chairs, letting their feet dangle. Feedback and complaints regarding this were communicated by several commuters to the MTR customer service department.

Image 2.49
Liverpool Street Station, London, 2018

Image 2.50
Inside an MTR Train, Hong Kong, 2017

77 Creadick, Anna G. (2010) *Perfectly Average: The Pursuit of Normality in Postwar America* (Amherst, MA: University of Massachusetts Press)

78 The Star (2016) Todd Rose 'When U.S. Air Force Discovered the Flaw of Averages', <https://www.thestar.com/news/insight/2016/01/16/when-us-air-force-discovered-the-flaw-of-averages.html> [accessed 21 October 2020]

79 Savage, Sam (2012) *The Flaw of Averages: Why we Underestimate Risk in the Face of Uncertainty*, ill. by Jeff Danziger (Chichester: Wiley)

Despite this, MTR decided to keep the seats by justifying the steady annual increase in the average height of commuters. Maybe this decision makes sense, as these seats will outlive many generations.

Striving for the average seemed to be a logical consequence to ease the industrial paradigm of "one-size fits all". In 1942, the obstetrician Robert L. Dickinson and the sculptor Abram Belskie created "Normman" and "Norma", statues representing the average man's and woman's physique, in order to highlight America's improving physical health; Norma's measurements were based on data collected from 15,000 young adult women. Three years later the Cleveland Health Museum, who purchased the statue, hosted a contest to find an Ohio woman whose statistics matched Norma's: an Ohio newspaper asked: "Are You Norma, Typical Woman? Search to Reward Ohio Winners".[77] Although thousands of women sent in their measurements, none of the contestants' proportions exactly matched Norma's. Martha Skidmore, who won the contest, was the only woman who came close to some of Norma's measurements. The "flaw of averages", identified by Sam Savage, has been also discovered by the US Air Force to be one of the main reasons for air crashes.[78] Savage suggests – using a humorous example of a statistician who drowned while fording a river that was, on average, only three feet deep – that "Plans based on the assumption that average conditions will occur are usually wrong".[79]

80 Westdeutsche Zeitung (2018) 'Düsseldorfer Start-up "Welect": Werbung als alternative Zahlmethode', <https://www.wz.de/nrw/duesseldorf/duesseldorfer-start-up-welect-werbung-als-alternative-zahlmethode_aid-25630109> [accessed 21 October 2020]

81 City Monitor (2019) Jonn Elledge 'The Nestify Ads on the Tube Are Disgusting, and TfL Should Stop Taking the Company's Money', <https://citymonitor.ai/politics/nestify-ads-tube-are-disgusting-and-tfl-should-stop-taking-company-s-money-4720> [accessed 21 October 2020]; Learn Bonds (2020) Justinas Baltrusaitis 'TFL Continues to Promote Junk Food, Despite a Ban on Advertising', <https://learnbonds.com/news/tfl-continues-to-promote-junk-food-despite-a-ban-on-advertising/> [accessed 21 October 2020]

82 Greater London Authority (2017) 'News from Caroline Russell: Latest Body Shaming Ads Should Be Torn down from Tube Stations', <https://www.london.gov.uk/press-releases/assembly/caroline-russell/latest-body-shaming-tube-ads-should-be-torn-down> [accessed 21 October 2020]

83 Transport for London (2019) 'Commercial Media', <https://www.tfl.gov.uk/info-for/business-and-commercial/commercial-media> [accessed 21 October 2020]

84 Damm, Steffen and Klaus Siebenhaar (2005) *Ernst Litfaß und sein Erbe: Eine Kulturgeschichte der Litfaßsäule* (Berlin: Bostelmann & Siebenhaar)

85 Greenhalgh, James (2020) 'The Control of Outdoor Advertising, Amenity, and Urban Governance in Britain, 1893 – 1962', *The Historical Journal*, pp. 1 – 26, <doi:10.1017/s0018246x20000205>

86 Art Lebedev Studio (2013) Erken Kagarov 'Moscow City Design Code', <https://www.artlebedev.com/moscow/design-code/> [accessed 21 October 2020]

87 Baur, Ruedi (2008) 'Civic Space and Design', in: Michael Erlhoff, Philipp Heidkamp and Iris Utikal, *Designing Public: Perspektiven für die Öffentlichkeit – Perspectives for the Public* (Basel: Birkhäuser), pp. 96 – 99 (p. 98)

88 Mc Cafferty, Declan (2017) 'Stations vs. Cities' (Talk) Royal College of Art, Kensington, London

2.2.2.2 Commodification

One of the most notable features of my field research in transit spaces was the prevalence of advertisements. Public transportation providers use advertisements as a way to maximise profit and keep fares down. In the last decade there has been a significant shift in the quality, quantity and nature of advertisements. Digital technology has changed the presentation of advertisements in two ways. The first of these is the replacement of physical hoardings with digital screens. This has the benefit of making the rental of advertising space easy and versatile; also, the screen is often used for 'infotainment', providing commuters with entertainment while they wait. Secondly, the digital approach has in part shifted the physical, static placement of advertisements to individual mobile devices: here advertisements are positioned on ticketing apps or websites.

Image 2.51
Hammersmith Station, London, 2018

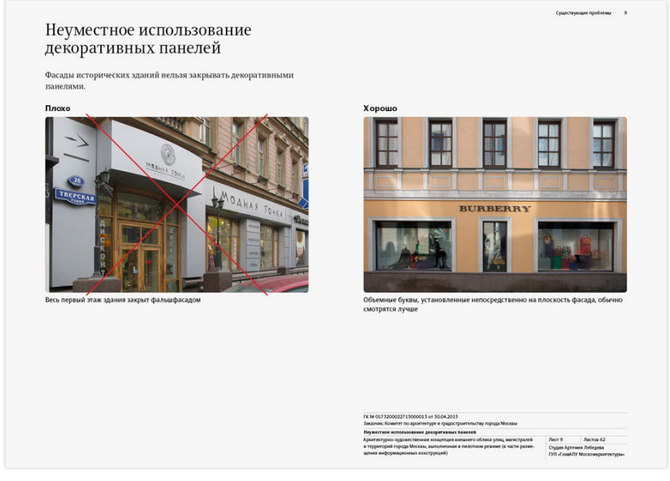


Image 2.52
Moscow Redesign Concept, Moscow, 2018

The German start-up Welect has developed an alternative to traditional advertisements. They call it the "on demand advertisement": in this model the app users decide if they want to see advertisements or pay a higher amount for an advertisement-free ticket[80].

During the timespan of this field research, the early use of digital screens was found to be widespread alongside physical hoardings. In the architectural space of public transportation, the screen, with its fleeting animated images, seems more aggressive than the static hoardings. In addition, the use of screens enables advertisements to be targeted and segment-specific. In the monotonous non-spaces of public transportation areas, advertisements gain in dimension. Masked by form, colour and movement, advertisements punctuate the waiting time in these areas with (privately determined) profit-oriented goals. TfL has frequently been criticised for the nature of the advertisements they host.[81] The most infamous of these was the body-shaming advertisement for Protein World, that read "Can you keep up with a Kardashian?"[82] Now TfL has issued a set of guidelines for their advertising policy, in an attempt to curb the worst excesses of advertising, which of course is merely tinkering at the edge of the problem.[83]

Urban transit spaces are an integral part of the cityscape, and are influenced by the prevailing urban design trends in the city. Advertisements in these spaces are designed and positioned to draw the attention of people waiting in traffic or moving around the city, in much the same way as window displays, signboards, bus shelters, traffic lights do. The overwhelming effect of advertising has long been a concern – the invention of the Litfaßsäule, or advertising column, in 1854 was an attempt to regulate this.[84] A century later, in the 1960s, the Labour MP Francis Noel-Baker vehemently opposed outdoor advertising, suggesting that it not only destroyed Britain's traditional landscape but was also detrimental to the urban experience of the citizen.[85] A more recent anti-advertising movement was initiated in Moscow in 2013 (see Image 2.52). Sergey Sobyanin, Mayor of Moscow, initiated a campaign in which Moscow's Architecture and City Development Committee cleaned up the historic inner city visually. Advertising and information placement concepts for the old city's eleven historic streets were developed as a style handbook[86] by Art Lebedev Studio. The guidelines in the handbook listed a set of recommendations for installing shop names on historic buildings; this signage had to be pre-approved by the city council before it was put up.

Ruedi Baur writes about urban spaces becoming "artificially overloaded with meaning while at the same time infinitely reproducible, interchangeable, and much too quickly consumed: it reinforces selfishness and is detrimental to a sense of public good".[87] The transportation provider profits from passengers' waiting time, making the break between buying a ticket and waiting for the journey to begin into an opportunity for consumption.[88] Kowloon station in Hong Kong (Image 2.53) proudly hosts the tallest building on the island, housing high-end fashion stores and other offices. Renting out property remains a steady and good source of income for the Hong Kong Metro (MTR). Coming out of Kowloon station one is greeted by a conglomeration of luxury stores; there are hardly any sitting possibilities on this floor, and dustbins remain hidden.

89 Mascena, Adrian (2012) 'Benno Wissing and the Modernization of de Stijl,' *Art Journal* Vol. 2012, Iss. 1, Article 6, <https://digitalcommons.providence.edu/art_journal/vol2012/iss1/6>

90 Fischer, Jill, Lee Paxman-Clarke, & M. Minichiello (2020) *Effective wayfinding adaptation in an older National Health Service hospital in the United Kingdom: Insights from mobile eye-tracking*, <https://doi.org/10.1080/24735132.2020.1729000>

In Image 2.51 and 2.53 we see how consumption becomes the primary motivation in public transportation design. Here, "design" is directed towards the consumer and not the commuter. The Dutch designer Benno Wissing is celebrated till today for the clarity and simplicity of the signage design he designed in 1967 for Schiphol Airport. Wissing was very aware of the post-world war II advertisement boom and how airport passengers were flooded with increased information. To ease travellers Wising used simple colour coding and only a few shapes to guide them to the one out of a hundred gates.[89] To avoid confusion he also banned any other signage in his chosen shades of yellow and green from Schiphol, including Hertz's car rental signs. The Image 2.54 shows us the entrance to the Munich domestic airport, where the advertisement of Sixt car rental aggresively claims the attention of the travellers to the disadvantage of the signage system.[90]

Image 2.53
Kowloon Station, Hong Kong
2017

Image 2.54
Munich Domestic Airport, Munich, 2019

91 YouTube (2018) Maxson Goh Films *PAssion POSB Card Ad Concept*, <https://www.youtube.com/watch?v=57e2fc6ssXE> [accessed 21 September 2020]

92 "Junkspace" is a term coined by the architect Rem Koolhaas. According to him, "If space-junk is the human debris that litters the universe, junk-space is the residue mankind leaves on the planet." One of the characteristics that Koolhaas assigns to junkspaces is their temporality. Koolhaas, Rem, and Hal Foster (2016) *Junkspace: With Running Room* (London: Notting Hill Editions), p. 9

93 Lynch, Kevin (2012) *The Image of the City* (Cambridge, Mass.: MIT Press), p. 3; pp. 46 – 90

94 Al Jazeera (2019) Charis McGowan 'Chile Protests: What Prompted the Unrest?', <https://www.aljazeera.com/news/2019/10/30/chile-protests-what-prompted-the-unrest> [accessed 21 October 2020]

95 Lasn, Kalle (2008) *Culture Jamming: Das Manifest der Anti-Werbung* (Freiburg im Breisgau: Orange-press), p. 107

Image 2.55 shows the inside of an underground train in Singapore. Behind the appeal of the pink, green and yellow colour scheme and the baskets full of fresh fruit, someone is trying to sell the commuters a 'cash-free membership' for a debit card.[91] In this case the advertisement does not remain inside a screen but takes over the physical space inside the carriage. Kevin Lynch argues that the mental image of cities that citizens hold is largely dependent on the "'legibility' of the cityscape". Lynch's arguments can easily be applied to transit spaces, where the "legibility of the space" is important and necessary. When advertisements spill out from their traditional frames they take over the enclosed space. The initial reaction of the commuter to this encroachment maybe interest or fascination, but this quickly gives way to a sense of disorientation and of being lost in the otherwise non-space. The nature of advertisements is fleeting, making transit spaces into "junkspaces"[92] where, like a reptile shedding its skin, these spaces are refurbished with new advertisements every Monday morning. This practice destroys the legibility of the space, as it hinders the re-recognition and organisation of the space into a coherent pattern by its users.[93]

Advertisements blur the distinction between public and marketised space, making us uncertain about the intentions with which we design shared spaces for all. The city, by selling itself in the neoliberal market, becomes a space that constantly incites its citizens to consume. Commenting on the 2019 protests in Chile, the Chilean sociologist Victor Villegas said that one of the main reasons for the protests is the neoliberal political climate in Chile, where citizens feel they are treated 'as subjects of consumerism and no longer as people with rights.'[94] As a challenge to the capitalisation of public space an anti-advertising movement was started in the 1980s by Kalle Lasn. Lasn called this "culture jamming."[95] It was a protest against the monopolisation of public spaces for commercial purposes. Unlike traditional protests, culture jamming uses the norms of advertising space and style, subverting the communication by imitating the feeling and appearance of a targeted advert.

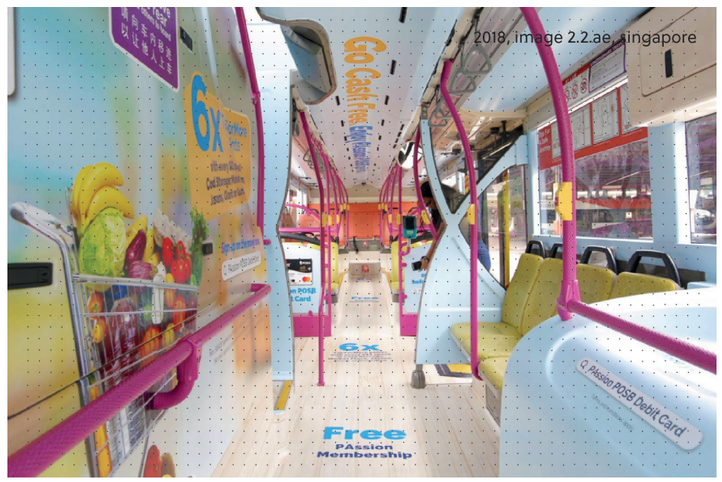


Image 2.55
Bus Service 111 – Volvo B9TL,
Singapore, 2018

96 Ibid.

2.2.2.3 Beautification

Art on the Underground (originally Platform for Art) is a curatorial programme that has its roots in the early twentieth century, in the belief of Frank Pick, commercial manager of Underground Electric Railways Company of London, in the importance of the visual arts to the London Underground. Pick commissioned artists and designers to develop London Underground's distinctive corporate identity in every detail. Several stations on the network were also decorated with locally relevant murals. As part of this, the Johnston typeface, distinctive colours, simplified representation of the tube maps, wayfinding systems and advertisements were used by Pick and his team to create what we now know as integrated brand design.[96] The aim was to "create

97 Transport for London (2020) 'Art on the Underground', <https://art.tfl.gov.uk/> [accessed 21 October 2020]

98 Arch Daily (2017) Luke Fiederer 'AD Classics: Paris Métro Entrance / Hector Guimard', <https://www.archdaily.com/870687/ad-classics-paris-metro-entrance-hector-guimard> [accessed 21 October 2020]

an environment for positive impact and to enhance and enrich the journeys of the passengers that are its audience".[97] In the same period (between 1900 and 1913), Hector Guimard, in Paris, was designing the entrances to the first Paris Metro stations.[98] His cast iron and glass designs, typical of the Art Nouveau style, came to be known as *le style Metro*, and have been a visual symbol of RATP's tradition as a service provider for the city of Paris. In Image 2.56 we see the Art Nouveau style entrance of the Daumesnil metro station. TfL and RATP were pioneers in the provision of art in underground/ metro/subway stations. Since then, many urban transportation providers (also refer Image 2.59) have used this strategy in the architectural and design planning of their subways.

Image 2.56
Daumesnil Station, Paris, 2018

Image 2.57
Gare de Lyon, Paris, 2017

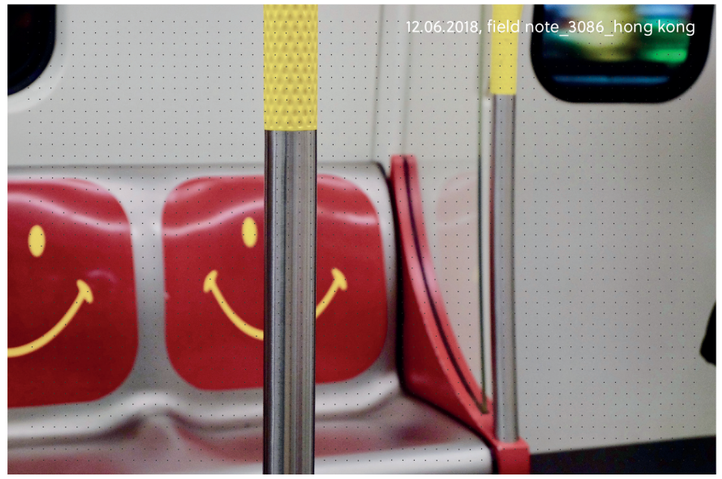


Image 2.58
Inside an MTR Train, Hong Kong, 2017

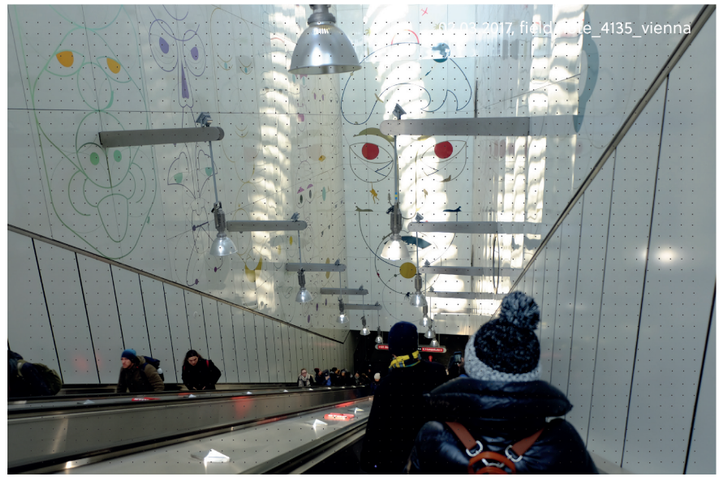


Image 2.59
Altes Landgut, Vienna, 2017

But unlike Pick's ambition to make the London Underground a place that was accepted and cherished as an important part of the city, newer trends in beautification arose from competitive trends between major international cities in the 1990s, which aimed to make the city space more attractive[99] for the growing number of weekend travellers. There has also been a movement in cities like Copenhagen that boldly took a very human-centred approach to urban redesign.[100] I acknowledge this movement towards authenticity in urban design and will discuss this later, in Section 2.3. Here, in the following text, I try to analyse the vacuous intentions and effect of this superficial aesthetic dressing-up, as art in this context is usually meant to compensate for the otherwise non-space quality. It is removed from the *firmitas* and *utilitas* of the architectural space, and serves no real function. Although this is an important discussion to engage in, it is also one of the more complex arguments in this work. Aesthetics, in the ancient Greek sense of the word, refers to the synthesis of all our senses. Our dominant commodity-driven aesthetic culture today is very different from the quality of *venustas* (beauty) that Marcus Vitruvius in the first century BC classifies as one of the three pillars in architecture along with *firmitas* (structural integrity) and *utilitas* (functionality).

As Fritz Haug, Zygmunt Baumann and Rem Koolhaas, amongst others, write, the widespread problem of our time is that we tend to treat commodity aesthetics as products in themselves, rather than positioning them in a balanced relationship to *firmitas* and *utilitas*. This was also design's basic task – to assist the new industrial commodity aesthetic. Interestingly, Haug points to the automobile, of all industrial products, as "normalised as that sort of brand-name item of which the physical appearance represents both the use value and the brand name".[101] Haug elaborates on the Marxist analysis of the exchange relationship, in which the use-value of a commodity is the pre-supposition for its value. Since the consumption (use-value) of the product is realised only after the purchase, the value of purchase is only a presupposition of the use-value.[102] Until the sale is set in motion the "use-value appears to be" what it eventually might be. In the commodity aesthetics of the industrial world this illusion of " taking appearance for being" is played on so that it is not what something "is" but its "appearance" that prompts the act of purchase. This "appearance" creates false need and builds a planned obsolescence into the product or the space, bringing about an aesthetic ageing of products with an apparently outdated shape that still function perfectly well.[103]

During the expert interviews and field research, I observed a noticeable inclination in the newer designs of public transportation vehicles towards the automobile aesthetic. At first glance this seems to be restoring a feeling of pride to public transportation that has been missing for some time,[104] but a closer look makes us question the validity of this false aesthetic. The new Routemaster buses, launched in London in 2012,[105] are a good example of how a lopsided emphasis on the aesthetics of a product, combined with political motivation, may come at a very high price. Tom Barry and his team have researched the new Routemaster intensively, comparing technical data, interviewing TfL bus drivers on these lines anonymously and gathering user information on social media. They give an exhaustive account of this in their blog.[106] Amongst a list of ten malfunctioning aspects of the new bus, are: "the air cooling does not work hard enough in hot weather so the bus feels like a mobile greenhouse; and the windscreen wipers are upwards dragging rain water to the top of the screen so that in a heavy downpour the water falls back down the screen in your line of vision".[107] They candidly write about how the development and production of the bus was rushed through for political reasons, with more attention given to superficial aesthetics than practicality and capacity specifications.

The Routemaster is a notorious example of how design priorities may be misused as a means to an end. The dominant aesthetic of our times is defined by Marc Augé as the cinematic "long shot".[108] Our gaze is educated by photographs taken from observation satellites and aerial shots. These immensely beautiful visual experiences are fed to us continually, and create an image of the world as we would like it to be. This ocularcentric approach is what we are constantly confronted with when urban spaces are designed. There are several stakeholders in a public transportation project – the city, the service provider, the citizens and the investors. Each of these has a clearly defined agenda and idea of how the project should be carried out. Since sight remains the most immediate and frequently accessed of all our senses, the process of working together is easiest when stakeholders can see and plan on and with the visual.

Koolhaas characterises spaces such as airports as merely interiors, characterised by mirror, polish and echo. These spaces are disorienting and anonymous, held together by skin, with no structure.[109] In pithy aphorisms, Koolhaas writes that these "junkspaces" do not aim to create perfection but only interest: they are flamboyant and yet unmemorable. These spaces thrive on "design": graphics, emblems, the sparkling infrastructure of LEDs and video create an identity-less world, taped together. This provisional materiality, held together by staples, clamps, tapes and glue[110] helps to ease the transition from one appearance to another.

99 Gehl, Jan, and Birgitte Svarre (2013) *How to Study Public Life* (Washington, DC: Island Press), p. 156

100 Ibid.

101 Haug, Wolfgang Fritz (1987) *Commodity Aesthetics, Ideology and Culture* (New York: International General), p. 44

102 Ibid.

103 Ibid., p. 11

104 "Margaret Thatcher once said anyone on a bus over the age of 25 is a failure. "We've moved on from that – I think people on a bus is a success." Tribune (25 April 2019) @JeremyCorbyn pic.twitter.com/vJKYPSavVB [tweet], <https://twitter.com/tribunemagazine/status/1121539549862289410> [accessed 09 July 2020]

105 These are also known as Boris buses, as Boris Johnson promised them during his 2007 election campaign to become Mayor of London.

106 Boris Watch (2014) Helen 'The New Routemaster – What Transport For London Refuse To Admit', <https://www.boriswatch.co.uk/2014/07/17/the-new-routemaster-what-transport-for-london-refuse-to-admit/> [accessed 21 October 2020]

107 Ibid.

108 Augé, Marc (2008) *Non-Places: An Introduction to Supermodernity* (London: Verso)

109 Koolhaas, Rem, and Hal Foster (2016) *Junkspace: With Running Room* (London: Notting Hill Editions)

110 Ibid., p. 10

Image 2.60 shows us the pretty sprawl of new seating built around early 2019 in the main waiting area of Stansted Airport, London. The seating is in wavy rows of bentwood. Every seat is provided with electric sockets. It looks as though the whole space has been transformed into an inviting spacious lounge, but in reality the seats are too high, and too deep.

The ergonomics of the furniture are a misfit for the bodily proportions of most of the users. Images 2.61 – 2.64 show how various users tackled the problem of seats that are too high and too deep, by either resting their feet on rucksacks or suitcases or by sitting cross-legged. The seats are 46.5 cm high and 42.0 cm deep. These measurements are at odds with standard European ergonomics, in which the standard height of public seating is set at 45.0 cm and the depth at 40.0 cm.[111] The corporeal reaction of almost all average passengers was to compensate for these inappropriate dimensions by positioning their body differently.

Pick famously said "where there is life, there is art": it was his vision that made London Underground an important patron for the work of artists and designers. The London Underground was the first of its kind in the world. Apart from being an expensive project, it was also a testing ground to see how it would be accepted by the different social classes who would be sitting next to each other and using the same space. Pick's intervention, commissioning artists to bring art objects into the station and using designers to devise a marketing and public image strategy, was indeed *wertschätzend*[112] towards achieving the democratic quality of space a station usually offers. But the problem with this sort of intervention that involves beautification is when it becomes lopsided and, as Jacobs argued, is the "dishonest mask of pretended order", that suppresses "the real order that is struggling to exist and to be served".[113] Jacobs observed how futile it is to plan a space for people based on how it looks without understanding its innate functioning integrity. She argues further that by endowing places of use with these superficial appearances is "even meaner than outright ugliness and disorder". In Image 2.58 we see how the rather anonymous and sterile-looking seating (as discussed earlier) has been superficially animated by simply pasting a 'smiley' on to it.

111 Neufert, Ernst, Johannes Kister, and Mathias Brockhaus (2005) *Bauentwurfslehre: Handbuch für den Baufachmann, Bauherrn, Lehrenden und Lernenden* (Wiesbaden: F. Vieweg), p. 39

112 This is a German expression meaning valuing, respecting and having goodwill towards others.

113 Jacobs, Jane (2011) *The Death and Life of Great American Cities* [1961] (New York: Modern Library), p. 31

Image 2.60
Waiting Lounge Stansted Airport, London, 2019

Image 2.61 – 2.64
Waiting Lounge Stansted Airport, London, 2019

114 Kalab, Martin (2018) 'Tram, Metro, Bus in tendering process' (Talk), *UITP Design & Culture Platform Meeting*, Vienna

115 Tietz, Thorsten and Shalini Sahoo (2014) Interview with Stephan Schönherr, Vice President MAN Truck & Bus AG, Munich on colour & material selection for public transport interiors

2.2.2.4 Anti-Vandalism

Architectural and design decisions within the public transportation domain are made largely on the basis of functionality, ease of maintenance, durability and cost factor.[114] The material and design specifications issued for tenders always explicitly mention the need for materials and products that are easy to clean, low maintenance and vandal-proof.[115] Image 2.65 shows us the extensive cleaning being undertaken to remove graffiti and Image 2.66 shows us a "vandalised" dustbin. The majority of public transportation providers I interviewed during this phase understood vandal-proof construction to be an essential part of planning.

Image 2.65
4th arrondissement, Paris, 2019

Image 2.66
Park in Viertel, Bremen, 2019

116 Newman, Oscar (1972) *Defensible Space: Crime Prevention Through Urban Design* (New York: Macmillan Publishing Company), p. 203

117 Flusty, Steven (1994) 'Building Paranoia: The Proliferation of Interdictory Space and the Erosion of Spatial Justice'. *LA Forum for Arch & Urban Design*, pp. 4 – 5

118 Glanville, Ranulph (2009) *The Black Boox, Vol 3: 39 Steps* (Vienna: Echoraum), p. 229

Based on these requirements, a space with reinforced glass, steel, concrete and ceramic tiles is created. It is an anonymous space, with robust surfaces and products that hold their sterility and form against the hardest of (ab)use. This sort of architecture is predicated on violence, assuming that every potential user is also a potential vandal. On crime-proof or defensible architecture, Oscar Newman wrote that it "... is a model for residential environments which inhibit crime by creating the physical expression of a social fabric that defends itself".[116] The arguments that Newman, amongst others, initially used as a tactic for social liberation was turned on itself as a strategy to control spaces in global enclaves of privilege.[117]

Ranulph Glanville writes in 'Impoverishment: the Context'[118] about the prevailing social tendency that assumes humans to hold an impoverished view of themselves. This negative view has a wide influence on our social patterns and attitudes. Glanville elaborates on this by citing the example of a specific

Image 2.67
A typical bus stop, Wales (Alamy Stock Photos)

Image 2.68
Walkhampton's bus stop, Devon (Trendland, 2009. See footnote 124)

119 Ibid.

120 Norberg-Schulz, Christian (1997) *Intentions in Architecture* (Cambridge, MA: MIT Press), p. 17

121 Robinson, Sarah and Juhani Pallasmaa (2017) *Mind in Architecture: Neuroscience, Embodiment, and the Future of Design* (Cambridge, Massachusetts; London, England: MIT Press), p. 3

122 Norberg-Schulz (1997), p. 17

123 Ibid, p. 22

124 Trendland (2009) 'Creative Bus Stop Design', <https://trendland.com/creative-bus-stop-design/> [accessed 27 October 2020]

125 Tavistock Times Gazette (2017) Sam Hughes 'Walkhampton Bus Stop Makeover Goes Viral', <https://www.tavistock-today.co.uk/article.cfm?id=419758&headline=Walkhampton-bus-stop-makeover-goes-viral%C2%A7ionIs&searchyear=2017> [accessed 21 October 2020]

one-in-a-million "incident" affecting pedestrian trips. This figure was the cause of much horror and was used to propose draconian measures to prevent such incidents. With this example Glanville clearly showed "our willingness to determine life by the down-side". For every "bad" incident there are 999,999 pedestrian trips that are safe. But by measuring and defining our lives by the lowest common denominator we are "permitting the rare possibility to dominate our lives and our lives to be dominated by fear".[119] Surely there has to be an extraordinary reason to let 1 ever outweigh 999,999 events. When public transportation spaces are designed to serve the lowest common denominator, a space is created which presumes that every potential user is also a potential vandal: thus the space does not serve the commuter but the criminal who might be there.

The architectural space of any well-designed environment can influence the behaviour of its users.[120] It is not just the human user who is in control of the space: it is also the built environment, its materiality and architectural features, that create the quality of the user's journey experience, evoking in them definite feelings or behavioural patterns. Sarah Robinson writes that since our mind includes and is influenced by aspects of our physical and cultural environment, it also means that the kind of environments we create can also alter our minds and our capacity for thought, emotion and behaviour.[121] This is the subject-object dichotomy that arises through a constant recursive interaction between the outside and the inside world. Thus, the task and effect of architectural structures transcends mere functionalism.[122] Christian Norberg-Schulz considers architecture as a human product which should order and improve our relations with the environment, stressing the importance of asking: 'What purpose has architecture as a human product?'[123]

Image 2.67 shows a typical bus stop on the route between Tavistock and Meavy in Devon, in south-west England. After years of being heavily vandalised, the bus stop in the small Dartmoor village of Walkhampton received a guerrilla makeover (see Image 2.68).[124] The makeover recreated it as a living room, complete with plants, picture frames, couch, cushions and a blanket to keep waiting passengers warm. The villagers described how this changed the cold, bleak atmosphere of the bus stop to that of a cosy and lively space. Added to this, the vandalism stopped completely after the refurbishment.[125] There could be many reasons for this. At the material semantic level, the refurbished space resembles a living room, and we are taught early in life how to behave in this space. The second reason might be that since the remake of the space was done to provide the users with comfort, they react towards it with a sense of ownership, gratitude and respect. The same phenomenon can be seen in Gorky Park, Moscow, after its grand renovation in 2011. The then director of the Central Park of Culture and Leisure, Sergei Kapkov, decided to shut down the park for several months to carry out a major reconstruction. This involved

126 Russia Beyond (2014) Louise Dickson 'The Woman behind Gorky Park's Rebirth', <https://www.rbth.com/arts/2014/07/21/the_woman_behind_gorky_parks_rebirth_38379.html> [accessed 21 October 2020]

127 Newsweek (2011) Owen Matthews 'Moscow's Famous Gorky Park: Once A Place to Avoid, Now a Magnet', <https://www.newsweek.com/moscows-famous-gorky-park-once-place-avoid-now-magnet-66381> [accessed 21 October 2020]

128 Intégral Ruedi Baur Paris (n.d.) 'Project Wayfinding Vienna Airport' (2012), <https://www.irbparis.eu/projet/index/id/84> [accessed 21 October 2020]

129 Die Presse (2012) Norbert Philipp 'Neuer Terminal: Abflug mit dem Architekten', <https://www.diepresse.com/1265089/neuer-terminal-abflug-mit-dem-architekten> [accessed 21 October 2020]

130 The New York Times (2012) Alice Rawsthorn 'Designers of the Signs That Guide You', <https://www.nytimes.com/2012/10/22/arts/22iht-design22.html> [accessed 21 October 2020]

131 This orientation system was later corrected by the Austrian information designer Peter Simlinger.

renovating monuments, cleaning the pond and delivering soil and grass turf. A 15,000 metre ice rink, with separate zones for children, hockey, dancing, and general skating, was officially opened in December 2011.[126] Before this intervention Gorky Park was notorious as a place where people met to either deal in drugs or to commit murder. Families with children, couples and elderly rarely visited the park and avoided the area after dark. The great renovation of Gorky Park was an attempt to create a communal space for all. Now it is a city within a city, with its own transport system, electricians, cleaners, janitors, landscapers, and communal places to eat. In the first year after reopening, the number of visitors almost doubled. Now there are almost 15 million visitors per year, more than the entire population of Moscow. Gorky Park is now the most popular recreational space for Muscovites, and if an item of furniture or another park amenity gets damaged, local visitors repair it before the park authorities have even registered the damage.[127]

The paradigms discussed in this section need to function in a balanced relationship with each other. When one of them dominates, they do so at the expense of the other factors. This then creates an environment that is out of balance and may not fulfil its main intended purpose. For example, the much renowned graphic designer Ruedi Baur was given the assignment to design the orientation system for the new Vienna Airport "Terminal Check in 3" (planned and constructed between 2005 – 2012). For this he was invited to work quite early and in close collaboration with the architect architect (Itten Brechbühl and Baumschlager-Eberle). Baur's signage system with symbols and typefaces were meant to not only navigate the passengers but also to create the desired atmosphere. For this the signage was worked out and executed in a dialogue with the artistic installations created by Susanna Fritscher.[128] After the opening of the airport in the year 2012, in an official statement given by the association of the visually impaired[129] the signage system does not work well for users with varying grades of visual impairment, it seemed for many reasons the "artfully blurred signs are not legible."[130] Clarity, legibility and quick accessibility are the primary characters of a signage system. In absence of these an orientation system fails its purpose.[131] At the same time Baur's intention with the signage system to create a congenial atmosphere was indeed novel.

Image 2.69
Airport Terminal, Vienna, 2012

Image 2.70
The public realm is a space contested by various users. A group of young dancers attract a big audience around the Rundel Mall in Adelaide, 2017.

132 European Commission (2019) European Commission, Directorate-General for Mobility and Transport (DG MOVE) *Transport in the European Union: Current Trends and Issues* (European Commission, 2019), <https://ec.europa.eu/transport/sites/transport/files/2019-transport-in-the-eu-current-trends-and-issues.pdf> [accessed 21 October 2020], p. 3

133 Ibid.

2.3 Discussions: Public Transportation Policies & Urban Mobility as a Common Good

The field research, as discussed earlier, builds the foundational understanding of the object of knowledge. It helped me analyse how materiality influences the quality of the journey experience for commuters, and on what intentions transportation providers based their design and architectural decisions for these spaces. Along with this, an important aspect was the systems insight that the field research provided me with. In this section, I discuss the global trends and issues in urban mobility. Here I will elaborate first on how the European Union (EU) conceives transportation strategy in cities, and second, how streets are integral to cities. Third, I discuss the importance of transit hubs in 20-minute cities, and finally I discuss the question of the ownership of the city.

2.3.1 EU Trends in Transportation Policy

In the past few years there has been an increasing realisation globally of the need to move away from fossil fuels. In addition, urban mobility is being perceived more and more within the context of urban planning. The motor-city planning of the early twentieth century is being replaced by other ways of measuring the quality of life in cities. The following is an account of urban transportation policy in the context of the EU.

The European Commission's Directorate-General for Mobility and Transport declares, in the March 2019 issue of its Transport in the European Union: Current Trends and Issues, that "transportation is a fundamental sector for and of the EU economy."[132] The report states the urgency of the need for a functioning climate-neutral connectivity within the EU at country, state and city level. Along with this it articulates the challenges the European transportation sector faces within the current situation of disruptive changes in technology and mobility.[133] The Commission proposed a new long-term budget for the period 2021-2027 that involved long-term goals regarding sustainability, inclusive growth, investments in new mobility models, renewable and energy-efficient solutions, research and innovation and digitalisation. The Commission suggested a focus on research into autonomous mobility and zero-emission transport. Although this report deals with urban mobility only briefly, and
then within the context of other transportation modes, nevertheless it is an important source for identifying patterns that determined eventual trends in urban mobility. These trends have mainly been in two directions, digitalisation

and autonomous mobility and the zero-emission transport model.

I identified the prominent policy trends within EU city planning in a report prepared by the EU in collaboration with the United Nations Human Settlements Programme, 2016.[134] In this report the EU Commissioner for Regional Policy recognised the growing importance of cities in the forefront of societal change, where innovation, diversity and sustainable living may be experimented with and practised. The report recognised that one of its main objectives was to support more evidence-based urban policy-making in Europe, by empirically assessing economic, social and environmental trends at city level. The urban agenda of the EU was based on the UN's 2030 Agenda for Sustainable Development, adopted in 2015.[135] This includes a set of 17 Sustainable Development Goals to end poverty, fight inequality, deal with injustice and address climate change; amongst these, goal number 11 aims to "make cities and human settlements inclusive, safe, resilient and sustainable". The report recognises the crucial role of urban mobility planning in reducing greenhouse gas emissions by facilitating walking, cycling and the use of public transport in cities. The EU Cohesion Policy plans to invest more than EUR 77 billion in projects to build and integrate public transportation hubs, with new metro and tram lines and infrastructural improvements for pedestrians and cyclists.[136]

The EU understands cities as experimental grounds to promote low-carbon mobility. Since land utility also plays an important role in creating a more resource-efficient city, parking areas and roads for private vehicles are seen as becoming a growing nuisance in the new urban planning. Public transportation is thus understood as the solution to traffic congestion and a clean city. But this shift in mobility from privately owned vehicles to shared transportation can only be successful when an affordable, reliable and inclusive transportation facility is offered to city dwellers, and is promoted likewise. The report clearly shows that the UN's sustainable agenda development in a city is only possible with a sound public transportation system.

134 European Commission (2016) European Commission, Directorate-General for Regional and Urban Policy, United Nations Human Settlements Programme (UN-Habitat) *The State of European Cities 2016: Cities Leading the Way to a Better Future*. (LU: Publications Office), <https://data.europa.eu/doi/10.2776/643506> [accessed 21 October 2020]

135 United Nations (2016) UN-Habitat III, Sustainable Development Goals: 'Goal 11: Make cities inclusive, safe, resilient and sustainable', <https://www.un.org/sustainabledevelopment/cities/> [accessed 21 October 2020]

136 Puchler, John, and Ralph Buehler (2008) 'Making Cycling Irresistible: Lessons from the Netherlands, Denmark, and Germany', *Transport Reviews*, 28:1, p. 495–528

137 National Geographic (2009) John Roach 'Lost City of Mohenjo Daro Puzzles Archaeologists', <https://www.nationalgeographic.com/history/archaeology/mohenjo-daro/> [accessed 21 October 2020]

138 Augé, Marc (2008) *Non-Places: An Introduction to Supermodernity* (London: Verso)

2.3.2 The Urban Context

The basic infrastructure that makes a city is housing and utilities. Housing is where the citizens live, raise families and are at home and utilities are the facilities that support them, such as education, healthcare, childcare, care homes, place of work, recreation, etc. Between the housing and the utilities there is a whole system of communication and transportation that supports and inter-connects them. Therefore, the city is like an organism and the transportation systems ensure the flow within it. The city can only exist and function with its transit routes and nodes and these, on the other hand, exist only in relation to the city. Thus, the following discussion on the nature of the city is key to understanding the potential in its transportation structures. I also discuss the city and how its mobility system defines the character and the quality of life in its spaces. The ancient cities of Harappa and Mohenjo-Daro, part of the Indus Valley Civilisation in Pakistan, are regarded by many archaeologists as examples of a highly developed urban planning. One of the determining factors for this was their intricately designed street grids and an even more elaborate drainage system.[137] The quality of interconnectedness has always been the measure of a functioning urban system. This happens largely at two levels, locally and globally. Marc Augé expresses this as the capacity of cities to import and export people, products, images and messages.[138] The spatial interconnectedness within the city via pathways, streets, rail networks and cable cars determine, shapes and nurtures the quality of life in the city. When the first underground railway lines (now known as the Tube) were built in London, it changed the societal structure of the city. Families could afford to live relatively luxuriously in the outskirts and still have complete access to the other facilities in the city. The Tube network enlarged the urban space by shrinking its commuting distances. Cities are highly dependent on their routing systems, which in turn are determined by neighbourhoods. TfL and RATP, along with other transportation providers and station architects like Declan McCafferty, Rob Naybour, and others, are championing the role of the station in influencing the quality of the city and how place-making is an important aspect of the design of stations and transportation hubs. In the following I cite two case studies, first from Hong Kong to show how a socially healthy urbanscape may look. Second, from Chile to show how the urbanscape may transform into protestscapes.

Image 2.71
Chater Road, Hong Kong, September 2017

139 The New York Times (2019) Mary Hui ' "Not Just a Maid": The Ultra-Running Domestic Workers of Hong Kong', <https://www.nytimes.com/2019/05/25/world/asia/hong-kong-maids-running.html> [accessed 21 October 2020]

140 The Guardian (2017) Emma-Lee Moss ' "That One Day Is All You Have": How Hong Kong's Domestic Workers Seized Sunday', <http://www.theguardian.com/cities/2017/mar/10/sunday-sit-in-inside-hong-kong-weekly-domestic-worker-resistance> [accessed 21 October 2020]

141 Ibid.

142 Constable, Nicole (2014) *Born out of Place: Migrant Mothers and the Politics of International Labor* (Berkeley, CA: University of California Press)

143 Ibid.

144 Schiewe, Jürgen (2008) 'History of Language as History of Communication', in: Michael Erlhoff, Philipp Heidkamp and Iris Utikal, *Designing Public: Perspektiven für die Öffentlichkeit – Perspectives for the Public* (Basel: Birkhäuser), p. 78

2.3.2.1 Case Study: Hong Kong

The basic infrastructure of Hong Kong in the area next to the central station (streets, pavements and parts of the station) is transformed every Sunday, and on public holidays. Empty dismantled cardboard boxes are used by hundreds of mainly female Filipinos and Indonesian workers to sit on or lie down on. Hong Kong is one of world's most densely populated cities, where migrant domestic workers make up almost 5 % of the total population.[139] Most of them live in appalling conditions,[140] with "live in" and "two weeks" rules;[141] they often sleep in the kitchen or the bathroom and have no private space for themselves. These migrant workers take over the area around Hong Kong's Chater Road, the upmarket financial district, on Sundays and on public holidays (as in Image 2.71). The otherwise anonymous, chic borough is claimed and transformed dramatically into a venue for picnicking, chatting, holding protests, dancing, singing and hair cutting. The migrant workers in the city have been claiming the public space in this way since the 1980s. In 1992, a group of local residents tried to ban them from this practice, resulting in "the Battle of Chater Road" which prompted a fierce public debate in the press. The sympathy and support for the migrant workers resulted in the eventual failure of the petition.[142] Almost thirty years since then, these gatherings today form a part of Hong Kong's identity as a city.[143] It is an interesting phenomenon, where public space is used to demonstratively enact private life. The social and legal conditions of the domestic workers in Hong Kong have long been criticised. In this public congregation the migrant workers flaunt themselves as a vivid part of a city which otherwise prefers them to be invisible. This exemplifies how public space, as Jürgen Schiewe writes, can be used for a "reactive corrective function, which consist[s] in the demand that state power be controlled and arbitrary exercise of power be exposed, made 'public' and eliminated by disclosing their illegitimacy".[144]

2.3.2.2 Case Study: Chile

> "The right to the city is far more than the individual liberty to access urban resources: it is a right to change ourselves by changing the city. It is, moreover, a common rather than an individual right since this transformation inevitably depends upon the exercise of a collective power to reshape the processes of urbanisation. The freedom to make and remake our cities and ourselves is, I want to argue, one of the most precious yet most neglected of our human rights."
>
> David Harvey, 'The Right to the City', *New Left Review* 2008

The transportation system of a city represents its power-structures and determines the quality of life for various social groups. This makes the right to public transportation a political issue. The Brookings Institution's Global Metro report states how the emerging markets are focused on cities. 300 of the largest metropolitan economies account for nearly half of all GDP. These urban concentrations attract large numbers of migrant workers, driving in and out of the city every day. This poses a systems challenge with regard to commuting, housing, medical facilities and childcare.[145] In early October 2019, the government in Chile announced that the rush hour metro ticket prices would rise by 30 pesos.[146] This provoked an immediate public outcry (refer, Image 2.72). The Minister of Economy, Juan Andres Fontaine, replied that those who objected to the rise could wake up early and pay a lower rate. Students retaliated to this by conducting a mass fare evasion, jumping over the metro turnstiles and in many cases destroying them. As the authorities attempted to stop them by force, the protests flared out on to the streets, and a state of emergency was announced.[147] This protest against the 3 % transportation price hike was made in the context of an already high cost of living, low wages and pensions, poor public health and the rising inequality. In Chile 1 % of its population earns 33 % of the nation's wealth. The right to exercise one's autonomous choice of movement and the ability to afford mobility in the regional context of the urban landscape is a basic citizens' right.[148]

The public realm (as seen above in the Case study: Hong Kong) is about sharing a space contested by various users. But a democratic access to it becomes an issue of human rights. In the following I discuss the same with respect to various service providers. Both TfL and MTR Hong Kong operate with a zone model – fares based roughly on the distance travelled out of the city centre. In this model someone living on the edge of the city pays much more to access it than those from the affluent class who can afford to live in the heart of the city. Despite this, both TfL and MTR have various fare concession models. The city of Paris, on the other hand, follows a single fare policy, where residents in all the zones pay the same fare. Since March 2014 Paris has faced severe smog and air particle pollution. The city officials have therefore launched a programme to combat these problems, from rules that cars only allowed to enter the city on alternate days, to making public transportation free on days when the smog problem is particularly acute.[149] The present Mayor, Anne Hidalgo, is contemplating making public transportation free in the city (before the next election in 2020) as a measure to deter the use of private vehicles[150] and reduce air pollution. Although she has received ample criticism from her political rivals for this, there are 24 other towns in France who have opted for the cost-free transportation model.[151] In a press interview, the mayor of Dunkirk (which adopted the free transportation model[152] in September 2018), Patrick Vergriete, articulated that the main reasons for this action were not only to crack down on traffic and pollution problems but also to remove social inequality by providing easy access to jobs and other facilities. Estonia and Luxembourg have already adopted a free transportation policy.[153]

Image 2.72
Chile Protests, Chile, 2019

145 Al Jazeera (2019) Charis McGowan 'Chile Protests: What Prompted the Unrest?', <https://www.aljazeera.com/news/2019/10/30/chile-protests-what-prompted-the-unrest> [accessed 21 October 2020]

146 Ibid.

147 The Guardian (2019) Jonathan Franklin 'Chile Protesters: "We Are Subjugated by the Rich. It's Time for That to End" ', <https://www.theguardian.com/world/2019/oct/30/chile-protests-portraits-protesters-sebastian-pinera> [accessed 21 October 2020]

148 Ibid.

149 The Telegraph (2018) Rory Mulholland 'European Cities Consider Making Public Transport Free to Tackle Air Pollution', <https://www.telegraph.co.uk/news/2018/03/25/paris-mayor-mulls-making-public-transport-free-combat-pollution/> [accessed 21 October 2020]

150 Ibid.

151 Metropolitics (2018) Henri Briche & Maxime Huré (translated by Oliver Waine) 'Dunkirk as a New "Laboratory" for Free Transit', <https://metropolitics.org/Dunkirk-as-a-New-Laboratory-for-Free-Transit.html> [accessed 21 October 2020]

152 Ibid.

153 European Commission (2019) European Commission, Directorate-General for Mobility and Transport (DG MOVE) *Transport in the European Union: Current Trends and Issues* (European Commission, 2019), <https://ec.europa.eu/transport/sites/transport/files/2019-transport-in-the-eu-current-trends-and-issues.pdf> [accessed 21 October 2020], p. 51

Image 2.73
Montreal, Canada, 2017

154 Poelman, H., and L. Dijkstra (2015) *Measuring Access to Public Transport in European Cities*, Regional Working Paper 01/2015, European Commission Directorate – General for Regional and Urban Policy (European Commission)

155 World Bank Blog (2015) Ke Fang 'Public Transport and Urban Design', <https://blogs.worldbank.org/transport/public-transport-and-urban-design> [accessed 21 October 2020]

156 Sliuzas, Richard, and Ke Fang (2019) 'Accessibility and Urban Form', in: Jonathan Levine, Joe Grengs and Louis A. Merlin (ed.) *From Mobility to Accessibility* (Ithaca, NY: Cornell University Press), pp. 71–85, <https://doi.org/10.7591/ 9781501716102-007>

2.3.3 Transit Hubs and the Growing Localism

Walkable accessibility from transit points to work and other amenities plays an important role in determining the popularity of public transportation systems.[154] In a study conducted by the World Bank, three mega-cities, Beijing, London and New York, were compared for their pedestrian accessibility to their central commercial districts.[155] These were Guomao in Beijing, Oxford Circus in London and Grand Central Station in New York. A 20-minute walk was used as a measure to map out the catchment area around the central transit point, as 20 minutes is the measure people normally can walk without a break. When offices and amenities are located within this 20-minute catchment area, people tend to use public transportation more often. Among the three cities Beijing had the highest density of population but the lowest number of public transportation users. The reason was found to be that the city planning of Beijing did not fit the 20-minute catchment area model, as most of its offices and public amenities were further away from the transportation nodes.[156]

2.3.3.1 Case Study: Xiongan

What the city of Beijing had missed out in its urban planning was corrected in the design of the model district of Xiongan in Hebei Province.[157] It was planned as part of the coordinated development of the Beijing-Tianjin-Hebei region. Xiongan is situated 100 km southwest of downtown Beijing. The aim was to restructure the densely populated areas of Beijing. The urban planning of Xiongan, according to Xi Jinping, was designed to prioritise ecological protection, improve people's wellbeing, and protect and carry forward Chinese traditional culture – almost everything that China's rampant industrial growth had undermined.[158] One of the highlights of this new city planning is its interconnectedness: every borough is equipped with basic facilities such as supermarkets, hospitals, schools, recreational centres and offices, and this is within a radius of 15 minutes' walk. Commuting beyond the 15-minute catchment zone would be facilitated with autonomous electric shuttle buses.[159]

This 20-minute city planning not only ensures citizens' access to important utilities like healthcare, schools, supermarkets and transportation nodes, but also emphasises the development of the neighbourhood. Thus, the urban transportation planning becomes important for understanding that cities have much more complex needs than just managing traffic.[160] Transportation hubs are increasingly being understood as enclosures hosting a diverse range of users, and not only need to address the functional level of navigating, orienting and managing commuter flow, but also the provision of a desirable quality of stay (as in Image 2.73) and offering the possibility for engagement in activities other than commuting, such as weekly or seasonal markets, concerts or local pop-up shops.[161] Thus, as Rob Naybour stated in his concept for the redesign of Liverpool Street Station, the station will be the new community space.[162] Image 2.71 shows us a street festival organised by the local community in Montreal.

157 Xinhua Net (2017) 'China to Create Xiongan New Area in Hebei', <http://www.xinhuanet.com//english/2017-04/01/c_136177270.htm> [accessed 21 October 2020]

158 NPR (2007) Louisa Lim 'Air Pollution Grows in Tandem with China's Economy', <https://www.npr.org/templates/story/story.php?storyId=10221268> [accessed 21 October 2020]

159 Hage, S., and M. Hesse (2019) 'Motorschaden', *Der Spiegel* 44, p. 17

160 Jacobs (2011) p. 23

161 Naybour, Rob (2020) (Talk) *IMDC Conference on Intelligent City*, Royal College of Art, London

162 The statements in, and assumptions behind, this recent call are relevant here: '"The Design Competition Challenge". Royal Institute of British Architects (2020) 'Re-Imagining Railway Stations', <https://www.ribacompetitions.com/reimaginingrailwaystations/> [accessed 21 October 2020]

163 Oldenburg, Ray (2005) *The Great Good Place: Cafés, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community* (Philadelphia: Da Capo Press), p. 14

164 Ibid., pp. 44 – 45. "When men are thus knit together, by a Love of Society, not a Spirit of Faction, and don't meet to censure or annoy those that are absent, but to enjoy one another: When they are thus combined for their own improvement, or for the Good of others, or at least to relax themselves from the Business of the Day, by an innocent and cheerful conversation, there may be something very useful in these little Institutions and Establishments." Addison, Joseph (1965) *The Spectator*, no. 9, edited by Donald F. Bond (London: The Clarendon Press)

165 Ray Oldenburg, (2005). *The Great Good Place: cafés, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community*. Philadelphia: Da Capo Press, pp. 44 – 45

166 "Das kannst du deinem Friseur erzählen."

167 Pucci, Paola, and Matteo Colleoni (eds.) (2016) *Understanding Mobilities for Designing Contemporary Cities*, Research for Development (Cham; Heidelberg; New York; Dordrecht; London: Springer)

2.3.3.2 Transit Spaces as the Third Space

> "How do you design spaces where peace can be negotiated?",
> Martti Ahtisaari asked Juhaani Pallasma.

Ray Oldenburg classified three types of spaces needed for community building. These three places define our experience of the neighbourhood, Oldenburg writes that for our daily life to be relaxed and fulfilling it must find its balance in all the three realms of experience.[163] The first place is the domestic home environment. The second place is the workplace and the third place is the social surrounding that is neither home nor work, it is a public and neutral setting where (wo)men are knit together by a Love of Society "to relax themselves from the Business of the Day, by an innocent and cheerful conversation[164] ..." Each of these three realms are built on experiences, associations and relationships appropriate to it. According to Oldenburg these are physically separated and distinct places, with their own measure of autonomy from the others. The first space is crucial for our foundational developments, we are born here, and continue having this always as a base to return back. The second place is the gainful or productive setting which provides us the means to a living, and improves the material quality of our lives. This demarcation between the first and the second place was largely brought into existence by industrialisation, and is probably again getting reduced by the effects of digital work places. The ranking in terms of importance and time spent in the three places is much higher for the first and the second place. But nevertheless, the quality of the third space actually defines the resilience, health and well being of the society. According to Oldenburg the third place is one which is inviting, comfortable, freely accessible. Unlike[165] home or workplace the third space is non-obligatory. It is grounded in fraternity, solidarity and empathy. The third place is an inclusive space, open for all. With low or ideally none formal prerequisites for acceptance, the third place is plane, non-pretentious and accepting. It is home away from home, in terms of feelings of warmth, intimacy and belonging. In traditional settlements these were spaces like the barber's shop[166], the local tavern, the corner store or the community house. Image 2.74 shows an open space used by residents in the Gare du Nord area to socialise, meet up and play.

A city is a conglomeration of diverse human beings living and sharing together services and amenities amidst a public environment. To encourage a living environment that is inclusive and seeded in democracy these amenities need to function as a third place, as envisioned by Oldenburg. The public transportation system is a service provided by the city, and is probably the most apt from all the other amenities like health services, schools, kindergartens, parks, ... etc, to function as a third place. Like Oldenburg's third place, the urban mobility system, apart from its functional aspects of transportation, commutation and communication, has the potential to create an active social fabric in the city. Mobility systems are not just spatial occurrences but also a social phenomena.[167] Everyday they host a myriad of demographically, racially, socially, economically diverse users. They hold in themselves the potential for bringing substantial changes in the quality of life and of mutual cohabitation in the city, by offering communal spaces of being- places of sojourn, where diverse groups are treated as citizens and guests and not as consumers.

Image 2.74
Gare du Nord, Paris, 2020

168 Business Insider (2019) Kate Taylor 'Starbucks Is Reimagining the Core Belief That Turned the Chain into a $88 Billion Juggernaut', *Business Insider*, <https://www.businessinsider.com/starbucks-reimagine-third-place-2019-3?r=DE&IR=T> [accessed 21 October 2020]

169 Starbucks Coffee Company (n.d.) 'Third Place Policy', <https://www.starbucks.com/responsibility/learn-more/policies/third-place> [accessed 21 October 2020]

170 'Starbucks Ungefiltert – Die bittere Wahrheit hinter dem Erfolg', Doku | ARTE, *YouTube* (n.d.), <https://www.youtube.com/watch?v=hC65nHwAg9g> [accessed 21 October 2020]

171 Ibid.

172 Ibid.

In todays urban spaces where services have become fast and efficient, the quality of relaxation and being there is lost. Although Starbucks did start a trend in early 1970s capitalising on Oldenburg's third place concept.[168] Amongst other marketing nuances Starbucks brought in the couch and the living room atmosphere in their cafes. Today the company has 28,000 cafes throughout the world. The CEO, Howard Schutz in an interview stresses on the companies policy to not just make profit but primarily to offer the customers convenience, comfort and personnel connection to the brand. Starbucks mission and value statement: "Creating a truly welcoming space, where people can come together with understanding, respect and compassion, and where diverse backgrounds and life experiences are embraced, is fundamental to our role and responsibility as a company. These principles will continue to guide Starbucks and we will hold ourselves accountable to them. Together, we can create and maintain a welcoming third place, where every individual is treated with humanity, dignity and respect."[169] The third place concept has been exploited as a profit making tool by Starbucks. The internal work atmosphere is stressful and uncongenial. The coffees and other products on sale are more expensive than in local cafes's.[170] The amount of sugar in beverages from Starbucks are higher than drinks from other brands.[171] Starbucks follows an aggressive marketing policy that has ruined local businesses throughout the globe.[172] Nevertheless the success of Starbucks is also an indicator of a growing deficit in our social fabric, that is, the existence of a third place. A place that is safe, democratic, inclusive, open, comfortable and brings us in contact with the stranger that according to Sennet is what the city is made for.

Image 2.75
Cafe Ahl, Fes 2018

2.3.4 The Ownership of the City

From the French Revolution to the Chilean protests from the year 2019, the right to the city and its urban life has again and again been claimed by its people. Although a city is never just determined by administrative prescription, a significant part of the planning of urban space determines the quality of life in a city and the behavioural responses of its users.

2.3.4.1 Case Study: Paris

Between 1853 and 1869 Baron Haussmann was commissioned by Napoleon III to modernise the city of Paris. Amongst other interventions, Haussmann recreated the city with a network of wide, straight boulevards, designed to lead the eye to architectural monuments of greater beauty. The culmination of each boulevard was marked with a grand square. Haussmann's intention was not only to bring more light and clean air to the city, but also to design an urban system that was more resistant to revolutionaries and vandals. Between 1830 and 1848 seven armed uprisings and revolts broke out in the centre of Paris, along the Faubourg Saint-Antoine, around the Hotel de Ville and around Montagne Sainte-Genevieve on the left bank. The residents of these neighbourhoods had taken up paving stones and blocked the narrow streets with barricades, and had to be removed by the army. Haussmann's new urban design of grand boulevards removed the human scale from the city's architecture (as seen in Image 2.76). This discouraged public gatherings and made it easier for the upholders of law and order to intervene quickly when they needed to, thus tipping the balance from 'harrying street fighters towards mounted cavalry'.[173]

Henri Lefebvre states that if urban life is to recover and strengthen its capacities of integration and participation, it can only be done by the citizens, by those who have been segregated and removed to the outskirts.[174] According to him, our social needs have an anthropological foundation. These he lists in complementary pairs: the need for security and opening, certainty and adventure, work and play, similarity and difference, isolation and encounter, solitude and communication. In all of these, Lefebvre writes, is also the need to sensually engage oneself with the environment.[175] Lefebvre appealed to win back the right to the city from its sense of dispersal and alienation, arising from its primal design for consumption. This, according to David Harvey, was not just Lefebvre's theoretical concept, but was one that arose from the streets, out of neighbourhoods that were marginalised and suppressed.[176]

173 Owen, Graham (2009) *Architecture, Ethics and Globalization* (New York: Routledge), p. 45

174 Lefebvre, Henri, Eleonore Kofman, and Elizabeth Lebas (1996) *Writings on Cities* (Oxford: Blackwell), p. 146

175 Ibid.

176 Harvey, David (2019) *Rebel Cities: from the Right to the City to the Urban Revolution* (London: Verso), p. 14

Image 2.76
Paris, 2020

2.3.4.2 Case Study: Medellin

The following is an example of how a well-planned spatial network can change the social fabric of a city, in the Colombian town of Medellín. Medellín has approximately 2.7 million inhabitants, the poorer amongst them living in the mountains and the others in the valley zones. Before December 2012, the city of Medellín had two metro lines running in the valley, one north to south and the other from the centre to the west across the city, and a series of bus networks running through the mountainous terrain. To access the city from the mountains people had to take a bus that meandered down to the valley. The bus ticket cost more than the tram ticket, and the journey was arduous and slow. This resulted in a clear separation of the poorer communities from the more affluent ones. This separation produced an increased crime rate and a severe loss of law and order in many pockets of the wider city. In December 2012 the city of Medellín launched its first Metro Cable, as seen in Image 2.77. The Metro Cable gave easy access for the poor communities living in the mountainous zone to the more affluent valley where the Metro line ran.[177] It is composed of 3 lines (J, K, and L), and follows a one-price policy. Line K connects the Biblioteca España to the valley. The Biblioteca España (2007) was a part of a social equity project initiated by the Proyecto Urbano Integral (PUI) to integrate and develop the poorest zones of the region.[178] The easy access to the library via the Metro Cable allowed a constant flow of students into the otherwise notorious neighbourhood of Santo Domingo Savio.

Eventually the proximity to the library and the low cost of living in the neighbourhood created an active student community there. For the locals in this region, the area's economic prospects changed not only through the influx of young students but also because of the numerous tourists who use the Metro Cable for the exhilarating panoramic view of the city, changing the urban fabric of Medellin completely within just a few years. The Medellín model is a pertinent example of how mobility solutions can be used at the level of state policy to bring in desired social changes. The Biblioteca España project could only be vervollständigt (completed) with the intervention of the Metro Cable in 2012. The Medellín example is a model of inclusion. Through the Metro Cable lines the socially fragile area of the city is connected to its more affluent and safer regions, thus facilitating a conversation of sorts between social groups who were otherwise separated, eventually building between them a fabric of trust and exchange. The Medellín model is a pioneering example for various urban development projects in Colombia and other parts of Latin America. In 2015, during a meeting of the Latin America Network of Strategic Urban Development, Medellín vice-mayor Alvaro Berdugo cited the example of his city and urged the city of Cuenca to think big when it comes to solving transportation problems: "When you make transportation plans, consider the impact it will have on the public life of the city." "You need to build a network that not only moves people from one place to another but brings them together. Latin Americans are a very social people and creative transportation solutions can serve to benefit this," he said.[179]

177 Uncover Colombia (n.d.) 'The Basics of Public Transportation in Medellin, Colombia', *Uncover Colombia*, <https://www.uncovercolombia.com/blog/public-transport-medellin/> [accessed 21 October 2020]

178 Bullivant, Lucy (2012) *Master Planning Futures* (London: Routledge)

179 CuencaHighLife (2015) 'Medellin, Colombia Vice-Mayor Says Cuenca Should Think Creatively, Embrace and Expand the New Tram System; and How about a Cable Car from Turi?', <https://cuencahighlife.com/medellin-vice-mayor-says-cuenca-should-think-creatively-embrace-and-expand-the-new-tram-how-about-a-cable-car-from-turi/> [accessed 21 October 2020]

180 Oldenburg, Ray (2005) *The Great Good Place: Cafés, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community* (Philadelphia: Da Capo Press), p. 14.

181 Ibid.

182 Harvey, David (2019) *Rebel Cities: from the Right to the City to the Urban Revolution* (London: Verso), p. 24

Image 2.77
Metro Cables, Medellin, 2014

Public transportation is the foundational structure on which cities are built. This public mobility system not only encompasses stations, stops, buses, metros, loan bikes or car sharing but also the interstitial spaces in the city scape: sidewalks, pavements, parkways, squares, parks and boulevards.[180] The engagement of the citizens in these interstitial spaces defines the quality of the life in the city. Interstitial spaces are fluid in nature; these are not commercial or residential areas, and represents several characters of the third place like inclusion, easy accessibility and openness to all. Oldenburg insists that when these spaces represent the demographic diversity of the city, by hosting not only the well-dressed middle-class but also the 'elderly and poor, the ragged and infirm,' then it is a clear sign of an engaging public life.[181] In a cityscape where gentrification has taken an upper hand,[182] guerrilla interventions like urban gardening, graffiti making, subvertisements, skate boarding often take place in the interstitial space. They are an effort to claim back the city from its otherwise commercial, controlled and staged forms. Along with this, an inclusive public transportation pricing policy that makes mobility affordable for the financially most disadvantaged is clearly the urgent issue of the day. The potential in such planning is transformational for the urban fabric. It can be uplifting, like the Medellín model, or can challenge the political system, as seen in Chile in October 2019.

3 Praxis Investigation

3.1 Methodological Considerations

Praxis is one of the three poles Aristotle used to define human activity. The field research conducted in Section 2 contributed to the theoria, or reflective enquiry into the object of knowledge – that is, transit spaces and the Human-Material-Interaction in these spaces. In this section I discuss the praxis part of the research carried out with Hochbahn AG for the construction of smart stations on the new U5 metro line in Hamburg.

In this PhD research the first object-level enquiry was about understanding how materiality within transit spaces informed and subconsciously influenced commuter behaviour, (as depicted in Diagram 3.1). For this, the method of Immersive Behavioural Observation (IBO), as discussed in Section 2.1, was used to enquire into user needs and their behaviour within transit spaces. The information gained from this was bottom-up in nature. Dissecting Organisational

Image 3.1
Central Station, Helsinki, 2018

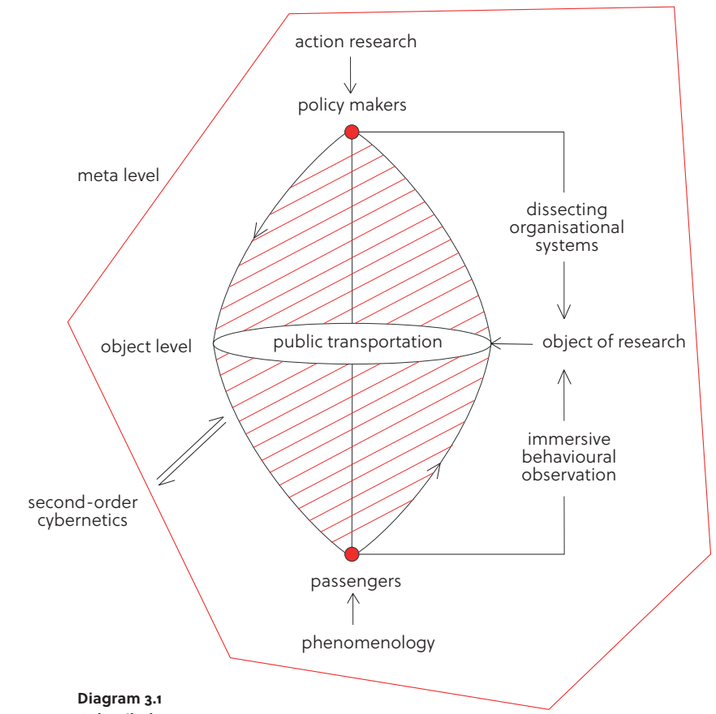


Diagram 3.1
A detailed systems context of the object of research

Systems was used to situate and penetrate the problem from the context of policy-making in the public transportation offices. This was the top-down model (refer Diagram 3.1). With this, an intervention in the object of knowledge was undertaken with the primary objective of grasping an understanding of the various stakeholders and their decision-making parameters, and to use this understanding to facilitate a directed change in practice. Dissecting Organisational Systems is a framework under the action research methodology (discussed earlier in Section 1.5.6). Action research has been used in diverse fields to narrow the gap between the generation of new knowledge and its application.[1] It may be understood as a paradigm in which practitioners research their practice directly in the process of their enactment of it.[2]

In this work the action research via the Dissecting Organisational Systems may be understood at two levels: first, as an attempt to understand the problem better in its wicked context. Second, to communicate to the policy-makers the behavioural responses of the users to the policies they had devised. B.F. Skinner writes about a new order of problems that the post-industrial world faces, such as poverty, the exhaustion of resources, pollution and over-population.[3] The solution to these, he writes, cannot be achieved only by technological intervention, such as prescribing contraceptives, finding new energy sources, or growing more nutritious grains, but also by understanding human behaviour. For example: what prevents couples from using contraceptives – what are the cultural and religious beliefs around contraceptives, and how can effective population control methods be designed for individuals and groups? These are some of the ways in which a behavioural enquiry may succeed in understanding the reactions of users to policy decisions made at a political level.[4]

Though the insights from the IBO method were used to support policy-makers' knowledge of particular topics with insights gained from the actual behavioural responses of the citizens to policies, it deals only with part of the system and not the whole of it. As we see in Diagram 3.1, the object of knowledge lies on the horizontal axis of the two poles, the policy makers or transportation providers being on one end and the passengers on the other. To generate a systems-centric solution both these approaches to the object level – bottom-up (gathering via the IBO method, information on the Human-Material-Interaction in transit spaces) and top-down (investigating with Dissecting Organisational Systems into the basis on which design and architectural decisions are arrived at by policy makers) – need to be worked with, first to acquire an understanding of the research problem in its systems context and second to negotiate a more systems-relevant solution. Therefore, one of the key issues I was investigating in the praxis was the connection between goal setting and the actual performance of government or public organisations.

1 Feldman, Allan, Patricia Paugh and Geoff Mills (2004) 'Self-Study Through Action Research', in: J.J. Loughran, et al. (eds.) *International Handbook of Self-Study of Teaching and Teacher Education Practices* (Cham: Springer), pp. 943 – 77, <https://doi.org/10.1007/978-1-4020-6545-3_24>

2 Ahmed, J.U. (2009) 'Action Research: A New Look,' *Kasbit Business Journal*, 1:1&2, pp. 19 – 33

3 Skinner, Burrhus F. (2005) *Walden Two*, with a new preface by the author (Indianapolis, IN: Hackett), p. vi

4 Niedderer, K.v et al., (2016) 'Design for Behaviour Change as a Driver for Sustainable Innovation: Challenges and Opportunities for Implementation in the Private and Public Sectors.' *International Journal of Design*, 1 August 2016, 10 (2), pp. 67 – 85 (ISSN 1991-3761)

5 Böckler, Anne, et al. (2017) 'Know Thy Selves: Learning to Understand Oneself Increases the Ability to Understand Others', *Journal of Cognitive Enhancement* 1:2, pp. 197 – 209, <https://doi.org/10.1007/s41465-017-0023-6>

6 For Buber interactions to the Other where used to ultimately reach God. Ich und Du.

7 Vermes, Pamela (1988) *Buber* (London: Peter Hablan). p. vii

I worked as an external consultant for Hochbahn, supporting them to conceptualise smart stations. During this phase the biggest challenge was understanding the workings of an artificially organised system (of which Hochbahn is one) and finding a strategy to work effectively with them to bring about a democratically agreed and directed change. An artificial system is a socially organised system that is never fully knowable or adequately predictable. It is a part of a continuously fluctuating socio-economic system and its wicked repercussions. To understand it, I developed a framework, I call Dissecting Organisational Systems, discussed in Section 3.1.2. This framework details out the method I used to work with Hochbahn. Along with this, to represent my understanding of the artificially organised structure, I used the management theorist Stafford Beer's Viable System Model (VSM). This is discussed in the following Section 3.1.1.

3.1.1 Structure of an Organisational System

The Dissecting Organisational Systems framework helped me gain a tacit understanding of the organisational system I was working with. To practically comprehend the structure of this system I used Beer's VSM. The VSM was Beer's strategy for working with a constantly fluctuating unknowable system by comparing it with the human nervous system. Beer's VSM attempts to grasp an understanding of the Other via the understanding that the Self (VSM) fosters within itself.[5] Another way of understanding it is that the Other is multi-faceted and it may be understood in various ways; in the case of the VSM it is the human nervous system. For Beer, in this context of constantly changing complex systems "representation can only be provisional, performance is what we need to care about". In this spirit the model I built to map the structural organisation of Hochbahn was indeed a provisional representation, that facilitated my understanding. This is similar to the idea of Martin Buber, who declared that he could not discuss God, but only a relationship to God.[6] This relationship to God[7] is investigated via the semantic tools that the Self understands and decides to use to interact with the Other.

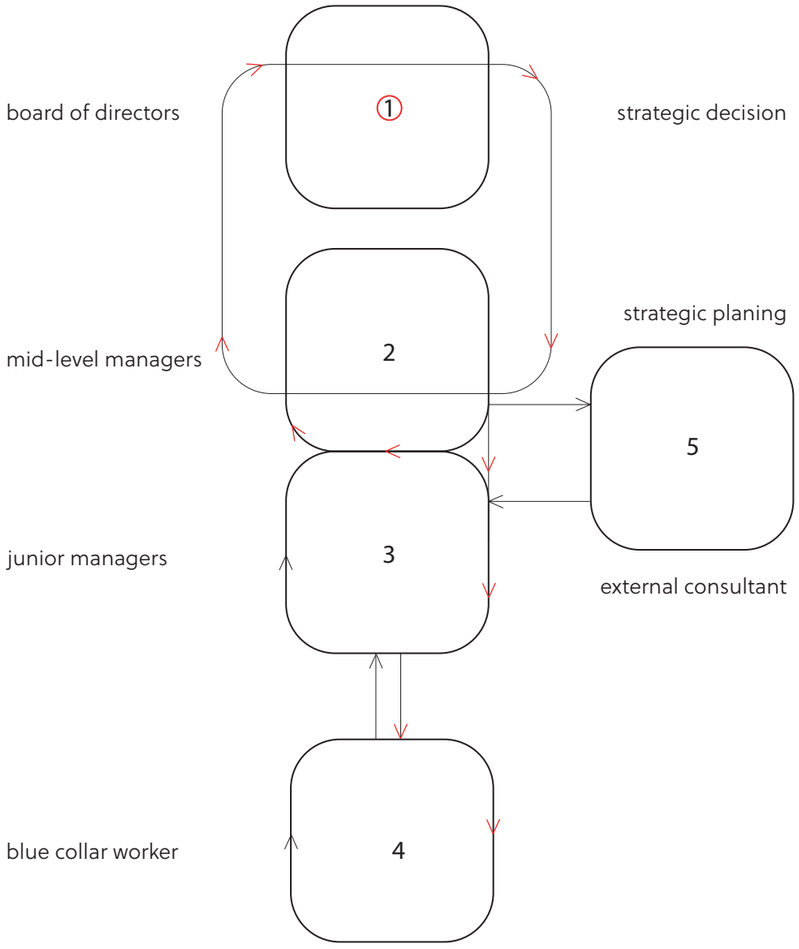


Diagram 3.2
The organisational structure in Hochbahn Hamburg

8 Pickering, Andrew (2011) *The Cybernetic Brain: Sketches of Another Future* (Chicago, IL: University of Chicago Press), p. 250

9 Ibid., p. 251

In the following I discuss how the VSM facilitated a structural penetration, via a cognitive model, into Hochbahn's organisational structure. Although I perceive problems in its linear structure, for the purpose of understanding Hochbahn the linear VSM was actually quite accurate. The VSM is divided into five subsystems, to be applicable to any organisational system. With the analogy of the nervous system these five subsystems are linked and controlled by the brain and the spinal cord. These subsystems are, however, autonomous, and although they react in accordance with the higher goals set by the central unit, in this case the brain, they monitor and change their performance in reaction to the fluctuation in the environment. The basic ontological vision that Beer's VSM conjures up in us is: "the world as an ungraspable and unmasterable space of becoming; the organisation as open-endedly and performatively adaptable".[8] According to Andrew Pickering, Beer's conception of the VSM differed from the more traditional question of goals in cybernetics, more like the concept of a homeostat that reconfigures itself in order to keep within pre-set limits. In contrast, Beer's conception of the VSM specified no goals. Its aim was to adapt to the fluctuating environment surrounding the artificial system.[9] Pickering defines this act of adaptation as a Heideggerian process of revealing rather than enframing. This is precisely how I used the VSM, as a comparative tool to gain insights into the organisational workings of transportation providers. The step of mapping the organisational structure onto the VSM was equally important in accessing the system via the language it understood and with which it preferred to communicate.

The main purpose of Diagram 3.2 was that it enabled me to orient myself as an external consultant in an artificially organised system such as Hochbahn. The external consultant is represented in the diagram as Segment 5. As represented in the diagram we see that the input from the external consultant is fed into Segments 2 and 3 – junior and mid-level managers, respectively. The strategic planning happens at this level, even though the strategic decision-making happens between Segments 1 and Segment 2 – the board of directors and the mid-level managers. In the organisational system Segment 2 is the only one with direct access to Segment 1. All the decisions that are implemented in the firm flow down from Segment 1. Diagram 3.2 represents a linear model, one with a hierarchal top-down power structure.

10 Maturana, Humberto (1997) 'Metadesign', Instituto de Terapia Cognitiva INTECO, Santiago, Chile, <https://www.pangaro.com/hciiseminar2019/Maturana_Metadesign.pdf> [accessed 25 December 2019]

11 Ibid.

3.1.2 Dissecting Organisational Systems – a Framework

An artificially organised system in operation (in this research a public transportation provider) can be compared to a structurally determined living system. According to Humberto Maturana, living systems exist in two operational domains: the first is the micro domain, where it exists in its physiology and anatomy.[10] The second is the medium in which it arises and where it can be distinguished as an organism. In the context of a public transportation provider, the first domain is the internal structure of the company. This constitutes the hierarchical politics, long-term goals, agendas and ethical standards. The second domain is the context – that is, the medium in which it exists. In the case of the public transportation provider this is the social landscape of the city. The medium is the domain that triggers structural change through its interaction with the living system.

Since living systems are structurally determined systems,[11] any invading agency to this system may set off only the changes structurally pre-determined by the system itself. This determination is based on the regularities and coherence of its experiential past, unless, as Maturana writes, we use the method of a recursive interaction. When we transfer this blueprint onto the case of the public transportation provider, we realise that when impulses from the context of the users (the social landscape of the city) are communicated to it, it would probably provoke only those structural changes the transportation provider determines for itself, unless they use the method of recursive interaction to negotiate a structural change with the user. To work with artificially organised systems, such as institutions, firms and companies, I developed a conversational strategy based on the following three points:

3.1.2.1 Infiltration of the system at a micro and macro level
3.1.2.2 Orientation in the structure of meaning of the system
3.1.2.3 Iterative interaction with the system

The three points are stated for clarity in a linear classification, but de facto, they may be carried out in several combinations: simultaneously or within each other.

12 Lewin, Kurt, Fritz Heider and Grace Moore Heider (1966) *Principles of Topological Psychology* (New York: McGraw-Hill Book Co.), p. 25

3.1.2.1 Infiltration of the System at a Micro and Macro Level

Infiltrating the system at micro and macro level, as shown in Diagram 3.3, implies an understanding of a particular situation in its global and local context. The findings at the micro level feed into the understanding of the system at the macro level in order to develop general laws with a broader application range. Vice versa, the consistency of these general laws is proven only through their application and adaptability at the more specific micro-level situation.

Both these levels of investigation and analysis consistently inform the understanding at the systems level – at the level of general laws and a specific situation. As Kurt Lewin asserts, the concepts thus generated are "operational", "in so far as a univocal relation between concepts and observable data is consistently maintained",[12] Working with a specific situation by informing it with globally observed patterns, or informing globally observed patterns with individual events, may mitigate the shortcomings of a more traditional scientific research approach in which a single event may be considered as a chance occurrence. In this case, dealing with the problems associated with public transportation, a project is often extensive in terms of time and cost, as these developments stretch over long periods and lead to rather drastic changes in the urban fabric, influencing the quality of life for many. Therefore, there are fewer individual cases that may be worked with compared to other fields, making the exchange between global patterns and local projects even more valuable. Also, transit spaces function inherently as a local node for global connectivity, again meaning that the development of such projects, at both a micro and a macro level, is of principal importance.

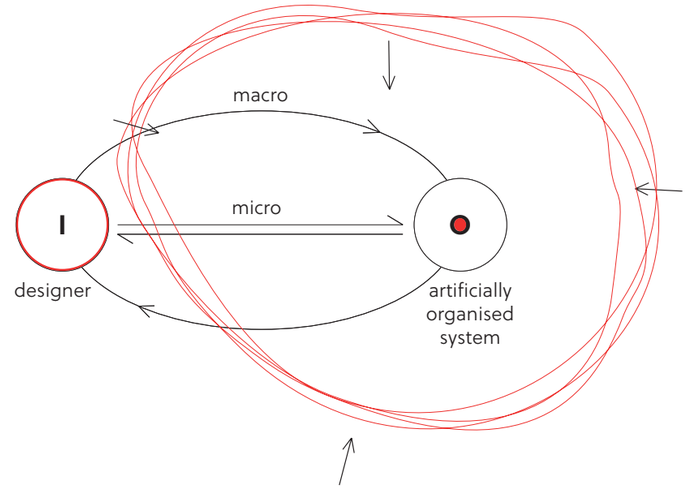


Diagram 3.3
The infiltration of the system at micro and macro level

This understanding of a system by infiltrating it at the macro and micro level in order to uncover the existence of a similar pattern to gain valuable insights has also been used in other fields. For example, amongst others, the mathematicians Benoit Mandelbrot and later Michael Barnsley used the fractal understanding of shapes to iterate them randomly. According to Barnsley, all objects have a fractal order: some of these are easily accessible and the others are more hidden.[13] This biological encoding of information is precise and highly structured, therefore the information in the spore that encodes one fern is also contained in its complete form.[14] Charles Eames' film The Powers of Ten, made with the physicist Phillip Morrison in 1977, employs a similar central theme.[15] The film illustrates how the tiniest segment of the human cell bears a close resemblance to the outer edge of the universe, depicting a physical experience of exponents.[16]

At the macro level the apprenticeship to the "object of knowledge" was conducted to gain a general understanding of how public transportation providers work globally. For this, a working relationship was nurtured with RATP Paris, NS Netherlands, MTR Hong Kong and BSAG Bremen. Meetings with Wiener Linien, Vienna, STM Montreal, TfL London and Moscow Metro were also undertaken. The exchange happened first via semi-structured dialogues, presentations (given by the various transportation providers, and also by me) and second via group discussions in the Design and Culture platform at UITP, Brussels. This served the purpose of understanding the more general patterns on which public transportation systems in different geographical and cultural contexts are built.

At the micro level, the diagnosis of the specificity of the situation,[17] or the main in-depth investigation, happened. This was done with Hochbahn AG Hamburg in its new U5 metro line project. The task with Hochbahn was to develop, along with other experts, the design and architectural handbook for 24 planned stations on the U5 line. In contrast to the macro level, the involvement with the object of knowledge at the micro level was more intensive, continuing over a period of one year (amounting to approximately three months over that period) and generating a more specialised knowledge.

The macro-level investigations helped me gain an idea of the global trends in urban mobility and the micro-level enquiry gave me an insight into the workings of a public transportation company in some of its complexities.

13 Barnsley, Michael F. (2012) *Fractals everywhere* (Mineola, NY: Dover Publications)

14 Gleick, James (1998) *Chaos: Making a New Science* (London: Vintage), pp. 238 – 239

15 Repp, Philip C. (2001) 'Three Information Design Lessons, Selected Films by Charles and Ray Eames', *Loop: AIGA Journal of Interaction Design Education*, April 2001

16 Ibid.

17 Lewin, Kurt (1946) 'Action Research and Minority Problems', *Journal of Social Issues* 2 : 4, (1946), pp. 34 – 46, <https://doi.org/10.1111/j.1540-4560.1946.tb02295.x>

18 Wittgenstein, Ludwig (2018) *Tractatus Logico-Philosophicus* [1921], introduction by Joachim Schulte (Berlin: Suhrkamp Verlag)

19 Wittgenstein, Ludwig (2010) *Philosophical Investigations* (*Philosophische Untersuchungen*). Trans. by G. E. M. Anscombe, Peter M. S. Hacker, Joachim Schulte (Oxford: Wiley-Blackwell), Verse 43

20 Ibid. Verse 11

21 Ibid. Verse 7

3.1.2.2 Orientation in the Structure of Meaning of the System

In working with the industrial partners and policymakers, I realised that one of the biggest challenges was the language. Not language per se, but how similar situations were approached with differing worldviews. The medium of words and terminology was a means to access and understand the perspectives with which the decision-makers had largely positioned themselves. Therefore my first task, after developing a structural clarity at the macro and micro level, was to demystify its language and via this its belief structures. Please refer Diagram 3.4 for this section.

This second phase dealt with orienting myself in the language structures of an organisational system. The strategy I use here draws much from Ludwig Wittgenstein's concept of language-games. The later Wittgenstein, in his Philosophical Investigations, attempts a new and less dogmatic[18] way of investigating language. Here a word is more than the mere object it may refer to, since "the meaning of a word is its use in the language".[19] He compares words to tools in a toolbox, which may be used in a variety of ways.[20] Therefore, it is futile to assign words a definite meaning and theorise about this while they are still in the toolbox. According to Wittgenstein, "In the practice of the use of language one party calls out the words, the other acts on them":[21] thus meaning is created in the interaction, or more precisely in the usage, of the words with the Other. The word and its meaning are restricted by four factors:

1. The agreed meaning of the word
2. The context of its usage
3. The way it is intended by the Self / utterer and Other/recipient
4. How it is perceived by the Other

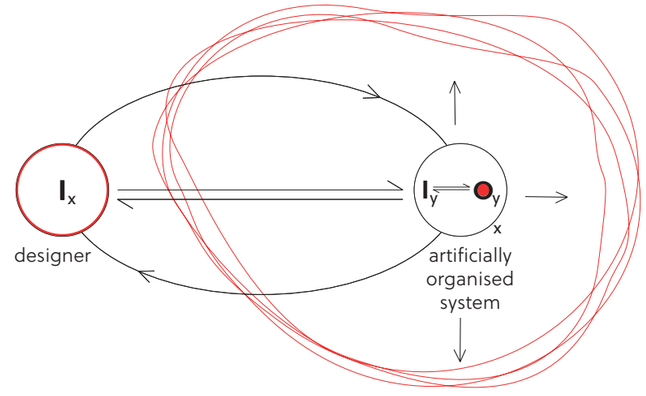


Diagram 3.4
Orientating in the structure of meaning of the system; Ix represents the reflective designer outside the artificially organised system represented as Ox. Iy represents the interacting designer with the artificially organised system Oy.

Wittgenstein implores, "Don't think, but look!"[22] He is saying that instead of giving a universal meaning to words removed from their context the specificity of their meaning should be fine-tuned with a description of their use.[23]

The investigation via the language-game played a crucial role in planning my work with the industrial partners. As elaborated in the earlier paragraph, language here is not language per se, but how similar situations were approached with other worldviews, expressed through the medium of natural language. Thus, the medium of words and terminology was a source through which I could access and understand more about the ideologies, constraints and interests within which the decision-makers had largely positioned themselves.

The medium of natural language has always been of vital importance in bringing societal changes, as the German linguist Joachim Heinrich Campe discovered at the end of eighteenth century,[24] when studying the first phase of the French Revolution in Paris. He observed how people from all social classes could discuss political events. This was not the case in Germany, since most of the terms used in politics had a foreign origin and thus were often unintelligible for the uneducated masses. Campe understood this coded expression of political language as a barrier that was designed to exclude those who were not a part of the ruling elite.[25] Campe took it on himself to Germanise words for the political and revolutionary vocabulary.[26] Thus Monarchie became *Alleinherrschaft* (*Allein*: "alone", *herrschaft*: "reign").

In the early 1960s, Paulo Freire, in his work with illiterate peasants and workers in Brazil, used the medium of natural language to infiltrate and work with their worldview. His was a democratic proposal, in which posing problems via the medium of dialogue was used to develop the power of the oppressed to perceive critically. As he later wrote, "the way they exist in the world with which and in which they find themselves; they come to see the world not as a static reality, but as a reality in process, in transformation".[27] He used the medium of language to revolutionise the peasants' critical thinking and emancipate them. This tectonic change threatened the ruling elite, and the 1964 coup d'état in Brazil destroyed it and Freire was exiled.

Campe's analysis of the French Revolution and Freire's work with Brazilian farmers are potent examples that show us how the medium of language is an important tool in working with social groups. Campe's aim, like Freire's, was to make it possible for the common people to critically reflect on and question the social system via language. Campe also closely associated the development of a social group with the development of the language that it used. Unlike them, my work in Dissecting Organisational Systems did not directly involve oppressed workers or the illiterate masses. I was primarily working with mid- to high-level managers in the public sector. Nevertheless, language played a pivotal role in my interaction with them. During my first meetings, the difference between the vocabulary they used and mine was immense. Thus, the first step for me was to acquaint myself with the language-games of the system: this method will be elaborated in the next section.

22 Ibid. Verse 66

23 Stanford Encyclopedia of Philosophy (2020) Anat Biletzki and Anat Matar, 'Ludwig Wittgenstein', <https://plato.stanford.edu/archives/spr2020/entries/wittgenstein/>

24 Joachim Heinrich Campe, *Wörterbuch Der Deutschen Sparche*, Veranstaltet und herausgegeben von Joachim Heinrich Campe (Braunschweig, 1807). Die Zeit (2008) Jürgen Overhoff 'Die Trümmer der Bastille', 10 July 2008, <https://www.zeit.de/2008/29/A-Campe>

25 Ausdrucksebene der Sprache als Barriere, die schon um der Verständlichkeit willen das mit dem Eigenen nicht vereinbare Fremde Fernhalten soll. Orgeldinger, Sibylle (2011) *Standardisierung und Purismus bei Joachim Heinrich Campe* (Berlin; Boston: De Gruyter), <https://www.degruyter.com/view/title/5702> [accessed 21 October 2020], pp. 21 – 34 (p. 28)

26 Schiewe, Jürgen (2008) 'History of Language as History of Communication', in: Michael Erlhoff, Philipp Heidkamp and Iris Utikal, *Designing Public: Perspektiven für die Öffentlichkeit – Perspectives for the Public* (Basel: Birkhäuser), pp. 76 – 77

27 Freire, Paulo (2018) *Pedagogy of the Oppressed*, 50th Anniversary edition, ed. Myra Bergman Ramos et al. (New York: Bloomsbury Academic), p. 12

28 Pask, Gordon (1976) *Conversation Theory: Applications in Education and Epistemology* (Amsterdam: Elsevier), p. 1

29 Ibid.

3.1.2.3 Iterative Interaction with the System

Infiltrating the organisational system at the macro and the micro level as a first stage gives us a basic knowledge of its working. This rather basic understanding was deepened in the second stage by orienting myself in its structures of meaning. Here Wittgenstein's language-game facilitates an insight into the thinking of the organisational system. In the third stage I embark on an iterative interaction with the organisational system, as shown in Diagram 3.5. This involved acquainting myself with the terminologies and concepts of the system I was working with, simultaneously sharing with them my worldview and perspective. In this way I developed a dialogue where we each acquainted ourselves with the other, finding in the process common ground for understanding and being understood. In the following text I discuss the framework of this iterative interaction in order to enable a more systems-relevant change.

Iterative interaction is a tautological expression, as interaction is a kind of action and reciprocal action between two or more objects. Thus, the two essential elements of interaction are, first, that it can only take place when there is more than one participant, and second, that it is inherently iterative: that is, it is always a to-and-fro exchange. Interaction between human beings helps us "exteriorise cognitive operations".[28] The obvious method for this is to engage in a conversation. This includes corporeal expressions and natural language exchange.[29] The main medium of investigation in this segment, iterative interaction with the system is conducted primarily with the tool of natural language. Nevertheless, to understand more an iterative interaction, it is necessary to reflect briefly on its basic nature.

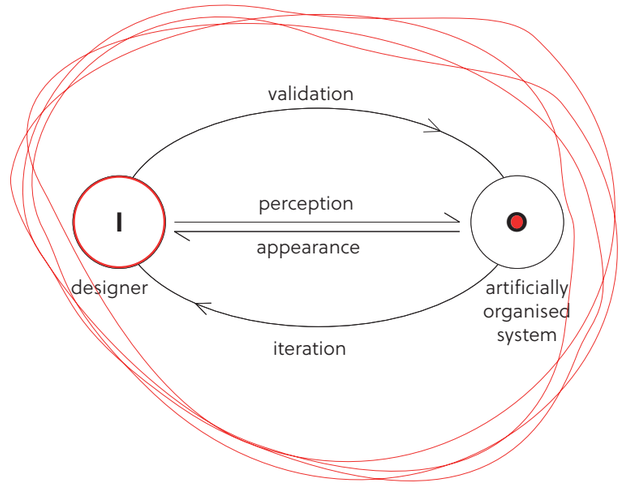


Diagram 3.5
The iterative interaction with the system

Iteration is inherent to interaction. It has been used intrinsically by living beings since the beginning of time. When a seed germinates, the Other is the environment that surrounds it. Its roots shoot out in negotiation with this Other. The direction of growth that is pursued is one that promises optimum humidity, nutrition and growth. When a child grows, its acquaintance with the material world (the Other) is enacted via the motor functions of its body in a series of self-optimising iterative performances. The most poignant of all iterative self-optimising interaction may be observed in the acellular slime mould, *physarum polycephalum*. In its search for food, as the scientist Toshiyuki Nakagaki identified, it was capable of finding the shortest route to food stored at one end of a labyrinth[30]. Apart from these examples from the natural world, the method of iteration was used 3000 years ago by the Babylonians for the computation of square roots. This algorithmic process is a relatively simple method: it begins with a guess and an iteration leading to a better guess. It is a classic scheme for solving equations by making successively better approximations.[31] This process of iteration focuses on a more precise answer; James Gleick compares this to a dynamic system seeking its steady state.[32] This can be usefully compared to the physarum that iteratively approximates its interaction with the (environmental) Other via transit distances, fault tolerance and the energy required in order to build an efficient network between its food sources.[33] This strategy pursued by the physarum enables it to find a solution in negotiation with the system. This very fundamental approach to an iterative interaction in negotiation with the Other offers an important insight into the working between the Self and the Other.[34] The basis of this section is the definition of the basic framework which facilitates the working relationship between the designer and the organisational system.

The Other is everything outside the Self; although it is perceived by the Self, it is in no way limited by it. This is an important ethical distinction for working with the Other. This understanding of alterity is based on the work of Emmanuel Levinas. During the second world war many of Levinas' family were killed and he was taken as a prisoner of war in Hannover. It was during this phase that he questioned the perception of the Other in Western thought, more precisely in the works of his German teachers, keeping in mind that Heidegger supported the Third Reich's ideology. Probing further into Heidegger's writings, Levinas recognised that the Other has been regarded as one separated from the Self; this Otherness was perceived as a temporary interruption to be eliminated, to avoid it being incorporated into the Self, or, as Colin Davis writes, "reduced to sameness".[35] In contrast to this was Levinas's abiding interest in understanding the ethical nature of the relation with the Other.[36] According to him, Otherness, or the Other, is more than what the self can perceive or comprehend. Levinas understands it as the ethical responsibility of the Self to protect the "Other from the aggressions of the Same."[37]

30 Toshiyuki Nakagaki, 'Introduction to Our Study on Physarum, Mycophylia – Revelations from the Weird World of Mushrooms (Written by Eugenia Bone)' (Handle Proxy. Rodale-Macmillan, USA, 1 January 1970), <https://www.nature.com/articles/35035159>, <http://hdl.handle.net/10445/7439>

31 Koshaleva, Olga (*2009*) 'Babylonian Method of Computing the Square Root: Justifications Based on Fuzzy Techniques and on Computational Complexity', in: *NAFIPS 2009 – 2009 Annual Meeting of the North American Fuzzy Information Processing Society, 2009*, <https://doi.org/10.1109/nafips.2009.5156463>

32 Gleick (1998), p. 217

33 Fricker, M. D., et al. (2009) 'Adaptive Biological Networks', in: T. Gross, H. Sayama (eds.) *Adaptive Networks: Understanding Complex Systems* (Berlin; Heidelberg: Springer)

34 Where the self and the Other may take different forms – becoming the human and the material, the self and the environment, the observer and the observed or in this section, the designer and the organisational structure.

35 Davis, Colin (2007) *Levinas: an Introduction* (Cambridge: Polity Press), p. 3

36 Ibid. pp. 34 – 62

37 Ibid.

38 Heidegger, Martin (1969) *Discourse on Thinking*, a translation of Gelassenheit by John M. Anderson and E. Hans Freund (New York: Harper & Row), p. 52

39 Ibid.

This is one of the key points in this framework – in which the designer's role is not only to create products or services to a design brief, but also to use a democratic model, like Freire's, to raise the critical consciousness of the organisational system. The designer's role is similar to that of a negotiator, enabling a more systems-centric solution.

In the spirit of Levinas, the designer, in interaction with the organisational system (the Other), accepts it in all its irreducible Otherness, knowing that the Other is never completely comprehensible and therefore an iterative interaction is key in creating an environment for the participatory development of solutions.

This phase (seen in Diagram 3.5) plays out over a longer period of time than the other two stages. During this, the designer and the organisational system are in an iterative interaction with each other. This happens in four stages, Perception – Appearance – Validation – Iteration.

Perception: This is the very first phase of creating distinction with the Other. It is conducted largely through the medium of natural language, by perceiving the Other through observation and deep listening. This stage can be broken down into first taking notice and second considering what we have perceived.[38]

Appearance: This is a reaction to the first stage, perception. The designer shares the motivation, objectives, methods and ethics of the observed system. The aim is to build a relationship of trust and confidence with the organisational system.

Validation: With validation, we evaluate whether what we perceived about what was being shared with us is congruent with the understanding the Other makes of it. This is the most important part of the iterative-interaction method.

Iteration: Going back to perception and appearance, until the designer and the organisational system become more certain of being understood by the Other and understanding the Other.

In the first phase of acquaintance with the system, an iterative interaction results in a structural congruency between the researcher and the observed system.[39] During this phase the foundational, structural and conceptual acquaintance with the system is built.

With the framework of Dissecting Organisational Systems a working relationship with artificially organised systems like firms, companies and institutions, may be established in context of a particular task. With this, not only knowledge about artificial systems is generated – where the artificial system becomes the focus – but knowledge with the system is generated "in the very process of transforming them."[40] This framework was built via a constant exchange between the theoria and the praxis. Dissecting Organisational Systems is a form of praxis that uses meta-level reflections or theoria to bring in object-level transformation. This is similar to the Marxist understanding that, "philosophers have only interpreted the world differently but the point is to change it."[41] The main purpose of this framework is to facilitate external consultants (represented by Segment 5 in Diagram 3.2) towards an efficient working with artificially organised systems. The role of an external consultant invited to work on a particular project involves knowing about the project but not necessarily knowing about other institutional limitations.[42] The tool for Dissecting Organisational System is developed precisely to deal with undiscovered situations of uncertainty and how, despite these, one could still work with the system.

40 Ahmed, Sara (2012) *On Being Included: Racism and Diversity in Institutional Life* (Durham, NC: Duke University Press), pp. 173 – 190

41 Marx, Karl (2009) *Theses on Feuerbach* [1845], trans. by Austin Lewis (Ellicott City, MD: Mondial Press)

42 Ahmed, Sara (2012) *On Being Included: Racism and Diversity in Institutional Life* (Durham, NC: Duke University Press)

Image 3.2
The U5 publicity event, Hamburg, 2019

3.2 Project U5 Hochbahn Hamburg

In this section I will be discussing the main praxis of the work. This was carried out with Hochbahn Hamburg AG to define the nature of the smart stations for the new U5 metro line project. My task involved working on the material experience of the user in the new fully automated train and station system. The project lasted for a year (2018 – 2019), and was marked by two major work phases. In the following I discuss the context, the assignment, the methods used, the work carried out, and the results achieved. The reflections and discussions on this are undertaken in Section 3.3.

3.2.1 Context

Hamburger Hochbahn AG (HHA) was founded by Siemens & Halske and Allgemeine Elektricitäts Gesellschaft AG (AEG) as a consortium on 27 May 1911. It offers public transportation in and around the city of Hamburg, Germany. It operates four underground lines and parts of the overground public transportation system (111 bus routes). In 1965 HHA was one of the founder members of the Hamburger Verkehrsverbundes (HVV), or the Hamburg Transport Association. This was the first company to coordinate various modes of public transport in and around Hamburg, Germany, by providing a unified ticketing system. For many years the Hamburger Hochbahn was a company with shareholders, until the city of Hamburg, fearing a "squeeze-out", decided to take over the company completely by buying out the shareholders. Since 2003 the HHA has been owned completely by the city of Hamburg.

With a rapidly increasing population and booming tourism, the Hanseatic city of Hamburg is one of the most important economic centres in Germany. The city of Hamburg is keenly aware of its responsibility to provide a basic urban transportation network that supports easy mobility in the city. This is the reason why the Senat (city council) of Hamburg decided to construct a fifth Metro line connecting the far eastern and the far western edges of the city (Bramfeld and Siemersplatz) to the city centre and the central station. In addition, the new line will connect dense residential areas like Steilshoop and Osdorfer Born. Important business and recreational areas such as City Nord, the State University of Hamburg and Arenen will also be better connected to the rest of the city. The DT6 trains (the sixth generation of short distance trains) on this line are planned to be fully automatic, arriving at 90-second intervals during peak hours.

The new U5 metro line is planned to have 25 stations distributed along a distance of 20 km. The planning started in 2015, the construction is planned to start in 2021 and the aim is to have the line running by 2028/29. A large segment of the U5 line connects boroughs which were previously only connected by bus

to the network of transit rail. Approximately 120,000 people would benefit immediately from this. The U5 metro line is a high-profile project, estimated to be completed in 15 years and costing around 1.75 billion euros. The project therefore constitutes a high risk. This is accentuated by the paradigm shift urban mobility is currently experiencing, with apps, shared taxis, autonomous vehicles, etc.

In September 2016, Hamburg Transport Association (HVV) initiated a new car- and bike-sharing service, Switchh. Switchh is a conglomeration of private car-sharing companies that includes BMW (Drive Now), Mercedes (Car2Go), Cambio and Stadt Rad Hamburg (a bike-hire company). Most of the Switchh car parks are near metro stations, providing near-seamless travel between different modes of transport. The future of urban mobility clearly seems to lie in collaborative utilisation,[43] and automobile giants are claiming their share in the public transportation market. Volkswagen's electric shuttle service Moia started operating in Hamburg in early 2018. Moia has a business model similar to Uber, and offers door-to-door pickup services which are easy, affordable and more sustainable. Unlike most of the traditional state-owned public transportation providers, the automobile industry has the benefit of less bureaucracy and relatively shorter decision-making and implementation cycles. Their services are tailor-made, flexible, efficient, affordable and designed to be pleasant to use.

Hochbahn realised that to be relevant on the future urban mobility scene they needed to reinvent themselves and offer services that are futureproof. Hochbahn's initial question to us (as well as to other external experts) was about the enduring usefulness of the U5 metro line in the face of the new shift in urban mobility. For Hochbahn the new U5 project also meant a paradigm shift, with fully automatic trains and a smart station system. This is the primary reason why, throughout this project with Hochbahn, our focus of concern was to lay down the principles on which this new paradigm shift could be established, instead of devising new methods for profit-making.

43 Boarnet, Marlon and Randall Crane (2001) *Travel by Design: The Influence of Urban Form on Travel* (New York: Oxford University Press)

44 Teherani, Hadi (n.d.), available at: <https://www.haditeherani.com/de> [accessed 19 May 2020]

45 IXDS (n.d.), available at: <https://ixds.com/> [accessed 19 May 2020]

46 Hamburger Hochbahn AG (ed.) (2018) *Gestaltungshandbuch: Der Zukunft entgegen – visualisierte Nachhaltigkeit* (Hamburg: Hamburger Hochbahn)

47 Transport for London (2019) *Streetscape Guidance*, 4th ed, Revision 1 (London: Transport for London), available at: <http://content.tfl.gov.uk/streetscape-guidance-.pdf> [accessed 19 May 2020]

3.2.2 Assignment

I encountered Hochbahn Hamburg AG during the Global Public Transportation Summit in Montreal in 2017, where they displayed their U5 metro line project and I presented my PhD research. We continued this exchange in Hamburg, and I was invited to join the team working on the conceptualisation of the fully automated smart stations on the U5 line. I joined a team comprising the architectural office of Hadi Teherani,[44] who had won the first tender for architectural station design, IXDS Berlin[45] and Hochbahn Hamburg Architektur U5-Ost team. The Hadi Teherani studio was responsible for the architecture of the first generation of stations, IXDS Berlin was responsible for user experience (UX) with respect to digital touch-points and I was called to contribute to UX in relation to Human-Material-Interaction. This was the first phase of the work, carried out mainly between January and February 2018. The second phase of this work was conducted in April 2019; this was done primarily by me in cooperation with Hochbahn Hamburg, with no other external partner.

I was involved in the main task, that asked: how can we make the passenger experience of the U5 metro line attractive and enjoyable via the physical and the digital space in the station? How can these solutions be user-friendly, up to date and with no built-in obsolescence? These questions were asked with the understanding that building a new metro line in a major city like Hamburg is extremely time- and energy-intensive, and therefore the durability of the solution plays an important role. The aim of this phase was to build a vision for the service and feed in the findings to the design handbook.[46] The design handbook defines the foundational directions on which the design and architectural decisions for the new U5 metro stations in the city of Hamburg will be based. This was the first part of the work, carried out largely between January and February 2018. The second phase of the work, in April 2019, involved establishing a more concrete interpretation of the design principles defined in the first phase in the new metro station in Steilshoop.

Both these assignments involved developing general guidelines. Specific requirements for different types of station[47] were not considered in this phase, the main aim of which was to define the more fundamental principles on which the new series of smart stations was to be built.

3.2.2.1 First Main Work Phase

The first main work phase involved three principal tasks, as shown in Diagram 3.6. First, mapping the passenger user experience of using the metro line (bottom-up). Second, understanding Hochbahn's higher-level organisational goals (top-down). The aim of this bottom-up and top-down approach was to use the findings of the first two tasks to carry out the third: that is, to define the design and architectural direction for the new series of stations. This was to be achieved in negotiation with the identified needs of the user and the limitations of the service providers.

3.2.2.1.1 Mapping passenger user experience
3.2.2.1.2 Understanding Hochbahn's service vision
3.2.2.1.3 Defining design principles

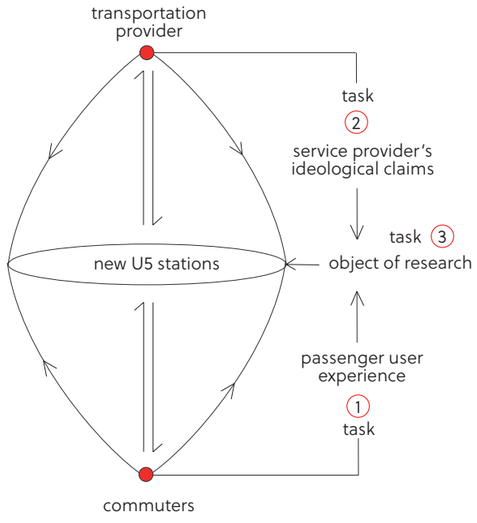


Diagram 3.6
The public transportation space developed in negotiation with user needs and the limitations of the transportation provider

Table 3.1
First main work phase (January – February 2018)

Task	Description	Collaborators	Time planning	Form of execution
1	Understanding the nature of passenger journey and mapping needs on it.	IXDS Berlin & Shalini Sahoo	January 2018	Expert analysis of field research data
2	Investigating how Hochbahn's higher-level ideological aims are understood by employees in segment 2 & 3.	IXDS Berlin: expert inputs and moderation of the workshop. Shalini Sahoo: expert inputs in the form of talks and critical analysis.	22 nd January 2018	Action research via participatory design workshop
3	Bringing together the insights of passenger needs and Hochbahn's higher-level ideological aims to develop the design principles for the new U5 stations.	IXDS Berlin: expert inputs and moderation of the workshop. Shalini Sahoo: expert inputs in the form of talks and critical analysis.	29 th January 2018	Action research via participatory design workshop

48 Kumar, Vijay (2012) *101 Design Methods* (New York: John Wiley), pp. 182 – 3

3.2.2.1.1 Mapping Passenger user Experience

Method: As shown in Diagram 3.8, we mapped the passenger experience at this stage. Due to the restricted timeline, no actual field research was undertaken here. Instead, earlier field data about the user journey experience I obtained along with IXDS were used as an information repository for mapping and analysing the user journey. The user data collected by IXDS was the in-situ passenger journey experience, via interviews and surveys. The user experience data I had collected was based on the IBO method, discussed in detail in Section 2.1. This information was organised to articulate user needs, and a journey flow map was constructed to track passengers through the entire process. To do this we followed the usual method of mapping user journeys,[48] which involved:

Step 1: Listing all the activities on a timeline.
Step 2: Clustering the activities into groups.
Step 3: Elaborating the map with a focus on the user needs.

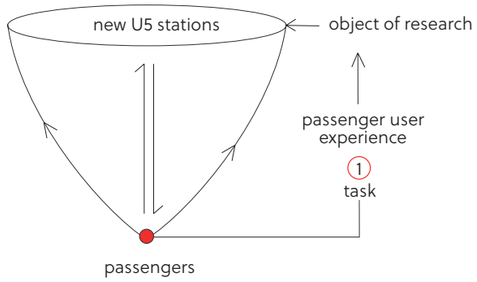


Diagram 3.7
The bottom-up approach to understanding passenger requirements

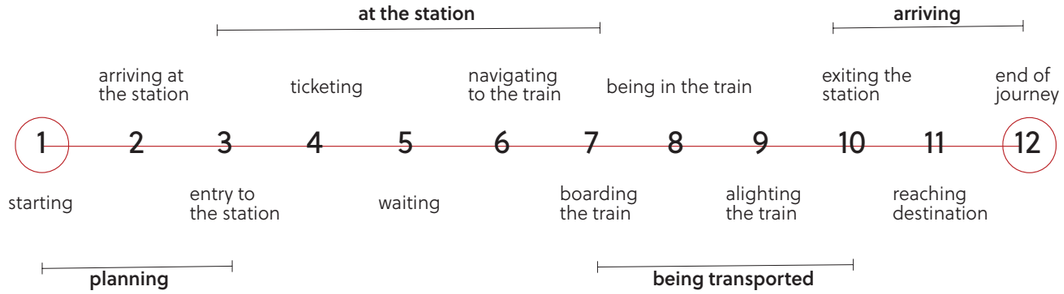


Diagram 3.8
Mapping different phases of the passenger journey

Passenger needs during different phases of the journey: Refer Diagram 3.8, here some aspects of the journey phases are symmetrical. Point 9, alighting from the train, can be compared to point 7, boarding the train. Similarly, point 10, navigating at the destination, is similar to point 6, navigating to the train. In the same way, point 11 is the same as point 5, and point 12, exiting the station, is quite similar to arrival at the station, point 3. This is a rather simplified model and one may easily argue against it, but considering the time and resource limitations we decided to abide by this.

1. *Planning the journey*
This involves users in identifying the various travel options available, considering the multi-modal transit system required in a city like Hamburg. This can be done via service points, with the help of network maps or apps. The users expect a range of journey routes, timings and costs to enable them to reach a destination. Also, real-time information about delays is important. It is important to encourage different kinds of proactivity on the part of users for trip planning and payment.[49]

2. *Arrival at the station*
This is the first mile of the journey, starting from the passenger's location to their nearest mobility node. This involves passing through the intervening parts of the city on foot, by bike or by motorised vehicle. At this point the passenger needs navigational support to reach the station. The first mile is an important part of the journey and influences the decision of the passenger about their mode of travel.

3. *Entry into the station*
The entrance to the station needs to be clearly marked, and services for differently abled users clearly signposted. For contrast, as previously discussed, Image 2.54 shows us the entry to Munich's domestic airport, where the advertisement for SIXT is more obvious than the orientation signs, visually impaired passengers or some just in a hurry may be confused with the "noise", that is the advertisement, around the main information.

4. *Ticketing*
Passengers expect a high degree of flexibility in paying for their ticket. Ticketing needs to function in both an analogue as well as a digital way, offering travellers the option of paper and digital ticketing. Users appreciate a transparent ticketing system that informs them quickly and easily about the details of various ticket plans. With digital ticketing, most users expect a receipt to be sent to them via the app. The ticketing needs to be easy and simple to operate.

5. *Waiting*
An allocated space to have a rest or drink a coffee is appreciated by passengers. This area needs clear demarcation, and should be easily accessible. The atmosphere of the waiting area plays an important role in enabling passengers to relax. Toilets and water fountains are essential in this area.

6. *Navigating to the train*
This step deals with navigation through the station to the train itself. The navigation tools can be digital, in which case users are guided via their devices, or these can be via the orientation tools integrated into the station architecture and signage system. The moment a train stops at the station it becomes essentially a part of it, so the orientation system between the station and in the train needs to be seamless.

7. *Boarding the train*
Most passengers perceived boarding the train, not only during rush hours, as the most stressful part of their journey. Clear demarcations, crowd flow navigation and distributing the passengers over the entire length of the train are important here. Accessible and easy boarding for passengers in wheelchairs or with babies in strollers is also important. Before boarding the train most passengers also expressed their need for confirmation that they are on the right train.

8. *Travelling*
After finding a place in the carriage, most passengers remain in one position till they need to alight. Therefore, at this point the materiality of the space that holds the passengers plays an important role. The quality of sound, light and air, the orientation of the seats, the information display board and easy access to the door are factors that define the quality of stay in the coach.

49 Herrmann, Christoph, Jürgen Kawalek, and Annegret Stark (2005) 'User-Centred System Design: Addressing User Needs with a Mobile Information System', in: *Proceedings of the 7th International Conference on Human Computer Interaction with Mobile Devices & Services – Mobile HCI '05* (presented at the the 7th international conference, Salzburg, Austria: ACM Press), p. 335, <https://doi.org/10.1145/1085777.1085853>

Table 3.2
Analysis of the various journey phases

Journey Phases	Phase Description	Passenger Needs	Carrier
1. Planning the journey	identifying various travel options, timings and costs to reach a destination	flexible journey possibilities and information in real time	service points, network maps, internet access or apps
2. Arrival at the station	first mile of the journey – from the passenger's location to the nearest mobility node	navigational support through interstitial parts of the city to reach the station	city maps or apps
3. Entry to the station	first physical interaction of the passengers with the station; this is also the point where the station meets the city	station entrance to be clearly marked and services clearly signposted for all	entry needs to be easy to locate and accessible for people with special needs
4. Ticketing	transparent ticketing system that is easy and quick to access	highly flexible payment system and an easy interface	ticketing needs to be available independently of devices, as both a paper and a digital ticket
5. Waiting	for the waiting passenger, the station becomes a space of sojourn	allocated and easily accessible spaces to have a little break	proper seating, toilets and water fountains are essential to this area
6. Navigating to the train	wayfinding through the station into the coach	seamless, intuitive and inclusive orientation system	navigation tools can be personalised digital ones or physically integrated into the station architecture
7. Boarding the train	boarding train for passengers with differing needs during different parts of the day / week	clear demarcations, crowd flow navigation, accessible and easy boarding for all passengers, need for confirmation that it is the right train	the station architecture, the materiality of the space and the signage system
8. Travelling	after finding a place in the carriage most passengers remain in one position till they need to alight	a sense of security and comfort is important for the passengers	the interior of the train and the quality of sound, light, air, temperature and seating; easy access to information display board and to the exit

Based on the information depicted in Table 3.2, we extracted the passenger needs in Table 3.3 in order to identify their needs in different phases and in general for the whole journey. In Table 3.3 we see that there are certain basic needs that resonate in both the digital and the physical world. Some of these consistently accompany the passenger during her various journey phases. In summary, this is a set of foundational passenger needs:

1. Easy access to information for navigating towards and within the station.
2. Intuitive orientation with digital tools and in the physical station space.
3. Secure, comfortable space, evoking a sense of belonging.

Table 3.3
Aligning journey phases with passenger needs

Journey Phases	Passenger Needs
1. Planning the journey	Flexibility in planning Information in real time
2. Arrival at the station	Navigational help
3. Entry to the station	Accessible Easy to locate Intuitive orientation
4. Ticketing	Hassle-free Transparent payment Possibility of obtaining tickets without personal digital devices
5. Waiting	Secure Clean Accessible
6. Navigating to the train	Intuitive orientation Accessible Easy
7. Boarding the train	Accessible Hassle-free
8. Travelling	Accessible Comfortable Information in real time

50 Hamburger Hochbahn AG (2016) *Unternehmensbericht 2016* (Hamburg: Hamburger Hochbahn), <https://www.hochbahn.de/hochbahn/wcm/connect/de/39005db0-6fce-424a-a68a-bb24cf49d201/170523_hbn_ub16_d.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE.Z18_JH8I1J-CoL05M10AEB6TSP430A1-39005db0-6fce-424a-a68a-bb24cf49d201-mwToGIO> [accessed 19 May 2020]

3.2.2.1.2 Understanding Service Vision

Method: As shown in Diagram 3.9, this part involved understanding the higher-level ideological aims of the service provider – that is, Hochbahn – and how this may be interpreted through the principles defining the actual design and architecture of the new stations on the new U5 metro line. This was done by:

Step 1: Studying Hochbahn Hamburg's company report, 2016
Step 2: Conducting a workshop with Hochbahn's managers (Segments 3 & 4, as shown in Diagram 3.2)

Studying Hochbahn Hamburg's Company Report, 2016:
To understand Hochbahn's higher-level ideological aims we (IXDS and myself) analysed the company's reports from 2016.[50] The U5 Metro line project started in 2017, and the 2016 company report discussed the foundational strategy on which Hochbahn was planning to grow as a company and build the new U5 metro line. Therefore, even though the workshops were carried out at the beginning of 2018 we decided to use the Unternehmensbericht, or company report, from 2016 instead of the one from 2017. The company report is a

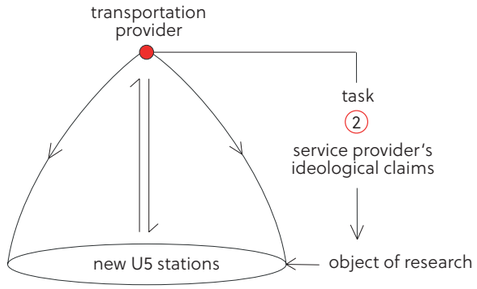


Diagram 3.9
Understanding Hochbahn's higher-level ideological aims

Image 3.3
The working session for mapping passenger user experience. Hochbahn Hamburg, 2018

document published annually by Hochbahn that focuses on the past performance of the company and lays down the company's future prospects for shareholders, the city of Hamburg and the general public. Hochbahn's company report is not merely a factual document, but more like a public relations document, for which Hochbahn invests much in the design and layout. The 2017 Unternehmensbericht was awarded the German Design Award for 'Excellent Communications Design – Corporate Identity'.[51]

The Hochbahn company report is impeccably designed; it is attractively laid out with bright graphic accents and many colourful pictures. As in a typical marketing catalogue, words and images were used, like Aldous Huxley's Soma,[52] to preserve us from anything unpleasant, to give us a holiday from the facts.[53] Like Soma, corporate marketing uses perfectly framed sentences and glossy feel-good images, "to calm our anger and reconcile our enemies".[54] As Huxley writes, in the past one could accomplish these things by making great effort and after years of hard moral training. Now most companies have a public relations department that hires the desired services to "somatise" their image. Although we (IXDS and myself) were very aware of questionable character of such documents, we still decided to work with it. We saw it as a starting point to lead discussions about the more ethical aspects of the design and architectural decisions involved in the making of the new U5 metro stations. We decided to work with the claims in the company report because we wanted to investigate the seriousness behind them. Our objective was to determine how far higher-level company goals could actually influence the quality of stay for passengers using the facilities of Hochbahn. For me it was also important to gain a deeper insight into terminology, concepts and trends that were used for decision-making within Hochbahn. I hoped that this knowledge would help us to facilitate an intervention prompting consensual change within Hochbahn's structure and negotiate more achievable solutions by finding more authentic grounds on which to communicate between the limitations of decision-makers and user needs.

51 Hamburger Hochbahn AG (2018) *Unternehmensbericht 2018* (Hamburg: Hamburger Hochbahn), <http://www.hochbahn.de/> [acccessed 19 May 2020]

52 Huxley, Aldous Leonard (1998) *Brave New World* [1932] (New York: Harper & Row), p. 102

53 Ibid.

54 Ibid.

Table 3.4
The main aims, strategies and objectives behind understanding Hochbahn's higher ideological aims

Aim	Strategy	Objective
To investigate the earnestness behind higher-level company goals	For this we conducted workshops with various high- and mid-level managers from Hochbahn, where they presented their interpretation of the company's vision and mission statement.	We processed this so as to derive from it a more inclusive set of principles.
To understand how externally instigated structural changes in artificially organised systems influence it	For this purpose, apart from my input as an external expert, I have been regularly following up, as much as possible, the internal decision-making processes at Hochbahn. This is elaborated below.	This was feedback to help me understand how systems like Hochbahn function, so as to refine my work as an external agent of change.
To investigate the terminology, concepts and trends that were used for decision-making.	The method I used here is elaborated in Section 3.1. I primarily used iterative interaction and active listening during the workshop sessions, discussions and team meetings.	My primary objective was to orient myself in Hochbahn's structures of meaning, and to use this understanding to facilitate a directed change in practice.
To facilitate an intervention prompting consensual change in the system.	We used the method of participatory research, my role primarily being that of a negotiator between passenger needs and their connections to the higher-level aims laid down in Hochbahn's company report.	During the work sessions the individual team members freely expressed and defended their points of view; this created a space for the democratic creation of ideas.

55 Gilbert, Nigel, and Paul Stoneman (2016) *Researching Social Life* (Los Angeles: Sage), p. 106

Workshops conducted with managers:
To understand how managers at Hochbahn relate to higher-level ideological aims, I organised two full-day workshops with IXDS. The first workshop was conducted on 22 January 2018 and the second one was on 29 January 2018. The participants in the workshops were largely mid-level managerial staff; junior managers were often present only in the absence of their immediate senior manager. There were twelve participants in the workshops. These participants were responsible for planning various tasks in the station, or in the train. These were as follows (these responsibilities may differ from their official ones, but this is how the participants introduced themselves during the workshop):

1. U5 automatisation
2. U5 station architecture
3. Marketing, 'future vision'
4. Operations management
5. Sales management
6. Infrastructure adaptation for differently abled
7. Project management DT6 (the new generation of fully automatic trains)
8. Multi-modal mobility
9. Station construction
10. Marketing
11. Passenger security
12. U5 project planning

Despite their diverse backgrounds, all the officers were pursuing the same practical goals: the conceptualisation and construction of the new U5 metro line in Hamburg. The workshops were attended by twelve mid-level and junior managerial staff from Hochbahn and the city of Hamburg Senat. In addition, the architectural studio of Hadi Teherani was also represented and an expert on artificial intelligence (AI) was also invited. The architect from Teherani was instrumental, as their design had won the first tender for the station architecture, and the design handbook that we aimed to generate for the smart stations on the U5 line was ultimately to be "designed" by them. The expert on AI was important to give us feedback during the various discussion sessions.

The ratio of internal participants to external experts was usually 3:1; this helped to balance various factors in the group, like the ratio of in-house internal participants to externals, and those researched to the researcher, as recommended for example by Nigel Gilbert and Paul Stoneman.[55] The coming together of participants who were mainly carrying out the implementation (internals from Hochbahn, as represented in Diagram 3.2 as Segments 3 and 4) and participants who were mainly undertaking the research generated a rich exchange between ideas and their real-life implications. This helped remove

56 Schuler, Douglas, and Aki Namioka (eds.) (1993) *Participatory Design: Principles and Practices* (Hillsdale, NJ: L. Erlbaum Associates); Ehn, Pelle (1993) 'Scandinavian Design: On Participation and Skill', in: Douglas Schuler and Aki Namioka (eds.) (1993) *Participatory Design: Principles and Practices* (Hillsdale, NJ: L. Erlbaum Associates), pp. 41 – 77

any subject-object relationship, ensuring an atmosphere of congeniality, openness and support. This supported, on one hand, the transformation of purely theoretical knowledge into applied practice, and on the other a practice that also influenced my research-focused thinking.

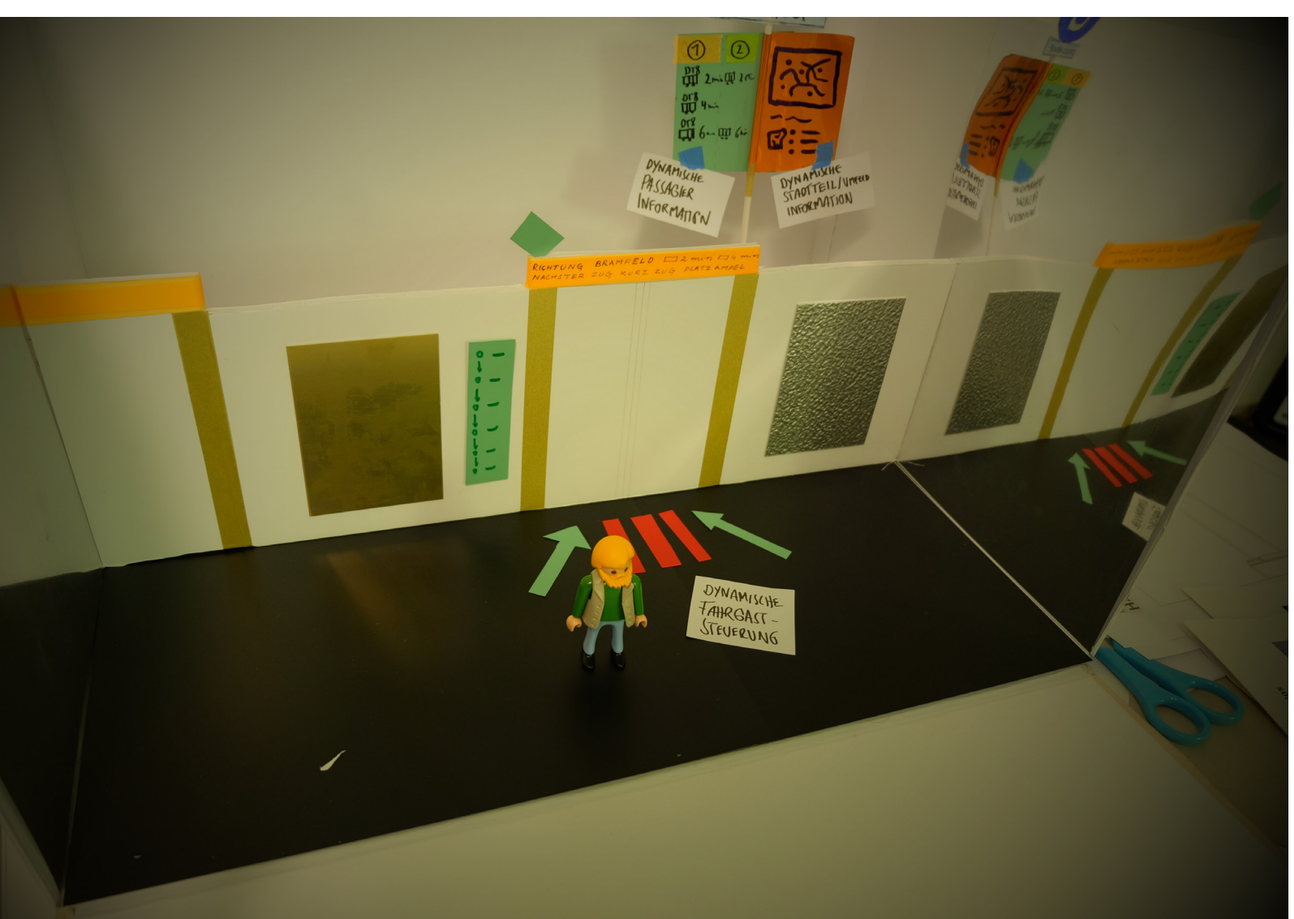
The workshop structure was built according to the participatory action research method, which again is based on a democratic model.[56] A democratic model here refers to development of project goals, visions and directions that are shared by the managers responsible for various tasks, and is not a top-down briefing determined by the capital owners. During the workshops, the managers not only stated how they related to Hochbahn's mission and vision statements (discussed later) but also, with the help of external experts, worked together to lay down their vision for the U5 project. This phase aimed:

1. To coordinate the different aspects of the project at the meta level of defining visions for the new metro line.
2. To define a common agreed goal for the project. The hope was that this would give a more informed and connected execution of higher-level tasks to the various departments working on the project and ease the process of following a shared idea.
3. To assist the identification of the mission, key tasks and factors were critical to effective operation.

Table 3.5
Organisational details of workshop 1

Workshop 1	First main work phase
Date	22 nd January 2018
Organiser	Projektmanager, Architektur U5-Ost, Hochbahn
Main external experts	IXDS Berlin, Shalini Sahoo
Venue	Hochbahn, Hamburg
Participants	12 internal Hochbahn employees
Language	German
Objective	Understanding Hochbahn's higher-level ideological aims with respect to the U5 project

Image 3.4
A model of the smart station generated during the participatory session. Hochbahn Hamburg, 2018



The first workshop (see Table 3.5 for details) involved the participants in discussing two statements taken from the 2016 Hochbahn company report: *Intelligente Mobilität für eine Lebenswerte-Zukunft* – Intelligent mobility for a future worth living. *Wir organisieren die Nachhaltige Mobilität in der Smart City Hamburg* – We organise sustainable mobility for the Smart City of Hamburg.

Three keywords extracted from the above statements were put on the table for reference:

Intelligente Mobilität – intelligent mobility
Lebenswerte Zukunft – a future worth living
Smart Cities

Each participant had between three and five minutes to express their position statement, based on the mission and the vision statements. The assignment was sent out a day before the workshop, so that the participants had enough time to formulate their answers precisely. These statements were a starting point for understanding how individual participants related to the service vision as described in the company report. Along with this, the position statement also gave us an insight into how the participants planned to incorporate their individual interpretation of their higher-level ideological aims into their specific decision-making process. The participants, as mentioned earlier, were from departments such as marketing, digitalisation, automatisation, fleet, architecture, information design and the Hamburg Transport Association (HVV). The workshop facilitated a more collegial exchange between the participants.

The position statements of the twelve participants were frequently similar to each other. For most of them the term *Intelligente Mobilität* was closely associated with a system that was well equipped for intuitively directing the first-time user to their destination. Another quality attributed to it was inclusive design, which enables passengers with disabilities to be able to use the facilities with ease. The future was perceived by most of the participants as a time when basic needs in public transportation, such as security, cleanliness and service efficiency, will be taken for granted. This will eventually lead to designing a space which is more human-centred and that responds to higher-level needs. A metro station which is a pleasant space to be in is in many ways the "representative" part of the city. Most of the participants, while they agreed on the importance of information being distributed in real time, technology being used to ease crowd flow and a transparent pricing structure, clearly disowned any sense of identifying with the term "smart city". The only participant

who reused the term "smart and intelligent" without explaining it much was from the marketing department. Sustainability, along with a greener cityscape, was a recurring concern; along with this was the wish to identify the individual stations with their surrounding boroughs, giving the station a very individual, local flavour. Based on these discussions, five points were crystal-lised to represent the service blueprint of the U5 project:

1. *Städtische Einbettung* (placemaking, a part of the cityscape)
2. *Langfristig relevant* (long-term relevance of the service)
3. *Inklusive gestalten* (inclusive design)
4. *Intuitives Leiten* (intuitive interface for the station)
5. *Umweltfreundlich* (eco-friendly)

During the workshops, apart from crystallising the more realistic understanding of higher-level goals, I saw my task as facilitating solutions that considered the limitations of the decision-makers and the needs of the user. My insight into user needs was gathered using the IBO method, as previously discussed in Sections 2.1, 2.2 and 2.3. The various findings from the IBO field research were thematised during the workshops, and were helpful in initiating discussions.

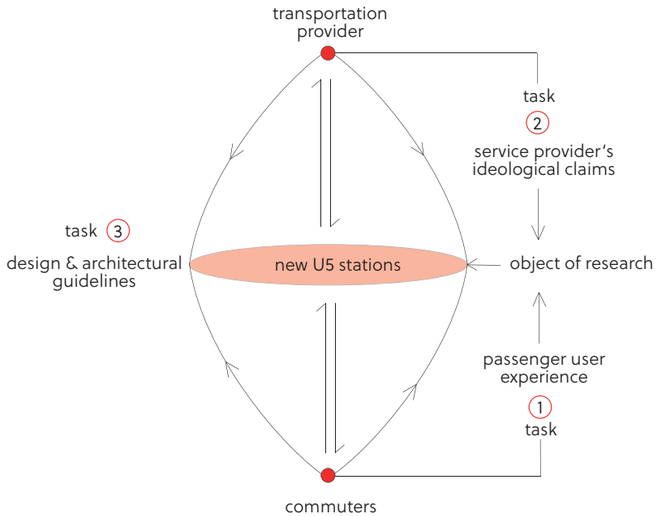


Diagram 3.10
Defining the design principles for the new smart stations

3.2.2.1.3 Defining Design Principles

The findings from Task 1 and Task 2 were processed in this phase to generate the design and architectural principles on which the new series of smart stations were to be built on the U5 line, (this is Task 3 as seen in Diagram 3.10). For this a second full-day workshop was conducted with the managers at Hochbahn: the details are listed in Table 3.6.

Table 3.6
Organisational details of Workshop 2

Workshop 2	First main work phase
Date	29 th January 2018
Organiser	Projektmanager Architektur U5-Ost, Hochbahn
Main external experts	IXDS, Berlin & Shalini Sahoo
Venue	Hochbahn, Hamburg
Participants	12 internal Hochbahn employees
Language	German
Objective	Interpreting the ideological aims in the passenger journey experience in order to define Hochbahn's service principles in relation to the U5 project

Table 3.7
Workshop 2: Comparing passenger needs and Hochbahn's company vision

Basic passenger needs	Hochbahn's company vision
1. Easy access to information and to / in the station. 2. Intuitive orientation via digital tools and in the physical station space. 3. Secure, comfortable space evoking a sense of belonging.	1. *Städtische Einbettung* (placemaking, a part of the cityscape) 2. *Langfristig relevant* (long-term relevance of the service) 3. *Inklusive gestalten* (inclusive design) 4. *Intuitives Leiten* (intuitive interface for the station) 5. *Umweltfreundlich* (eco-friendly)

As shown in Table 3.7, the insights from both Task 1 and Task 2 were brought together to develop the design and architectural principles for the stations on the planned U5 line. For this, four groups were formed in order to develop practical solutions for the actual station design with the help of models and sketches. For the workshop, two main directions were agreed on:

- Design Principles for the U5 stations
- Design principles concerning the city and the station's geographical location.

Based on this, the four teams worked on the ideal station that brought together user needs and Hochbahn's higher-level ideological goals. The final design solution was presented by the teams to the rest of the group. This exercise helped generate a clearer understanding of the project's common ideological goals and how these could be translated into the station architecture. This workshop reinforced the common vision of the team and showed the direction for a more authentic interpretation of this in the design of the station. From the work undertaken during Workshop 2, IXDS and I later formulated the following design principles for the new stations on the U5 metro line. Although I was seen as the materials expert in the team and IXDS as the expert on digital tools, my main input was largely related to the ethical foundation of the design principles.

Image 3.5
Translating the Design Principles on the Steilshoop Station, Hochbahn Hamburg, 2019

The Design Principles for the U5 stations were as follows:

1. *Humane in focus*

The new U5 metro line consists of a fully automated train and station system: that is, it is possible to run and monitor the service on the U5 line remotely, with no human presence in the station or in the train. This therefore makes it more crucial for Hochbahn to understand the humane aspect of their service design. Passengers need to be treated with respect and care in the station, which is a place of sojourn. The human user may in no circumstances be used as a means to an end. The services provided in the station are there to ease the stay of the passengers and not to entice them into mindless consumption.

2. *Inclusive design*

The U5 mobility nodes aim to guarantee barrier-free access and services for all users. The stations and platforms will be made accessible with ramps and elevator for wheelchair users and those with children in strollers. Information presented for orientation will be simple in design and expression. It is envisaged that the station will be designed for intuitive non-ocularcentric orientation. This will enable the station to work easily for a wide range of users from diverse cultural backgrounds and differing age and physical capacities. The inclusive design of the station will be an inherent part of its architecture, not an extra add-on. This point is a key requirement of the Hochbahn service at both the digital level of apps providing information, navigational tools and ticketing and at the physical level of the station design.

3. *Intuitively informing / avoiding ocularcentrism*

The U5 stations aim to provide a natural orientation through the various zones. All the stations will be built on a basic multi-sensorial orientation system. This ensures that passengers can navigate not only through text and signage but also with the appropriate quality of light, olfactory encounters, curated aural interventions and material semantics. During Workshop 2 one of the groups used light intensity as a navigational tool that could be used in the station. A multi-sensorial orientation system makes the space more inclusive and provides a smoother interaction between the users and the space. Along with this, it is envisaged that the station design will be remain free of advertisements and unnecessary visual information.

4. *Availability of real human contact in the station*

The importance of real human staff cannot be completely substituted with chatbots, real-time travel updates and a fully automated travel system. The U5 metro station would build trust amongst its users by providing them with real human support at most of the stations. The presence of professional staff at the station would provide the space with a sense of assurance and security. In addition, in cases of emergency the station staff will be equipped to organise quick and effective help. With the trend towards digitalisation and automation, the presence of station staff gives a humane identity to the service provider.

Design principles concerning the city and the station's geographical location were:

5. *Zone-specific use of materiality*

A station may be divided into three main zones: Meeting Points, Functional Zone, and Recreational Zone. These differ primarily in the service they offer; therefore the material decisions defining these zones may be specific to the purpose these zones fulfil. So as to create an atmosphere that serves the purpose of these.

a. The Functional Zone:
This zone involves the platform and the ticket hall. The basic requirement of this zone is that it should have a "no frills" feel. The U5 generation of automatic trains are scheduled to arrive every 90 seconds during peak hours. This means that the disembarking and embarking of passengers has to be executed fluently. The platforms and ticket hall serve the functional aspect of the journey.

b. The Recreational Zone:
This is the area in the station where passengers can relax with a cup of coffee and a croissant. This zone has shops and services like laundromats, dry-cleaners or postal services.

c. The Meeting / Ticket Hall Zone:
The meeting point needs to be one that is easy to describe and find, and pleasant to wait in.

The qualities and functionality of these three zones vary significantly. Therefore, it is essential that their material design has their specific needs in mind (referring not only to the tangible, but also the intangible, materials such as smell, sound, colour, light, proportions). A zone-specific materials approach such as this would enable passengers to navigate the station intuitively via different zones.

The Design Principles concerning the city and the station's geographical location were as follows:

1. Part of the environment
Hochbahn has actively included the residents of areas directly affected by the construction work of the U5 project in the planning process. Regular events were organised to share information about the plans for the U5 and understand the concerns of residents affected by the construction work.[57] Although this has been a largely a public relations-driven event, it was the first step towards enabling the citizens to develop a sense of ownership towards the U5 project,

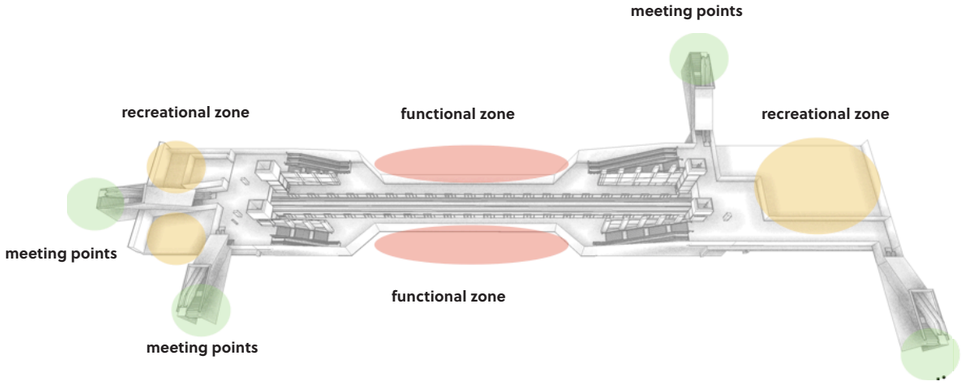


Diagram 3.11
The different zones in the station

57 Hamburger Hochbahn AG (2016) *Unternehmensbericht 2016*, p. 34 (see Footnote 50)

58 Transport for London (2019) *Streetscape Guidance*

and in particular the new station that would create a long-term change in the topography of the local area. To make the station an integral part of the neighbourhood it may be necessary to incorporate a local flavour into the designing of individual stations: this may include the use of a particular material or a building technique related to the area, or the use of symbols that represent the locality, or curating the uniqueness of the area in the form of exhibitions or cultural activities.

2. Planning unplanned station space
Planning unplanned station space means adopting a loose-fit architectural strategy in which the station space is designed to be adapted and co-created by the users. On one hand this ensures that modifications can easily to be made to the station in the future, and on the other it provides unplanned station areas for use by the local community or for the local borough to hire / use when needed. This increases the potential for the space to be adapted to host community events or to support start-ups or pop-up shops. This may increase the sense of ownership towards the space and support its more congenial use for a communal life.

3. Supporting communal living
A station is an important part of the neighbourhood.[58] It is an entry or exit point to and from a neighbourhood, and as such may be used for providing services like post offices or dry cleaning/laundromats. The atmosphere of the station should be such that users feel safe and welcomed. The physical meeting point of the underground station with the neighbourhood could be planned with a focus on supporting a vital community life. During the workshop, ideas were generated for offering the possibility of using the station roof for urban gardening, or as an amphitheatre.

4. Incorporate sustainability
The U5 metro stations would include sustainable innovations: the energy used, the materials, the lighting and the forms of the architecture would be consciously used to design the feel of a sustainable space. The initial design for the station actually uses nature as a source of inspiration, with graphic natural elements adorning the interior. The aim of this approach is to celebrate the sustainable nature of public transportation and use it as a unique selling point.

The station design principles defined in the two categories are not mutually exclusive – that is, looking after the "humane" aspects of the passenger in the station also positively influences the quality of the station as a part of the cityscape, and a station that is well integrated in the neighbourhood would also be a place where passengers feel safe and comfortable. After defining these principles, the project was handed over to the architectural studio of Hadi Teherani to integrate these in the Gestaltungshandbuch: the design handbook that lays down the architectural guidelines for the stations to be built on the U5 metro line. The action research with Hochbahn brought more clarity to my PhD enquiry. It helped me gain an understanding of the problem in its systems context. This grounded my grasp of the situation at hand and enabled me to develop a humbler approach to it.

3.2.2.2 Passive Work Phase

The passive work phase took place between the first and the second main work phases. During this I was not officially involved with Hochbahn. This phase consisted of three main meetings with the main architect in charge of the U5 Ost metro line. He has been my main contact person at Hochbahn. These meetings were conducted as a follow-up to the work carried out and also to understand, out of an epistemic curiosity, how a process of change-making is carried out in institutions like Hochbahn, which are rooted in traditional hierarchical structures.

The main strategy that followed in this phase was that of an iterative interaction; the aim was to orient myself more towards their (Hochbahn's) way of working and thinking. Through this I investigated whether, and how, change can be instigated and carried out in the form of guidelines laid down by external experts to be implemented by the internal team. The meetings with Hochbahn involved candid discussions on various internal decision-making processes and the kind of reaction the suggested change was provoking internally at Hochbahn. The insights from this exchange were instrumental in reflecting, understanding and planning my work with Hochbahn. Although I refrain from elaborating more on these meetings, I do use the insights from them to reflect on this work more in Section 3.3.2. I am grateful to the members of Hochbahn for their trust and readiness to work with me.

Image 3.6
Discussing the Design Principles in a participatory style workshop, Hochbahn Hamburg, 2018

3.2.2.3 Second Main Work Phase

Table 3.8
Second main work phase

	Task Description	Collaborators	Time planning	Form of execution
1	Interpreting design principles as practical implications on to the Steilshoop station on the new U5 metro line.	Innovation Natives, Hamburg: moderation of the workshop. Shalini Sahoo: expert input in the form of talks and critical analysis.	18 th & 24 th April 2019	Action research via participatory design workshop

The assignment for the second main work phase had not been planned initially, and came about only as a result of the passive work phase. This phase was done as a continuation to the first main workphase. The primary task was to interpret the design principles as laid down in the design handbook for the U5 stations in terms of practical decisions that were to be taken for the Steilshoop station planned for the U5 line. The participants in this phase belonged to the same departments as those listed above in Workshop 1. However, many of the participants were new, and had not been present during the first main work phase. I was asked to do the opening talk to (re)introduce the design principles to the participants and put this together in the context of the work already done. I structured my talk to recapitulate on the previous work phase and to lay down the foundational focus for this phase of the work. In the following I will elaborate the key points around which my talk was structured. These points were carried on further to be worked on during the two workshops.

To develop a deeper understanding of the design principles and their interpretation in the more practical construction of a station, I asked the participants three main questions:

3.2.2.3.1 Designing for the human user
3.2.2.3.2 Stations as places of sojourn
3.2.2.3.3 Implementation of service vision in station design

59 *I, Daniel Blake*, dir. Ken Loach (London: BFI, 2016)

60 Ibid.

3.2.2.3.1 Designing for the Human-User

> "I am not a client, a customer, nor a service user.
> I am not a shirker, a scrounger, a beggar, nor a thief.
> I'm not a National Insurance Number or blip on a screen.
> I paid my dues, never a penny short, and proud to do so.
> I don't tug the forelock,
> but look my neighbour in the eye and help him if I can.
> I don't accept or seek charity.
> My name is Daniel Blake. I am a man, not a dog.
> As such, I demand my rights.
> I demand you treat me with respect.
> I, Daniel Blake, am a citizen,
> nothing more and nothing less."[59]

The first point involved questioning the nature of the Other for which the stations were being designed. Who were these … customers, service users, shirkers, scroungers, beggars, thieves, national insurance numbers or blips on a screen?[60] Does the nature of how we define the Other eventually define our (inter)action towards them? Since 2003 Hochbahn Hamburg has been completely owned by the city of Hamburg; during Workshop 1, most of the participants emphasised being in the service of the city of Hamburg. It was made clear that as a state-owned mobility service its priority was not necessarily to make a profit, but rather to provide the city of Hamburg with a competent, reliable, functioning mobility service. Hochbahn's service was thus oriented towards the citizens of Hamburg.

3.2.2.3.2 Stations as Places of Sojourn

When we question (as above) what it means to design for the Other, we also clarify the *nature* of the Other which our actions serve. This is the point where we start enquiring into the nature of what we plan to create for that Other. The German word for a metro station is *'Haltestelle'* (*Halt:* stop, *Stelle:* place), translated into English it is a 'stop'– something fleeting, transitory, necessary only before moving on to something else. Compared to this the word *'Aufenthaltsraum'* (*Aufenthalt:* sojourn, *Raum:* Place) can be translated in English as a 'place of sojourn' and has a very different feel to it. The term *Aufenthaltsraum* has a quality of rest, of slowing down, of being cared for. It does indeed make a difference whether we are planning for a stop or for a place of sojourn. Therefore, understanding the nature of the two terms and the objects they refer to help us in our design and architectural planning.

Image 3.7
Planning passenger journey, Hochbahn Hamburg, 2018

3.2.2.3.3 Service Vision and Station Design

Our intentions are repositories of our actions: the points above build up the third point that questions the meta-level intentions behind our object-level dealings. Hochbahn follows an aggressive marketing and PR strategy.
How many of these higher-level goals are to be translated into the 'real' design of their service?

The workshops conducted during the second main work phase aimed to interpret the design principles that were developed in the first main work phase as practical implications for the new U5 station at Steilshoop. In the following text I will discuss the findings of the workshop. There were four main groups taking part in the work. Each group traced the passenger journey through Steilshoop station. The aim was to see how the above enquiries were interpreted by the four groups in order to find a diverse range of solutions.

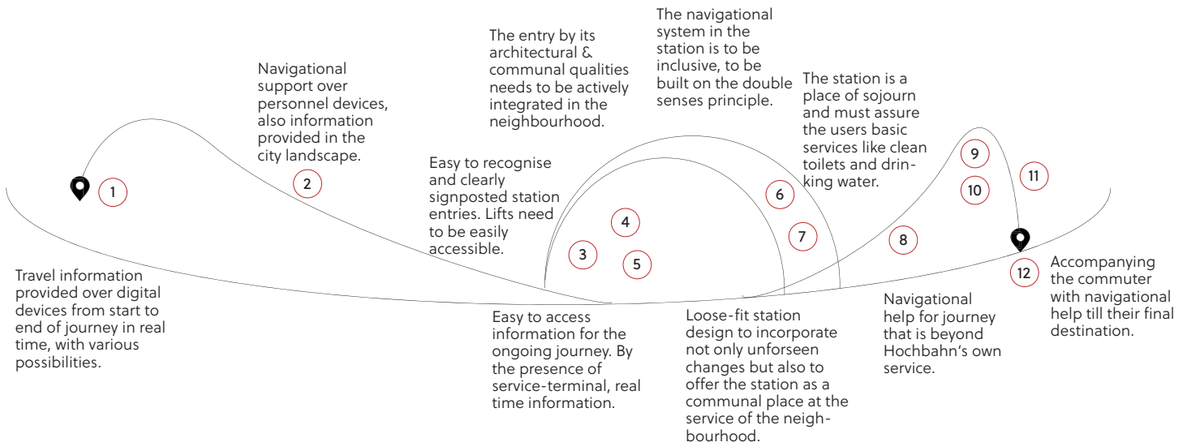


Diagram 3.12
Mapping different phases of the passenger journey on the needs of the passengers

The various journey phases seen above were further worked on by identifying the physical and digital solutions required, as depicted in Table 3.9.

Table 3.9
The journey phases and their requirements on the Steilshoop station

Journey phases	Digital & architectural solutions for Steilshoop station
1. Planning	Travel information provided via digital devices from start to end of journey in real time, with various possibilities.
2. Arriving at the station	Navigational support via personal devices; also information provided in the urban landscape.
3. Entry to the station	The entrance, through its architectural and communal qualities, needs to be actively integrated into the neighbourhood. Station entrances need to be clearly signposted; lifts need to be easily accessible.
4. Ticketing	Easy to access to information and transactions for the journey. This is through the presence of service terminal, real-time information.
5. Waiting	The station is a place of sojourn and must ensure that its users have basic services such as clean toilets and drinking water.
6. Navigating to the train	The navigational system in the station is to be inclusive.
7. Boarding the train	Using the platform secure doors to distribute the passengers throughout the train. Floor signage to be used to manage the flow of passengers.
8. Travelling to the destination	Accompanying the passenger to their final destination. Also, by providing navigational help for the rest of the journey that is beyond Hochbahn's services, that is, a door-to-door service.

The workshop was conducted over two full days; at the end of the workshop the group unanimously agreed to the immediate incorporation of the following into the planning of the Steilshoop station:

1. The entrance to the station, apart from fulfilling the basic needs of being inclusive and easily accessible, needs to seamlessly integrate itself, through its architectural style or selection of materials, with the neighbourhood. The station architecture may facilitate a communal place and is not just an opening that leads to the trains. The participants came up with ideas such as terrace gardening, an amphitheatre and communal rooms, that may be planned in the station architecture. This would make the station an essential part of the neighbourhood, creating a sense of belonging and responsibility amongst the users.

2. The second point considered the architectural implications that come when we create a *Aufenthaltsraum* (a place of sojourn) and not a *Haltestelle* (stop). These involved looking after the basic physiological needs of the users like clean toilets that are free of charge, drinking water fountains and proper seating (not anti-homeless benches). Apart from this, the station architecture must incorporate in its basic planning an intuitive orientation system that easily leads the passengers to the platforms and waiting areas, or to the exit and entry points.

This chapter has discussed the core praxis part of the PhD research. I began by discussing (Section 3.1) the Dissecting Organisational Systems framework. This I developed to guide me as an external consultant to bring about a directed change in the artificially organised systems under study. The work with Hochbahn as discussed here was important in contextualising this research through a real-life project. The Section 3.3 reflects at a meta-level my contribution towards the U5 project and the various factors that influenced its final outcome.

Image 3.8
The finalised Design Principles after the first the first main work phase, Hochbahn Hamburg, 2018

Image 3.9
Analysing passenger journey phases in a participatory style workshop, Hochbahn Hamburg, 2019

3.3 Discussions & Reflections

My work as an external consultant to Hochbahn on the U5 project officially ended after the second main work phase on 24 April 2019. The action from that point was planned to be carried out by Hochbahn internally. The mid-level manager responsible for organising the conceptual work (discussed in Section 3.2) was to present the architectural and design plans for Steilshoop station (discussed in Section 3.2.3) to the Hochbahn Board of Directors (Segment 1, in Diagram 3.2). I met the manager personally in December 2019 to enquire about the decision taken at Board level. In summary it was communicated to me that the Board had rejected the strategic planning carried out during the second main work phase for the Steilshoop metro station. This work had been done over two full workshop days, and included 22 participants from Hochbahn and external experts. In the Board meeting, that lasted less than thirty minutes, the rejection was articulated fairly clearly: there will be no toilets, drinking water fountains or comfortable seating; this is a smart station, where trains come every 90 seconds, so there will be no waiting. In addition to this announcement, the manager was advised by the Chief Executive Officer (CEO) to look into the process of SMART project management.

Image 3.10
In my task as an external consultant to Hochbahn on the U5 project. Hamburg, 2018

61 Ahmed, Sara (2017) *Living a Feminist Life* (Duke University Press), Part II: Diversity Work

62 Freire, Paulo (1974) *Education for Critical Consciousness* (London: Sheed & Ward)

63 Ahmed, Sara (2012) *On Being Included: Racism and Diversity in Institutional Life* (Durham, NC: Duke University Press), pp. 173 – 190

In this section I discuss and reflect on the praxis carried out with Hochbahn on the U5 project. With the help of this reflection I hope to gain a deeper insight into my role as an external consultant for an artificially organised system. This I discuss in the following three essays:

3.3.1 Being a diversity worker in institutional set-ups
3.3.2 Ever tried. Ever failed. No matter. Try again. Fail again. Fail better
3.3.3 Reflections on Smart vs. Toilets
3.3.4 Meditations on Toilets or, the Politics of Dematerialisation

3.3.1 Being a Diversity Worker in Institutional Set-Ups

My role with Hochbahn on the U5 metro line project was that of an external consultant – that is, an expert called in to execute a specific task that could not be accomplished with the skills available amongst the employees. As someone external to the main set of decision-makers in the company, my task was (in Sara Ahmed's terms)[61] to challenge the brick walls of the institutional structure in attempting to bring transformational change. Ahmed explains how transformation or aiming for transformation, as a form of practical labour, leads to knowledge, making praxis the starting point for theoria. As mentioned in the last chapter, I was part of a team consisting of Hochbahn, the City of Hamburg and other external experts. We were working together to define, in a democratic, participatory decision-making process, a set of design and architectural guidelines according to which the next series of smart stations on the U5 line were to be built. This document, the Gestaltungshandbuch, was intended to support the company's claims for its service vision and the socio-cultural aspect of the tender document for the new station architecture.

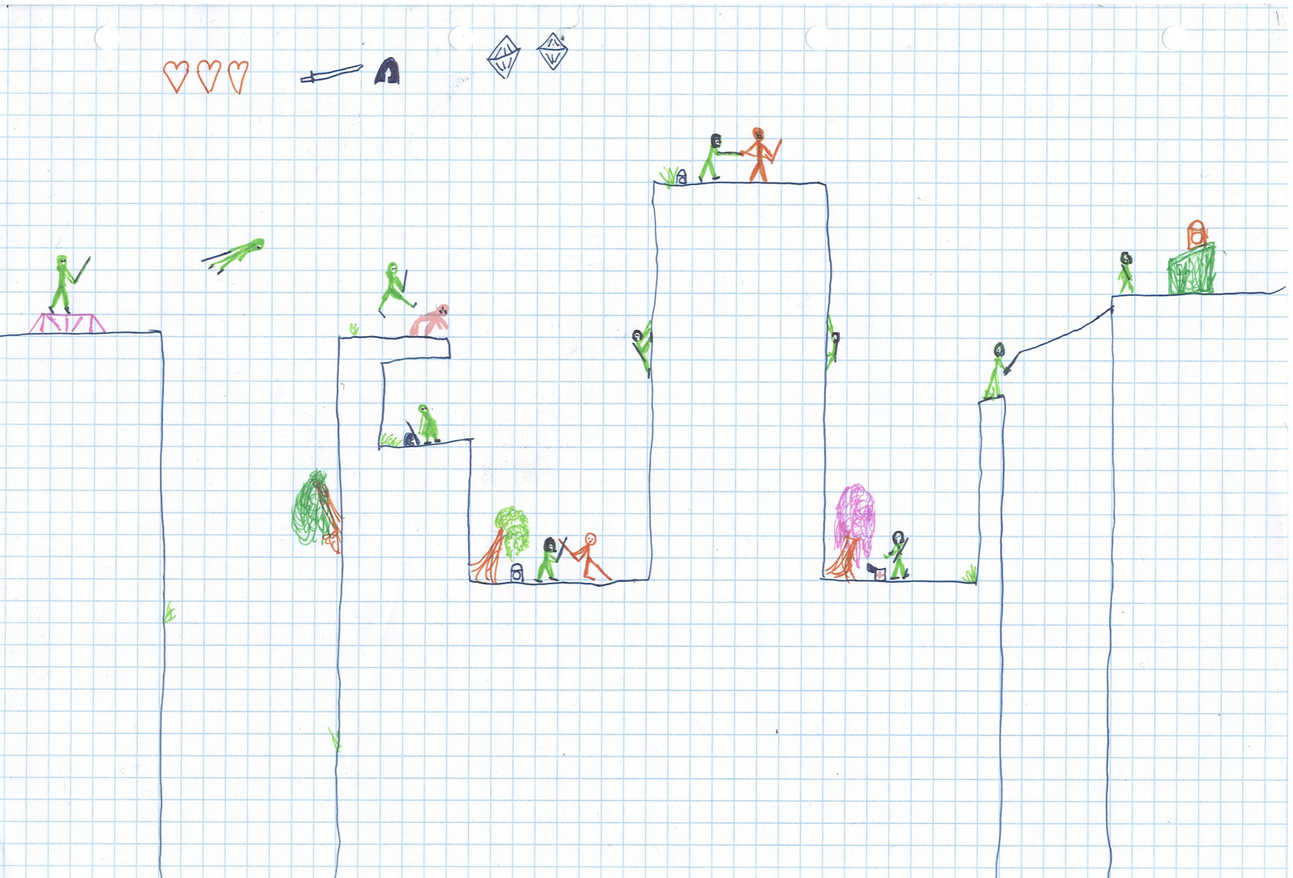
For Ahmed, diversity work has the explicit aim of transforming an institution, and is done by those who do not fulfil the usual institutional norms. Deleuze and Guattari explain something similar in their concept of the war-machine, which is exterior to the state apparatus. The state apparatus, according to them, is the form of interiority that defines the habitual model of thinking, it needs the war-machine, not always in the form of traditional war, but to create *conscientisation*[62] in various forms. With this the war-machine sets itself up in opposition to the order of the state apparatus – namely, the King, the Priest and the Law. Ahmed argues similarly that doing diversity work is like coming "up against the force and weight of something when we attempt to alter the conditions of an existence". Only in this act of coming up against the walls do the walls become apparent. Like Deleuze and Guattari's war-machine, the diversity worker is a thinker from the outside, belonging to the milieu of exteriority, and challenges the state-defined norm. This not only generates knowledge about the system – the state apparatus – where the organisational system becomes the focus, but also, "in the very process of attempting to transform them", knowledge is generated within the system.[63]

64 My way of working as already discussed in Sections 3.1 and 3.2 may be divided into three main parts:
i. Infiltrating the System at Micro and Macro Level
ii. Working with the Language of the System
iii. Iterative Interaction with the System
Though the three steps above are listed in a linear way they follow no particular causal structure and were often carried out simultaneously.

65 Ahmed, Sara (2012) *On Being Included: Racism and Diversity in Institutional Life* (Durham, NC: Duke University Press), p. 174

In my work with Hochbahn, I infiltrated at the macro and micro level by working with its language via an iterative interaction.[64] This became an intuitive strategy to make up for my lack of knowledge of the system. As an external consultant, I was not a part of the "norm" – the employees of Hochbahn. Ahmed describes the norm as "how we are immersed in a life".[65] The need to orient myself in this artificially organised system, with its own idiosyncrasies, and having a task to perform in it, forced me to observe, reflect and consciously curate my interactions with it. The aim was to bring in a directed change, by raising a critical consciousness amongst those who formed, and accepted, the norm. Like Freire, my praxis involved "reflection and action upon the world in order to transform it".[66] This I did from the position of external consultant – a position of privilege. By being made a part of the core internal team, I could reflect on what was happening in the project, not as an ideal intellectualisation but in an active iterative interaction with the praxis – the practical labour leading to knowledge.[67] I was, as Ahmed asserts, withdrawing from immersion – which is the usual "norm" state – and fulfilling the role of an external,[68] one who observes, reflects, articulates and transforms.

Image 3.11
The player has three lives, a sword, a helmet and two times luck. Sasha Sahoo, Bremen 2020



66 Freire, Paulo (2018) *Pedagogy of the Oppressed*, 50th Anniversary edition, ed. Myra Bergman Ramos et al. (New York: Bloomsbury Academic), p. 51.

67 Ahmed, Sara (2012) *On Being Included: Racism and Diversity in Institutional Life* (Durham, NC: Duke University Press), p. 174

68 Ahmed uses the term "diversity worker" rather than "external".

69 Beckett, Samuel (1992) *Nohow on: Company, Ill Seen Ill Said, Worstward Ho* (Paris: Calder), p. 101

70 Ahmed (2012), p. 174.

3.3.2 "Ever Tried. Ever Failed. No Matter. Try Again. Fail Again. Fail Better."[69]

The Self and the Other exist in interaction. The interaction becomes iterative when the Self experiences a resistance from the Other. As elaborated in Section 3.1.2.3, the physarum, in its search for food, sets out to find the most efficient route. It does this in a series of iterative interactions with the environment (the Other). Thus we see, even in an apparently simple lifeform, how resistance is resolved by an iterative interaction between the Self (the physarium) and the Other (the environment), with the aim of negotiating a mutually agreeable solution. According to Ahmed, "Doing diversity work is institutional work in the sense that it is an experience of encountering resistance and countering that resistance".[70] I describe this resistance as one that opposes sameness and constitutes Otherness.

The resistance that I faced during the U5 metro line project with Hochbahn Hamburg was primarily ideological, arising from a lack of a critical consciousness. I saw my task as one of informing, questioning and initiating the process of conscientisation amongst the working team: my role was that of an elucidator, a provocateur, a negotiator and a facilitator. I was what Deleuze and Guattari call the war-machine, exterior to the normative apparatus. The aim was to co-create change in a democratic, participatory process. The four main workshop sessions conducted were used for this purpose. The workshops happened in two blocks, with a time span of almost a year between them. The participants had a fluctuation rate of almost 60 %. Although I was working on a regular basis with the main architect in charge of the U5 project, the fact that the two workshops were separated by a year and the inconsistency of participants made my work generally challenging and exhausting.

The main task in the first phase, as mentioned in Section 3.2, was to compile a design handbook (Gestaltungshandbuch) which would define the meta directions on which the design and architectural decisions would later be based for the new U5 metro stations in the city of Hamburg. The team of externals called in for this phase were the Seamless Mobility team from IXDS; myself, and the Teherani architectural studio. The main document was later put together by the Teherani team. This is an important reference guidebook, on which not only the design and architectural decisions for the new stations, but also the upgrading of the older stations, are to be based.

Although the final document was intended to be based on the team findings, this document has become instead an opulent coffee-table book, with a 30 × 30 cm format. There is a total of 231 pages, with very brief textual chapters illustrated with several full-page photographs depicting the stakeholders from the city of Hamburg, Hochbahn and the star architect Hadi Teherani. A number of visuals with no captions were used to create the mood. The majority of the document contained 3 D renderings of the planned station and several generously laid-out technical diagrams. After the formal forewords from the stakeholders, summarised under "Prologue" is a brief excerpt that briefly lists the fifteen points that will ensure a more inclusive, user-centred station space. This part constitutes approximately 1.7 % of the document, and is the only place in the document where terms like user-centred, sustainability, inclusive design and wellbeing are used.

71 Hamburger Hochbahn AG (ed.) (2018) *Gestaltungshandbuch: Der Zukunft entgegen – visualisierte Nachhaltigkeit* (Hamburg: Hamburger Hochbahn), pp. 28 – 29

72 Koolhaas, Rem, and Hal Foster (2016) *Junkspace: With Running Room* (London: Notting Hill Editions), p. 8

73 South China Morning Post (2016) Ben Pang 'Why are Hong Kong's MTR Stations Different Colours?', 17 November 2016, <https://www.scmp.com/yp/discover/lifestyle/features/article/3071072/why-are-hong-kongs-mtr-stations-different-colours> [accessed 20 May 2020]

Following the Prologue is the Foreword by the architect Hadi Teherani – this presents a more candid picture of the direction of the document than the Prologue. The Prologue seems to be more of a marketing obligation than a sincere ethical foundation on which design and architectural decisions may be based. Teherani's Foreword is titled "Receiving the Future – with a Visualised Sustainability".[71] He writes about nature being a great inspiration, and how graphic elements inspired by foliage, grass or clouds would ornament the perforated ceilings of the new stations. This atmosphere of nature, he elaborates, would be supported with biodynamic lighting in the station. The Platform Screen Doors (PSDs) would be control-lit in various shades: this colour coding would be unique to each particular station. This issue of colour coding was actually discussed during the workshop, and it was agreed by participants that it would be difficult to execute over a larger network of stations. The ceramic walls are in the shape of curtains, and the seating, in the form of tree stumps, are to be made in metal or concrete.

Teherani's Foreword is crucial for an understanding of what went wrong in the final depiction of the democratically developed design and architectural guidelines. I see this as an act of corruption and breach of trust. His Foreword is presented next to a sleek, enigmatic picture of Teherani himself. It reminds me of Rem Koolhaas' writing in *Junkspace* about architectural brands who "perform the same role as black holes in the universe: they are essences through which meaning disappears[…]".[72] Teherani's studio used the handbook as an opportunity to advertise itself rather than addressing the more complicated human-centred issues in an acutely important space like a station in a world metropolis! Instead, Teherani presents a "visualised sustainability" as its unique selling proposition : a perforated ceiling with patterns from nature, the colour nuances of the PSDs, the modular system of the ceramic wall and the bio-dynamic lighting system; all of these are examples of how superficial ornamentation is used, yet again, masking and ignoring more acute needs (like toilets, drinking water fountains and wheelchair accessibility) in a place of sojourn. The terms we worked with during the workshops, such as sustainability, inclusive design, community-building, human-centred, intuitive orientation, are used merely as marketing obligations and do not appear anywhere else beyond the corner they were assigned to. The final Gestaltungshandbuch is a glossy, impractical technical guide that discusses the layout of the tiles and the permutations that are possible with the flooring element, also refer Table 3.10.

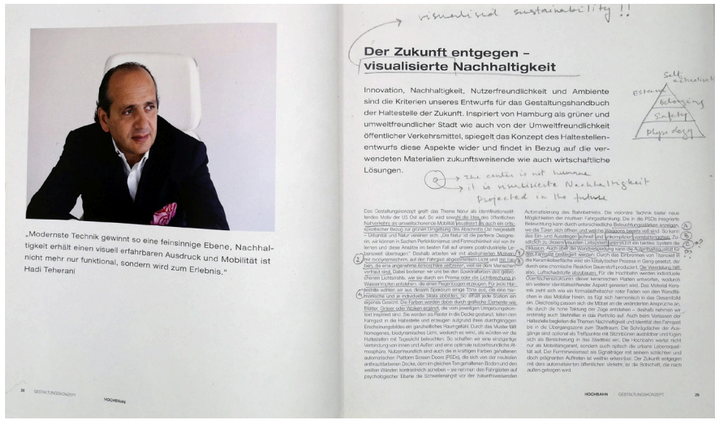


Image 3.12
Gestaltungshandbuch, 2018
The questionable character of the design handbook, that became a vanity project rather than providing a set of design and architectural guidelines for the stations on the U5 project.

Table 3.10
Comparing the nature of the design and architectural decisions as presented in the *Gestaltungshandbuch*

Citations from the *Gestaltungshandbuch*	What this means	Nature of the claim
"Receiving the Future – with a Visualised Sustainability"	A "visualised sustainability" is a clear expression of an ocularcentric approach.	Ocularcentric
"Nature is a great inspiration. Graphic elements inspired by foliage, grass or clouds would ornament the perforated ceilings of the new stations."	Nature is used as an inspiration for ornamentation, trivial "decoration" without real substance behind it (discussed in Section 2.2.2.3)	Ocularcentric
"Biodynamic lighting imitating the seasonal and daily rhythms of natural light."	This lighting, which claims to imitate the pattern of daylight, has the most intensive light phase between 8:00 to 9:00 p.m. In nature this is around noon. Also, more technical information, such as the colour rendering index, is missing.	Anomalous claim
"The Platform Screen Doors (PSDs) could be used to colour-code the stations. "	MTR, Hong Kong also initiated a similar concept in 1967; now, with 163 stations, the colour coding has become complex.[73] The issue of colour coding was actually discussed during the workshop and was agreed by participants that it would be problematic to execute over a larger network of stations.	Problematic claim
"The ceramic walls are in the shape of curtains."	The form of the ceramic tiles imitates curtains made of fabric.	Non-authentic
"Seating made of either metal or concrete is provided, considering the quick arrival of the fully automated train system."	The seating is designed to be anti-homeless. The material and the form of the furniture prioritises durability, cleaning and maintenance before the passenger's comfort and needs.	Non-inclusive

I struggle to maintain a dispassionate neutrality while reporting this. I understand that state-sponsored projects like new stations, though prestigious, are not always profitable. Thus, the need emerged for Teherani to make a vanity project out of it; for Hochbahn it meant having a star architect as a part of their aggressive U5 PR and marketing campaign. Nevertheless, I do not quite comprehend why a station project that is meant to last indefinitely, and will be used by numerous passengers every day, does not prioritise more basic human needs. The passive work phase with Hochbahn, as described in Section 3.2.2, was utilised to understand the gap I perceived between what was agreed in the first phase of the work and the final Gestaltungshandbuch that was later put together. The insights from this exchange were instrumental not only in reflecting and understanding my work with Hochbahn, but also in developing the PhD research in a more realistic context. It also meant being relentlessly on the path of the epistemic meta-enquiry (Section 1.4).

3.3.3 Reflections on Smart vs. Toilets

The Board at Hochbahn justified their rejection of our proposal for providing a more humane smart station for Steilshoop, with clean toilets, drinking water fountains and comfortable seating, by referring to the (apparent) nature of smart stations. In this part I reflect on the nature of "smartness" and how this is shifting our perception of our material Other. William Lovitt argues how modern people "… are trapped and blinded by a mode of thought that insists on grasping reality through imposed conceptual structures."[74] The way out of this, as Heidegger shows us, is *der Weg des Denkens*[75] the path of thinking/reflecting. This is what I endeavour to do in the text that follows, by investigating into the Human-Material-Interaction within the context of "smart". Smart, in this context, is often used to describe places where ubiquitous computing data is collected and used to manage infrastructures, assets, resources and services in the city.

My work on harmonising Human-Material-Interaction (hHMI), can be seen as a pun on the more familiar term human-machine interface (HMI). A human-machine interface denotes the interaction between a machine and a human user. Human-Material-Interaction, on the other hand, articulates the interaction between human users and the materiality that surrounds them in a built environment. Paul Virilio laments the shift to the 'post-urban' in our geopolitical urban spaces, where, amongst other things, there is a drift of attention, from "the human face-to-face and the urban vis-a-vis encounters at the level of human/machine interaction".[76] My main intention in this PhD research has been to investigate the effect materiality has on passengers, and how this may be arranged in order to create an atmosphere of wellbeing within public transit spaces. Based on this, the field research prompted me to investigate the materiality around the passenger, and the later part of the work with Hochbahn aimed to articulate this corporeal *matter-reality* of the user in a *smart* (station) system.

The Board decided against building toilets by placing the focus on the smart aspect of a fully automated station system. Along with this, the Board advised the manager presenting the work to use the SMART project management process. The word smart was thus applied in two ways by the Board: first to represent the digitised system, and second to use the concept of "S.M.A.R.T." (SMART), as developed by George Doran to articulate objectives in project management.[77] Doran used the SMART mnemonic to define the criteria that helped to form objectives, namely by making them "Specific, Measurable, Attainable, Relevant, and Time-bound".[78] Doran claimed that every corporation, department and section is capable of writing meaningful objectives if they follow the SMART guidelines. Objectives here are defined as reachable, short-term targets. Goals, on the other hand, represent "unique executive beliefs and philosophies".[79] Thus a SMART project management tool is used for setting of more effective objectives.

Therefore, when the Board dismissively refused the design and architectural direction that was proposed by Segment 2 (please refer Diagram 3.2, for the organisational structure in Hochbahn), and redirected the managers to come up with a SMART project management objective, it implied the framing of objectives that would enable Hochbahn to focus on the paradigm shift it was making towards digitalisation. This is precisely the work we did in the four workshops (as discussed in Section 3.2). Thus, the criticism and feedback from the Board seems to me to be misplaced. But what it brought forth was a value chain related to an inclusive and democratic approach to decision-making, which appears to have been overruled, and replaced, by an autocratic commodification chain. In numerous interviews, Heinrich Falk, Hochbahn's CEO and the progressive face of the U5 project, is to be found on various social media platforms sharing his vision for the most modern metro station. Everything about this is flawless – the filtered images and the clever #tags, everything seems to be in place. The information age has brought about a new set of requirements for companies: they must work tirelessly to keep up an image that is in sync with the trends. This is an age of *Selbstdarstellung*, or self-portrayal: regrettably, the portrait has become more important than that which is being portrayed.

Image 3.13
The toilet in the Inter City Express, Deutsche Bahn, Germany 2018

74 Heidegger, Martin (1977) *The Question concerning Technology, and Other Essays*, trans. and with introduction by William Lovitt (New York: Harper and Row), p. xiv.

75 Heidegger, Martin (1989) *Der Feldweg* (Frankfurt a. M.: Klostermann)

76 Virilio, Paul (2012) *Lost Dimension* (Cambridge, MA: MIT Press), p. 33

77 Doran, George T. (1981) 'There's a S.M.A.R.T. way to write management's goals and objectives', *Management Review*, Vol. 70, Issue 11, pp. 35 – 36

78 Ibid.

79 Ibid., p. 35

Hochbahn aims to make the U5 project the most advanced underground line in the world – a fully automatic system of stations, with trains arriving every 90 seconds during peak hours. The whole ambience of the station and the train is planned to reflect this, and since there will be no waiting, the seating is reduced to stumps for leaning on, and no toilet facilities are planned. Hochbahn's strategy for the U5 project is a typical example of the *zeitgeist*: where "we plan, research, and organise, we always reckon with the conditions that are given".[80] Heidegger calls this the calculative way of thinking. It takes into account the calculated intention of serving specific purposes, by incorporating "the sharp and realistic view, the unsentimental outlook quick to take advantage of circumstances to attain an end".[81] In the case of the U5 project, Hochbahn is building the first fully automated smart station system in Germany, at a time when German politics is aggressively promoting the digitalisation of traditional industries.

80 Heidegger, Martin (1969) *Discourse on Thinking*, a translation of Gelassenheit by John M. Anderson and E. Hans Freund (New York: Harper & Row), p. 46

81 Ibid., p. 12

Image 3.14
Sanifair paid toilets, Central Station, Bremen, 2019

82 European Commission (2016) European Commission, Directorate-General for Regional and Urban Policy, United Nations Human Settlements Programme (UN-Habitat) *The State of European Cities 2016: Cities Leading the Way to a Better Future* (LU: Publications Office), p. 13 <https://data.europa.eu/doi/10.2776/643506> [accessed 21 October 2020] p. 13

83 Bundesministerium für Arbeit und Soziales (BMAS) (2015) 'Grünbuch Arbeiten 4.0. Arbeit weiter denken', <https://www.bmas.de/DE/Service/Medien/Publikationen/A872-gruenbuch-arbeiten-vier-null.html> [accessed 21 October 2020]

84 Chui, Michael, Markus Löffler, Roger Roberts (2010) 'The Internet of Things', *The McKinsey Quarterly* 47:2, p. 1–9

85 Bauernhansl, Thomas, Michael ten Hompel, and Birgit Vogel-Heuser (eds.) (2014) *Industrie 4.0 in Produktion, Automatisierung und Logistik: Anwendung, Technologien, Migration* (Wiesbaden: Springer Vieweg)

86 The UK calls Industry 4.0.

87 It is roughly equivalent to what the UK calls Industry 4.0. (The expression Work 4.0 does occur in the UK, but not often).

88 Jochmann, Walter, Böckenholt Ingo, and Stefan Diestel (2017) *HR-Exzellenz: Innovative Ansätze in Leadership und Transformation* (Wiesbaden: Springer Gabler)

89 Breyer-Mayländer, Thomas (2017) *Management 4.0 – Den digitalen Wandel erfolgreich meistern: Das Kursbuch für Führungskräfte* (Munich: Hanser)

90 Ibid.

91 Hamburger Hochbahn AG (2020a) 'Der Aufsichtsrat', <https://www.hochbahn.de/hochbahn/hamburg/de/Home/Unternehmen/Unser_Job_fuer_Hamburg/Der_Konzern/der_aufsichtsrat, 2020> [accessed 21 October 2020]
Hamburger Hochbahn AG (2020b) 'Der Vorstand', <https://www.hochbahn.de/hochbahn/hamburg/de/Home/Unternehmen/Unser_Job_fuer_Hamburg/Der_Konzern/Der_Vorstand, 2020> [accessed 21 October 2020]

3.3.3.1 *Arbeiten 4.0* or *Industrie 4.0*

The Europe 2020 strategy promotes smart, inclusive and sustainable growth in the EU.[82] Before I elaborate more on the essence of "smart" I would like to illustrate the context of the German digital shift. This is important not only to understand Hochbahn's approach to digitalisation but also to grasp the digitalisation Zeitgeist that has taken over Germany. Around the end of 2016 the *Bundesministerium für Arbeit und Soziales* (Federal Ministry of Labour and Social Affairs) laid down the framework for the *Arbeiten 4.0*.[83] The *Arbeiten 4.0* or *Industrie 4.0* refers to the fourth industrial revolution.[84] This term was first introduced by Klaus Schwab at the 2011 World Economic Forum in Hannover.[85] The first industrial revolution was enabled by mechanisation via the steam engine. The second was achieved via conveyor belts and electrical energy. The third industrial revolution marked the beginning of the information technology era and the automation of production. Arbeiten 4.0 is the fourth generation of the industrial revolution: it focuses on the development of German industry towards a digitised work environment with the help of cloud computing, collaborative tools, big data and the Internet of Things.[86] In many ways *Arbeiten 4.0* is the second phase of the third industrial revolution. Traditional industries in Germany, such as Hochbahn, were expected to restructure themselves for this change.[87]

While looking for literature that might clarify the main agendas for *Arbeiten 4.0*, I realised the acute sense of emergency with which politics in Germany was approaching digitalisation within its core industry and service sectors. It is a strategy for standing up not only to the giants like Tesla, Apple and Google but also to the younger Silicon Valley start-ups.[88] A sort of cultural mind-shift was anticipated by the more traditional German industries with *Arbeiten 4.0*. Apparently, this urgency seems to cloud the complete picture of change that is needed to make this shift. In Volkswagen's infamous diesel emissions scandal,[89] we see clearly what can go wrong when the tools of digitalisation are used in top-down management politics to make up for the flaws in an already outdated system. Thomas Breyer-Mayländer calls this an outdated authoritative management strategy, too inept to deal with the challenges of *Arbeiten 4.0*.[90] Hochbahn's hierarchical organisational structure (Diagram 3.2) is very similar to that of Volkswagen. They are both attempting to make a paradigm shift by holding on to a fusty patriarchal structure. At Hochbahn the head of the Board is a man, the director of finances and technology are men and the only woman in the Board is the head of human resources. In a similar pattern the Supervisory Board (*Aufsichtsrat*) comprises of 11 men and 5 women.[91] The legal requirement in Germany is that 30% of the seats in management position need to be occupied by women. With the women's quota Hochbahn is just maintaing the requirements. Along with this quite obvious patriarchal structure in terms of men-women ratio there is also a strong patriarchy in the company's value and management system.

92 Heidegger, Martin (1977) *The Question concerning Technology, and Other Essays* (New York: Harper and Row), p. 5

93 Ibid., p. 12

94 Ibid., p. 16

95 As translated by Ernest Schonfield, Lecturer in German at the University of Glasgow, Scotland.

96 Heidegger (1977), p. 18

97 'Der Rhein; The Rhine – German Literature', <https://sites.google.com/site/germanliterature/19th-century/hoelderlin/der-rhein-the-rhine> [accessed 13 June 2020]

98 Heidegger, Martin (1977) *The Question concerning Technology, and Other Essays* (New York: Harper and Row), p. 16.

In *The Question Concerning Technology: and Other Essays*, Heidegger seeks out the essence of technology. He clarifies that the essence of technology is different from the perceived instrumental and anthropological definition of technology, where technology is means to an end and a human activity.[92] The essence of technology opens itself to us – it is the realm of revealing – that is, of bringing forth.[93] For technology is not only what we have created, but also what creates us in the process. With the example of the hydroelectric plant built on the river Rhine and the hymn written about the river Rhine by Friedrich Hölderlin, Heidegger illustrates the essence of the power station that transforms the river by damming it up into the hydroelectric plant. Here the currents of the river Rhine supply hydraulic pressure, and the electricity generated from this is dispatched in a network of cables. Heidegger urges us to compare "The Rhine" as a power station to Hölderlin's hymn "The Rhine",[94] in which he idealises the landscape by calling it "free-born" and "the noblest of all rivers".

„Die Stimme wars des edelsten der Ströme,
Des freigeborenen Rheins,"

"It was the voice of the noblest of all rivers,
The free-born Rhine,"[95]

With this discussion Heidegger brings us to the point at which he asserts that the real, or how the world reveals itself to us, shows itself in the light of the ideas that surround us.[96] What modern technology does to us – between Hölderlin's "The Rhine" and "The Rhine" as a power station – can be compared to the shift between the idea of the *Gegenstand*, that which "stands over or against", contrasted with *Bestand*, which denotes an asset, store or supply – a "standby". In Hölderlin's poem, the Rhine is a *Gegenstand* with the help of which he reflects on human life and how landscapes hold mystical powers that interact with human beings to strengthen them in their struggles. The Rhine as *Gegenstand* is revered by Hölderlin as a divine manifestation in the natural world.[97] In "The Rhine" as power station, the energy concealed in nature is unlocked, transformed, stored, distributed and switched as ways of revealment that never comes to an end.[98] Nature in this revealment is treated as an asset, supply, standby, or *Bestand*, and that which stands by no longer stands over or against us, as alterity. Heidegger takes this further by pointing out that when humans start perceiving the energies of nature as an asset, a *Bestand*, they themselves become a part of nature, a part of this *Bestand*. Applying this to the "smart" shift, we can see that there is a sort of dematerialisation of our world that has come with it. Hochbahn's failure to provide basic human needs (toilets, drinking water and seating) in a place of sojourn (stations) by referring to its smart context illustrates Heidegger's point above. The *Gegenstand*, that was until this point the user, the commuter, the passenger, the citizen, becomes a *Bestand*, an asset which "stands by" as a part of the smart system and is dictated by its character, thus clarifying the Board's treatment of the corporeal needs of the passenger as unimportant.

99 Ibid.

100 Heidegger and Lovitt, 2013, p. 16

101 Kroonen, Guus (2013) *Etymological Dictionary of Proto-Germanic* (Leiden: Brill)

102 Wedgwood, Hensleigh (1862) *A Dictionary of English Etymology* (London: Trübner & Co)

103 Ibid.

104 Salton, Gerald (1991) 'The SMART Document Retrieval Project', in: *Proceedings of the 14th annual international ACM SIGIR conference on Research and Development in Information Retrieval – SIGIR 91*, Chicago, IL. (New York: ACM), <https://doi.org/10.1145/122860.122897>

105 Weiser, Mark (1991) 'The Computer for the 21st Century', *Scientific American* 265:3, pp. 94–104, <https://doi.org/10.1038/scientificamerican0991-94>

3.3.3.2 Understanding Smart

In the following I apply Heidegger's technique of seeking the essence[99] in order to understand further how the smartness we are creating is forming us via our *Wahrnehmung*, our perception. Heidegger asserts that "the essence of a thing is considered to be what the thing is".[100] In this Heideggerian tradition I trace the word "smart" etymologically: its origin is the Proto-Germanic verb *smertan*, meaning "to hurt". In Old High German it is *smerzen*, *schmerzen* in German: this means "to pain".[101] The Old English verb *smeortan* means "causing sharp pain".[102] Here the adjective smeart meant "stinging, severe, painful; that which is a sharp pain". "Smart", as we use it today, means "quick, brisk, intelligent, sharp".[103] This interpretation removes the aspect of the pain which is felt by the physical/material body, but keeps the quality of what creates the pain or the nature of the pain itself, that is "sharp, quick and brisk". This shift in the way we use the word *smart* depicts the cultural practice where the *external* quality, that is sharp, is acknowledged, but the effect of the sharp, the wound or the pain, that is felt internally by the body is ignored. The "smart" of today is clearly a trend that externalises our experiences, creating a sort of dematerialisation of our actual corporeal perception and needs.

One of the early uses of the term smart with reference to computing was by Gerald Salton in 1971, in his article "The SMART Retrieval System – Experiments in Automatic Document Processing". In this, Salton describes the SMART retrieval system as a fully automatic indexing system, capable of processing a search on 70 computers at once. Salton[104] used the word "smart" to describe the fast speeds of autonomous computing. In 1991 Mark Weiser wrote 'The Computer for the 21st Century'.[105] In this prescient article he wrote about how ubiquitous computing would weave itself into the fabric of everyday life,

Image 3.15
The most prominent signage in the Bremen Central Station leads to the paid WC Center. Bremen, 2017

becoming a seamless part of our environment. Citing Polanyi, Weiser described how this would enable a tacit interaction between humans and silicon-based information technology. Weiser claimed that unlike virtual reality, ubiquitous computing would not simulate a parallel world but rather enhance the one that already exists. He argued that as a result of this, physical computers would become unnecessary and that it would make us more aware of the humans on the other side of computer links.[106] Weiser also envisioned a future in which the problem of information overload would be overcome by machines that became part of the human environment instead of forcing humans to enter theirs. In Weiser's "smart" world, ubiquitous computing was used to support a more humane world, in which technology enabled better human interaction.

Weiser assumed that in the world of ubiquitous computing, virtuality will be omnipresently embodied in its materiality. This brings us to the next point — that is, if the "smart" world exists by embodying virtuality, then virtuality is in the body that makes the "smart" world. Jean Baudrillard suggests that the nature of postmodern simulacra is one where the simulacrum precedes the original: that is, all distinction between reality and representation is removed. What remains is only the simulation, and there is no originality to which one can return.[107] Baudrillard calls it the point of no return (dead-end) in simulation. The Board's decision is a pertinent indicator of the shift in our perspective on the face of technology that is shaping our actions, experiences and our moral decisions.[108] The Board's judgement shows us their perceived dematerialisation of our corporeal beings in the presence of "smart". Since "smart" seems to be connecting everything, their decision ignores the physical connection of the station to the urban landscape, where the passenger, after walking in the sun, may be thirsty, or the young parent may need to change a nappy, or where the elderly may need to sit down before going out to the city. It seems everything that does not keep up with "smart" is not acknowledged: thirst, smelly toilets, or real communication which may happen in proper seats are viewed with scorn. The architect Teherani envisioned a 'visualised sustainability' for the U5 stations: with this, what is kept upright is the skin, that fills the station with patterns, colours and stylised forms. In accordance with Baudrillard's system of simulacra and simulation, the new series of smart stations on the U5 line are planning to keep the simulations and ignore the living bodies.

106 Ibid., p.104

107 Baudrillard, Jean (2010) *Simulacra and Simulation*, trans. by Sheila Faria Glaser (Ann Arbor, MI: University of Michigan Press), p. 100

108 Verbeek, Peter-Paul (2012) *Moralizing Technology: Understanding and Designing the Morality of Things*. (Chicago, IL: University of Chicago Press), p. 4

3.3.3.3 Importance of Automotive Cities for the Smart Context

From the early 1920s to the 1960s, many cities in North America and Western Europe were destroyed and rebuilt to accommodate automobiles. These "automotive cities" encouraged transportation via privately owned vehicles.[109] Peter D. Norton writes about how a technological artifact, the automobile, changed the social construction of the urban space, and old ways of using streets were readjusted to accommodate the new automobile culture.[110] Now, almost after a hundred years, many cities in Europe such as Paris, London, Stockholm, Copenhagen and Bremen, amongst others, are reclaiming the human qualities of the city. They are providing more bicycle and pedestrian lanes, improving public transportation, imposing high taxes on automobiles and reducing parking space on the streets. What we need to learn from the automotive city planning experience is not the demise of privately owned vehicles in twentieth-century urban planning,[111] but the fact that a totalitarian approach to city-planning based on our limited understanding of technology or products is doomed to failure over time. The example of the automotive city shows us how technology-focused decisions run the risk of becoming oppressive not only for human users but also for the socio-ecological environment of the city.

In my initial meetings with Hochbahn, one of the pre-eminent concerns that they had for the new U5 metro line project was the project's foundational validity (as already discussed in Section 3.2). One of Hochbahn's main concerns was to operate in a future-proof way in this age of disruptive technology. In the period that I worked with Hochbahn, I realised that it is impossible to provide Hochbahn, or anyone, with an obsolescence-proof solution. But what may work is a more *humane*-centred strategy, for the simple reason that the human user is indeed the most reliable constant of this system. During my consultation work with Hochbahn we investigated what a *humane*-centred strategy for the next generation of smart stations might be, and a tangible solution that came as a result of implementing the design principles from the first phase in the real case of the Steilshoop Station involved providing toilets, drinking water fountains and comfortable seating – these were probably very humble objectives for one of the most modern metro stations in the world.

The nature of my work with Hochbahn was more systems-centred than object-centred. I saw my work as creating the interface between two environments (see Diagram 3.1). This is similar to the surfaces described by Paul Virilio that are also an interface between two environments that are ruled by a constant activity in the form of an exchange between the two substances placed in contact with one another.[112] In the urban context of Hamburg the two substances may be defined as citizens and the socio-ecological system of the city that provides for them. As transportation providers our main aim is to ease the exchange between the two substances, and this is facilitated by providing (using Virilio's terms) *surfaces* that act as interfaces between the two substances. What becomes clear in this metaphor is that via the surface the service provider helps the interaction between the two substances: in the context of this research it is the passenger and the urban landscape. Therefore, the point of focus is not the aid – that is, the U5 metro line system – but the commuter

109 Newman, Peter (2015) 'Emerging Cities and Automobile Dependence', in: Peter Newman and Jeffrey Kenworthy (eds.) *The End of Automobile Dependence* (Washington, DC: Island Press), pp. 77 – 103, <https://doi.org/10.5822/978-1-61091-613-4_3>

110 Norton, Peter Daniel (2008) *Fighting Traffic: The Dawn of the Motor Age in the American City* (Cambridge, MA: MIT Press), p. 1, <https://doi.org/10.18130/v35k94>

111 Vanderbilt, T. (2010/2011) 'Cars' in 'The New Urbanism', *World Policy Journal* 27:4, Winter 2010/2011

112 Virilio, Paul (2012) *Lost Dimension* (Cambridge, MA: MIT Press), p. 34

and the city which the metro line is serving. By emphasising the nature of "smart" in the new U5 metro line, Hochbahn is focusing on the aid: it is making in essence the same mistake as the planning of the automotive city. Smart stations come into existence for the passenger and will be situated in the city as a part of it – this is an important power relation.

In my work with Hochbahn I was continually hoping to find a solution where technology and the resources of ubiquitous computing could be merged with social knowledge to create stations that are also places of sojourn, hoping that stations would thus become the "third place" that Oldenburg envisioned, where qualities like democracy, equality and solidarity provide the foundational grounds for pluralist existence, and diversity is not only accepted but also valued, to create a resilient community life.

Reflecting back, I now realise the complexity and murkiness of the situation I was confronting. When Hochbahn asked me to join in as a consultant for the U5 station planning, I believed they were in earnest. During the strategic planning for the Steilshoop metro station we used a participatory process in which, apart from Segment 1 (the Board) all the other segments were either physically present, or they were represented. As Pelle Ehn writes, "Participatory design raises questions of democracy, power, and control at the workplace. In this sense it is a deeply controversial issue, especially from a management point of view".[113] The rejection of the final co-designed proposal by the Board was a clear sign of a rigid top-down implementation. Today, I realise that the failure of the participatory undertaking had already been planned in the hierarchical company structure (ref. Diagram 3.2). As an external observer to this, I realise that the Board knew from the beginning what they wanted, and this clearly left no room for any co-designed scheme.[114] What was being staged with workshops and external experts was merely an outward-facing nod to a cynical agenda, to meet the legal protocols related to normative jargon such as user research, design thinking and barrier-free, inclusiveness, amongst others. The Board, who retain the sole power to make decisions, is only accessible to Segment 2, in Diagram 3.2. They never participated in any of the four workshops conducted during the first and second work phases. Also, to dismiss the work achieved over a period of an entire year by several managers from Hochbahn and the City of Hamburg Senat, along with external experts, confirms again the pernicious nature of this high-handed management style. The change I wanted to bring in could therefore only be realised when it was made by those at the top: there were clearly two tracks of decision-making at work – one had power and the other was a false construct to appease a myriad of 'best practice' policies that, in reality, mask the actual power of those with a vested interest in maximising profits and minimising any aspect of the design which attempts to accommodate, or embrace, a "messy" reality. It is clear why toilets and comfortable seating have been designed out.

113 Schuler, Douglas, and Aki Namioka (eds.) (1993) *Participatory Design: Principles and Practices* (Hillsdale, NJ: L. Erlbaum Associates), p. 41

114 Acklin, Claudia, Leon Cruickshank, and Martyn Evans (2013) *Challenges of introducing new design and design management knowledge into the innovation activities of SMEs with little or no prior design experience*, 10th European Academy of Design Conference, Gothenburg University, 17 – 19 April 2013 (Talk, Paper)

115 Amongst others this was one of the first publication on this: Negroponte, Nicholas (1996) *Being Digital* (London: Hodder & Stoughton)

116 Molotch, Harvey Luskin, and Laura Norén (2010) *Toilet: Public Restrooms and the Politics of Sharing* (New York University Press), p. 2

117 The Local (2020) 'How the commute to work in Germany is changing', <https://www.thelocal.de/20200207/why-are-more-and-more-people-in-germany-commuting-to-work> [accessed 21 October 2020]
Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) (n.d.) 'Erreichbarkeiten und Pendlerverkehr', <https://www.bbsr.bund.de/BBSR/DE/themen/verkehr-mobilitaet/erreichbarkeiten-pendlerverkehr/_node.html> [accessed 21 October 2020]

3.3.4 Meditations on Public Toilets / The Politics of Dematerialisation

As I write this, (Autumn 2020) I observe how the dire severity of the COVID-19 pandemic has collectively made us perceive our corporeal self as a liability – one that becomes sick, infects and dies. To deal with its frailties and unpredictability we avoided, isolated, tamed and disinfected it. Along with this the human bodies (fallible atoms) were preferably replaced with the sempiternal digital bits. This burden of the material Self is not just peculiar to the COVID situation but is rather a *zeitgeist* towards dematerialisation.[115] The pandemic has increased our aspiration towards bits against that of atoms, making us hopeful of compensating the failings of our physical body with the exactness, speed and efficiency of ubiquitous computing. From this perspective, Hochbahn's decision to rule out toilets from their new series of smart stations seems to be a matter-of-fact consequence of our *zeitgeist*. Like in the earlier text (Section 3.3.3) where I investigated the nature of "smart", I again use the toilet-conflict with Hochbahn as a spring board to understand the consequences and meaning of denying the fulfilment of basic corporeal *matter-reality*, for the human-users in a *smart* (station) system.

The act of using a public toilet is doing the private in public,[116] pushed by the bodily needs that are often not easy, possible or healthy to hold back. By focussing on this rather unspectacular case of station restrooms, I want to bring to light the most primal but unspoken user need. The toilet conflict with Hochbahn shows us how stakeholders serving the public domain conveniently choose to ignore the issue of toilets and how a conscious engagement with this may change the quality of our sojourn in transit spaces and bring about a sense of deeper social betterment. The argument against toilets in a smart station context, as explained at length earlier, is also supported by the new urbanism trend that supports the 20-minute neighbourhood, but the reality is that most people work and commute in a larger radius. In Germany, the average length of commute increased from 14.8 kilometres in 2000 to 16.9 kilometres in 2018. In 2018, almost 60 percent of all employees left their communities to get to work, while in 2000 it was only 54 percent.[117] In the UK, in the period 1988

Image 3.16
A toilet poster, Tokyo Central Station, Tokyo, 2019

to 2014 commuting journeys became longer – both in distance and time taken.[118] The unavailability of clean toilets in the public sphere is an issue of great concern, as it reduces the quality of life in the city not only for those who urgently need to use the toilet but also for those who later walk through the stench of urine.

According to Clara Greed, Julienne Hanson and Jo-Anne Bichard, toilets are the missing link in increasing the use of public transport. Bichard[119] uses the term 'bladder leash' to describe the physiological constraint most users of public transportation build into their journey planning.[120] An inclusive urban design is one in which the needs of the weakest user are considered, and providing facilities like toilets[121] and drinking water fountains (as designed and promoted by Sir Richard Wallace in the city of Paris in the late nineteenth century) is a *Grundversorgung*, or basic infrastructure in service of the citizens. Kate Washington also argues that the availability of toilets in the public realm increases the use of public transportation, and this in turn helps to maintain the goals of sustainability in the city.[122] Like Bichard, Hanson and Greed, Washington further argues that the use of toilets is a basic physiological need of all humans, and urban areas of high-density clusters must prioritise the provision of clean toilets as an issue of human dignity. But sadly, toilets in most urban set-ups are considered as a high-maintenance cost factor and not understood as a humane issue.[123]

Unlike other German cities, the city of Berlin addressed the public convenience situation by providing 280 new public toilets in 2018, but unlike the city of Paris, where public toilets and drinking water fountains are offered free of charge, the city of Berlin charges a fee of 50 cents for using the toilet.[124] This faced immense criticism, as many citizens considered the provision of toilets as part of the infrastructure of a city, like dustbins and benches. In 2020 Berlin again announced plans to provide 68 new toilets in areas that enjoy high levels of tourism.[125] This case of public toilets in Berlin shows us how the issue of toilets may be approached not, as Washington expresses it, as an issue of human dignity and an indicator of civilization, but as an economic tactic to make tourism more attractive.[126] Harvey Molotch reflects on the word *toilet*, "calling on its French connotation, to cover people's acts of intimate caring to themselves decently competent and without bodily offense."[127] For Molotch "peeing is political, and so is taking a shit and washing up." The urban space is organised by various stakeholders: investors, service providers and the state itself. The access to public utilities is not always based on providing for the most primal human needs. The practicalities for covering up for these missing utilities are many: "how long till I again have access to a toilet?" is the most central of all the questions that influences our journey planning. Followed by: will it be clean enough for me? Or, will there be a possibility to clean myself afterwards?[128]

In 2016 Rainald Grebe, a German citizen, sued the state of Rhineland-Palatinate at the Administrative Court in Koblenz against the 70-cent fee at rest stops.[129] Grebe argued that toilets on the German highway come under the State's basic service towards the citizens *(Daseinsvorsorge)*, therefore all the pay-toilets (Sanifair) should be made free. The court ruled out Grebe's lawsuit by referring to the existing free toilets[130] in the motorway and asserting that German citizens do not have a legal entitlement to free toilets, also services that ensure a *Daseinsvorsorge*, like drinking water, are not always free. In addition, Grebe had also chosen the wrong addressee, the state of Rhineland-Palatinate, as it was the Federal Government which actually allocates funds for the motorway maintenance.[131] During the field research I observed three models of public toilets in Germany - the first are rarely available, these are free of cost but very dirty and unsafe for use. The second are pay toilets from companies like Sanifair or McClean. They follow the *bon-system*, a toilet use costs either 1 Euro or 70 cents, out of which the customer receives a part of this as a voucher, that could be used for payments in specific stores above a purchase value of 5 Euros. The third kind of toilets are usually situated in big departmental stores, theatres, cinemas and also restaurants. Here a woman (mostly non-German) in a cleaner's uniform greets you with a mop, and once you are done she thanks you and shows you the tipping bowl. Almost all the users leave a coin or two behind, which is sadly cashed in not by the cleaning staff but what some journalists[132] and non-government organisations[133] have been calling the *Toiletten Mafia*. Elaborating on this is not my intention here, simply to briefly describe the rather odd public-toilet culture in Germany; against a backdrop of this, providing free and clean toilets as a part of Hochbahn's business model is more far-fetched than building the most modern smart station metro system in the world!

In my last meeting with Hochbahn, they stressed their new "human-centred" approach in devising the mobility service around the *Hamburger Takt*. In this highly publicized model, the city of Hamburg provides throughout Hamburg at all time a mobility service every 5 minutes to get people from A to B. On the other hand, toilets are unglamorous, they do not represent speed or efficiency, those who need them seek them in silence and those who may plan or maintain them do it in hiding. Thus, discussing toilets in the context of the smart system, is unceremonious and opens an area of discussion no one wants to enter. I feel precisely for this reason one needs to address this matter-of-course attitude where toilets are ignored, and instead Teherani's rather frivolous vision of a visualised sustainability is celebrated (Section 3.3.2). Along with this, Hochbahn's emphasis on Smart is a classic Cartesian elevation of the mind over the body[134], where the rejection of toilets is a rejection of the body. As toilets represent issues of human dignity and personnel hygiene, absence of these creates an exclusive system built for young healthy men, who can supress their bodily needs or take an inconspicuous leak around the corner. For the rest of us: babies, children, menstruating women, lactating mothers, older (wo)men, the anxieties of our basic bodily needs undermine our sense of wellbeing within these spaces. Molotch writes that "whatever the setting or scale of the problem, we have in the toilet an instrument and institution that both reflects how people and societies operate and also reinforces the existing pattern".

118 Department for Transport, London (2017) 'Commuting trends in England 1988 – 2015', <https://www.gov.uk/government/publications/commuting-trends-in-england-1988-to-2015> [accessed 21 October 2020]

119 Bichard, J.-A., J. Hanson, & C. Greed (2013) *Access to the Built Environment / Barriers, Chains and Missing Links* (London: University College London), p. 21

120 Ibid.

121 Greed, Clara (2003) *Inclusive Urban Design: Public Toilets* (London: Routledge), <https://doi.org/10.4324/9780080495354>

122 Washington, Kate (2014) 'Go Before You Go: How Public Toilets Impact Public Transit Usage', *McNair Scholars Online Journal*, 8.1: pp. 46 – 72, <https://doi.org/10.15760/mcnair.2014.46>

123 Ibid.

124 Der Tagesspiegel (2018) Maris Hubschmid 'Das Klo-Konzept ist notdürftig!', <https://www.tagesspiegel.de/berlin/oeffentliche-toiletten-in-berlin-das-klo-konzept-ist-notduerftig/22750278.html> [accessed 21 October 2020]

125 Berlin.de (2020) 'Öffentliche Toiletten für Berlin', <https://www.berlin.de/sen/uvk/verkehr/infrastruktur/oeffentliche-toiletten/> [accessed 21 October 2020]

126 Washington, Kate (2014) 'Go Before You Go: How Public Toilets Impact Public Transit Usage', *McNair Scholars Online Journal*, 8.1: pp. 46 – 72, <https://doi.org/10.15760/mcnair.2014.46>

127 Molotch, Harvey Luskin, and Laura Norén (2010) *Toilet: Public Restrooms and the Politics of Sharing* (New York University Press), pp. 1 – 21

128 Ibid.

129 Recht aktuell (2017) 'Verwaltungsgericht Koblenz: Urteil 5 K 1284 / 16. KO – Kein Anspruch auf unentgeltliche Benutzung von Toiletteneinrichtungen an Autobahnraststätten', <https://www.kostenlose-urteile.de/VG-Koblenz_5-K-128416KO_Kein-Anspruch-auf-unentgeltliche-Benutzung-von-Toiletteneinrichtungen-an-Autobahnraststaetten.news25219.htm> [accessed 21 October 2020]

130 These free toilets, which the court is referring to, are a part of the motorway parking lot. These are known to be dirty, smelly and unsafe. Along with this most of these parking lots are devoid of restaurants or any facilities that provide meals and other provisions.

131 Der Spiegel (2017) 'Kabarettist Grebe scheitert mit Klage gegen WC-Gebühr', <https://www.spiegel.de/panorama/justiz/teure-pinkelpause-kabarettist-rainaldgrebe-scheitert-mit-klage-gegen-wc-gebuehr-a-1181674.html> [accessed 12 October 2020]

132 Das Erste (1998) Verena Formen, and Stephan Wels 'Millionen für Toiletten-Mafia – Skrupellose Unternehmer beuten Klofrauen aus', <https://daserste.ndr.de/panorama/archiv/1998/Millionen-fuer-Toiletten-Mafia-Skrupellose-Unternehmer-beuten-Klofrauen-aus,erste6992.html> [accessed 21 October 2020]

133 Evangelisch.de (2012) Philipp Alvares de Souza Soares 'Im Geschäft mit dem Geschäft regiert die Toiletten-Mafia', <https://www.evangelisch.de/inhalte/107688/08-02-2012/im-geschaeft-mit-dem-geschaeft-regiert-die-toiletten-mafia> [accessed 21 October 2020]

134 Bordo, Susan (ed.) (1999) *Feminist Interpretations of René Descartes, Re-Reading the Canon* (University Park, Pa: Pennsylvania State University Press)

Image 4.1
Tokyo, 2019. The way out of an underground station

4 Conclusion

4.1 Summary

In this section concluding my research, I look back to reflect and make an inventory of my PhD journey, on which I embarked out of an epistemic curiosity to find how designerly capabilities may create a *better* world – a world that is situated in solidarity, equality and fairness. My point of departure was the work I had done in the automobile industry as a colour and material designer. This defined my research question at the object level: how does materiality within transit spaces inform and influence commuter behaviour? This object-level question was positioned in a larger seeking, the meta-level enquiry. These enquiries with which I set out used the framework of a PhD to investigate the issue in its depth and complexity, and to understand in what capacities I as a practicing designer may be able to make an effect, that benefits the larger *system*.

I started my object-level investigations by acquainting myself with transit spaces. For this I developed and used the IBO method. Although, the field investigations were more concentrated in the initial part of the research, it continued throughout the period of the PhD. The field research helped me situate my enquiry in its real- life context. Being in the field quickly made me realise the complex nature of the task, and to support my research I sought guidance from a wide range of experts. These included amongst others, public transportation providers, architects, philosophers, designers and anthropologists. My field research along with my interaction with experts were spread over various geographies. The insights from these made me re-frame my understanding of *materials*.

The wellbeing of passengers in train stations is deeply connected to their *geographical experience* in the space. Edward Relph defines geographical experience as, "the entire realm of feelings, acts and experiences of individuals in which they apprehend themselves in a distinct relationship with their environment."[1] Relph's geographical experience is similar to Gernot Böhme's idea of *atmosphere* as both refer to an immersive experience in a place, in ways that affects our disposition and are not to be located precisely.[2] But unlike Böhme's idea of atmosphere that deals with the more ephemeral quality of the architectural space, Relph's idea of geographical experience goes beyond the atmospherical quality of space to also include the more basic physical relationship of the user with the environment. Precisely, this physical relationship of the passenger to the transit space, defines their quality of sojourn.

1 Relph, Edward (1985) 'Geographical Experiences and Being-in-the-world. The Phenomenological Origins of geography', in: David Seamon, and Robert Mugerauer (ed.) *Dwelling, Place and Environment. Towards a Phenomenology of Person and World* (Dordrecht: Nijhoff), p. 20.

2 Böhme, Gernot (2017) *The Aesthetics of Atmospheres: Ambiances, Atmospheres and Sensory Experiences of Space*, ed. by Jean-Paul Thibaud (London: Routledge)

3 The Other is everything that is not the Self.

4 Glanville, Ranulph (2009) 'The Self and the Other: the Purpose of Distinction', in *The Black Boox*. 1. Vol. 1 (Wien: Echoraum), p. 479

5 "Bewusstsein von etwas" (Hut III/1, 188) zu sein. [Meaning of Intentionality], in Ebner, Klaus, and Helmuth Vetter (2005) *Wörterbuch der phänomenologischen Begriffe* (Hamburg: Meiner)

6 Crotty (2015), p. 44

The physical relationship of the passenger with the built environment is firstly perceived by the body's senses, to be then facilitated by the body's cognitive reaction to assure a more comfortable stay of the user in these spaces. Thus *materiality*, in my investigations about Human-Material-Interaction, comprises the percepts of the architectural quality of the space perceived by the body's sensory apparatus like: colour, olfactory encounters, aural quality, colour temperature, humidity, amongst others. This reinterpretation of *materials* made a crucial shift in focus within the research! Material before the field research was perceived largely in its exteriorised form, but now by experiencing them via the senses it became an interiorised process of reaching out to the world in the process of building a sense of wellbeing with it and through it.

This realisation came not only from my field research but also through my readings in philosophy about the Self and the Other. At the core of this research is the human, the material and the interaction between them. This dichotomy: the Human-Material, Self-Other, Passengers-Service Providers, Designer-Organisational systems, is the recurrent theme in this research. The construction of meaning for the Self is done in the interaction with the Other. By reframing the meaning of *materials* and by interiorising the perception of *materiality*, this PhD has enquired into the process of interaction with the Other,[3] hoping that this may enable us (using Glanville and Francisco Varela's expression) to create "things"[4] and negotiate solutions that are systems-centric and not profit-, goal- or user- centric.

In my philosophical reflections[5] on the Self and the Other I realised that truth, or *Wahrheit* (this German word is closely related to *Wahrnehmung*, discussed previously, meaning perception, *wahr* 'truth', *nehmung* from *nehmen*, 'to take'.) comes into existence only in our *interaction* with the *Other*. Thus, ethics like truth comes only to exist in our dealings with the Other[6]. Refer Diagram 4.1.

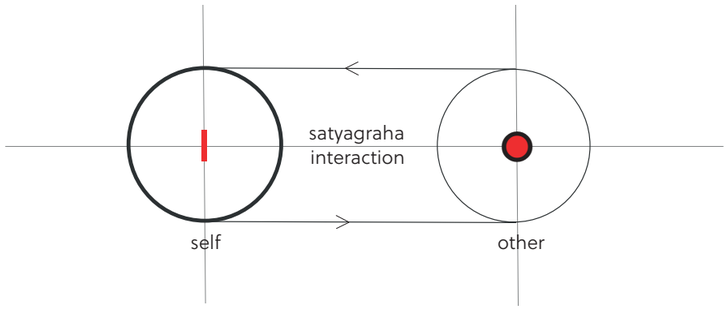


Diagram 4.1
The interaction between the Self and the Other via the insistence on truth, or *Satyagraha*.

7 ibid.

Between the Self and the Other both intentionality and consciousness play an important role in understanding the relationship between the conscious subject and the object of the subject's consciousness. The Other is shaped by the Self's intended consciousness towards it, and does not exist independently of it.[7] This has been the core philosophical location of this work, but instead of being just a code of conduct, these philosophical reflections actually influenced the work in a way that both the IBO method and the framework for Dissecting Organisational Systems arose from the interaction with the Other by the insistence on truth, or *Satyagraha*. The IBO method and the framework for Dissecting Organisational Systems contribute to original knowledge and are discussed later. The field research helped me situate my enquiry in its real-life context. The grounded reasoning developed through the IBO method gave my arguments more credibility while working with the service providers. My work with Hochbahn continued for a little more than a year, during which I worked with the senior management from Hochbahn and the Senate of Hamburg to develop the design and architectural guidelines for the new series of Smart Stations. To work with Hochbahn I developed and used the framework for Dissecting Organisational Systems. This framework helps one to establish a working relationship with artificially organised systems like firms, companies and institutions, within the context of a particular task.

During the first phase with Hochbahn I worked closely with external experts like IXDS, Berlin and the architectural studio Hadi Teherani to develop design and architectural principles for the new series of smart station on the U5 line. The principles were finally developed in a participatory style two-day workshop with the senior management from Hochbahn. One of the core discussions in these sessions were the marketing jargons used in the company's mission and vision statement and its real implications for the service that was provided by Hochbahn. At the end of the first working phase the design and architectural principles for the new series of smart station on the U5 line were laid down and it was agreed that the studio of Hadi Teherani (who had won the first tenders) would put it together in the *Gestaltungshandbuch* along with other details. As discussed in Section 3.3, the *Gestaltungshandbuch* became another publicity stunt, and did not fulfil its intended function.

During my work with Hochbahn I believed in earnest that it was possible to bring in a more *humane*-centred way of decision making. Therefore, after this first failing with Hochbahn I used the Dissecting Organisational Systems framework to keep the conversation going with Hochbahn. With this I was hoping to understand firstly what went wrong between what we had democratically agreed to, and what was finally being presented in the *Gestaltungshandbuch*. I was again invited by Hochbahn to work on the more concrete design of the Steilshoop Station. Like the first phase the second phase of work was done by a participatory process with the mid-level management, (that is, Segment 2 in Diagram 3.2), in a two-day workshop. As previously discussed, the finalised more *humane*-centred planning on the smart station included free and clean toilets, drinking water fountains and comfortable seating.

After this phase my work as an external consultant to Hochbahn on the U5 project officially ended. The management (Segment 2) presented the architectural and design plans for Steilshoop station to the Hochbahn Board of Directors. In this rather short meeting, the Board rejected toilets, drinking water fountains and comfortable seating; this they justified on the nature of a smart station, where trains come every 90 seconds, and there is no waiting. Here smart stations are understood as exclusive islands and not in the extended context of the city. Hochbahn celebrates efficiency, speed, automatization over the messy realities of the aging, weak and needy body. The Board's anti-toilet decision is a typical cartesian perception of the dematerialised body – a corporeal negation in the presence of "smart". By keeping technology and not the human-user at the core of their planning process, Hochbahn is bound to make the same mistakes as the planers of the automotive cities in the 1950s.

The U5 project has left in me a feeling of *scheitern*, or failure, but also one of an assuring peace. In my work with the managers, I brought in the process of conscientisation or critical thinking. The decisions that we made were based on a democratic process. As Ehn noted, participatory design is a deeply controversial issue, especially from a management point of view, where it raises questions of power, and control at the workplace.[8] In this sense, the rejection of the final co- designed proposal by the Board was a clear sign of a rigid top-down implementation. Though this has not been questioned yet, it has surely been noticed by the mid-level managerial staff. Apart from the work with Hochbahn my research presentations on various platforms often started off lively discussions. For example: in one of the UITP meetings, my presentation initiated a heated debate on smart stations, based on which the EU project on smart stations was reframed as "fair stations",[9] and my work was quoted in the official website,[10] "... Shalini Sahoo's presentation on maintaining the human touch within public transport with the station as a natural focal point." Another important collaborator in this work was the IIID.[11] In 2017 I was invited to present the initial findings of my research at their *Traffic & Transport Forum*, *Session 'Information as a (Public) Service'*, Linz, Austria.[12] In 2019 I was again asked by them to present my research findings at the *Mobility Talks*, *Universal Mobility – barrierefrei war gestern*, Munich, Germany.[13] During this talk I was granted, on public request, double the presentation time to elaborate my work more in detail. It has been comforting to see my work being received with ample resonance in various platforms.

8 Ehn, Pelle (1993) 'Scandinavian Design: On Participation and Skill', in: Douglas Schuler and Aki Namioka (eds.) (1993) *Participatory Design: Principles and Practices* (Hillsdale, NJ: L. Erlbaum Associates), 1993, pp. 41 – 77

9 FAIR Stations (7 March 2018) 'FAIR Stations at the UITP Design and Culture Working Group Meeting', <http://www.fairstations.eu/2018/03/07/uitp-design-culture-wg-meeting/> [accessed 10 October 2020]

10 Ibid.

11 The International Institute for Information Design (IIID) is a global network for people who work to make information clearer – for everyday life, business, education and science.

12 Sahoo, Shalini, and M. Conti (2017) 'Harmonising Human Material Interaction (hHMI) within interiors of Public Transportation', in IIID, *Traffic & Transport Forum, Session 'Information as a (Public) Service'*, Linz, Austria, 22 – 23 November 2017 (Talk)

13 Sahoo, Shalini (2019) 'Universal Mobility – barrierefrei war gestern' (Talk), *Munich Creative Business Week*, 2019, <https://2019.mcbw.de/sprecher/detailseite/speaker/shalini-sahoo-sahoo.html> [accessed 10 October 2020]

Image 4.2
Bunkyo City, Tokyo, 2019
Two girls taking a small break after school.

4.2 Research Contributions

The research contributions in this PhD have been at three levels — ethical, methodological and in terms of the "content". The new insights achieved:

4.2.1 The Ethical Insights

The ethical insights were largely developed at the meta-level enquiry. Here I aimed to understand how design research and practice may create products, services and spaces that instil in our society an environment of sustainability, democracy, equality and fulfilment of basic needs. To investigate this, I first used a systems-centric approach. Second, I enquired into the nature of *truth* or *Satyagraha*.

4.2.1.1 Designer as a Negotiator for the System

A systems-centric approach to designing is more than championing the user, because a dominantly user-centred design tends to out-balance other fronts that involves the service providers, maintenance, repair, profit generation or law and order. On the other hand, a design approach that lays focus on the needs of the service providers and concentrates on branding, marketing, profit generation may lose focus on the more veracious user needs. A systems-centric approach negotiates the optimal solution between the limitations of the service providers and the needs of the user. Thus, the main striving in this research has been to keep the interests of the "system" before everything else: generating a systems-centric solution has been the highest *Gebot* or precept in this work. This system exists in its simplest form as a dichotomy: at the micro-level with the *Sein* and the *Dasein* and at the macro-level as the Self and the ecological Other. A systems-centric approach is thus an inclusive approach, that understands the issue at hand in the totality of its context. It understands the system as one that is changing and is unpredictable. The solutions proposed arise, not from the traditional tool design[14] methodology, but rather by designing loose-fit solutions that serve the needs of various users (as identified through the IBO method) in negotiation (via the Dissecting Organisational Systems framework) with the limitations of the service providers.

4.2.1.2 The Aspect of *Satyagraha* in Design Practice

An important aspect in this research has been my sustained reflection on the overarching nature of ethics in design practice. For this I subjected myself to *Satyagraha* and the process of critical self-reflection. The path of *Satyagraha*, for me is not defined by any rigid notion of morality or idea of truth as something that can simply be seen or acquired, as it were readymade. It accepts, as Deleuze and Guattari argue, all things (and all beings) in relations of *becoming*.[15] *Satyagraha* incorporates in itself an inherent act of conscious seeking (re-searching),[16] reflecting and correcting. The ability to do critical reflection has been an important aspect in practicing *Satyagraha*. This rather philosophical practice deeply affected my work. For example, it was the insistence on standing by the true nature of field research, that eventually gave rise to the Immersive Behavioural Observation (IBO) method. The IBO method brings rigour into the otherwise questionable nature of self-collected evidences in the field. The second direct implication of abiding by these ethical principles was the creation of the framework for Dissecting Organisational Systems. This transforms the aspects of *Satyagraha* into a conversational strategy to bring about a democratically agreed and directed change. Here the aspects of *Ahimsa* or non-violence, which is similar to Levinas' philosophical reflections on alterity, is used to negotiate a more systems-centric solution with the Other.

In one of Gandhi's mystical descriptions of *Satyagraha*, he insists on the power of the path to reveal itself. He writes that "a struggle which has to be previously planned is not a righteous struggle." In my previous positions in the automobile industry I was required to do "research", but the final objectives were so clearly defined that one did not have the possibility to trust the path to unveil anything radically new. The final findings were already predefined in the research objectives and I had to work my way towards it with little or ideally no diversion. Therefore, in this PhD research it was important for me to trust the path and follow it. Hochbahn called me to join the U5 project because of my past expertise as a colour and material designer. But it was clear for me that I have no obligations towards Hochbahn for "designing" something novel, instead my obligations lay with the larger system to identify with humility what truly needs to be done and negotiate the best possible solution for it. Eventually it was the act of trusting the path and the insistence on truth that brought out the insights of envisioning stations as places of sojourn. For this I used the rather unglamorous toilet topic (along with drinking water fountains and comfortable seating) to raise the case of the frailest of users in the smart station. Over the period of my working with Hochbahn I increasingly used our discussions to bring out issues of a more humane station environment.

Image 4.3
Gloucester Road Station, London, 2017
The Gloucester Road Station was opened in 1868 and is served by the District, Circle and Piccadilly lines.

14 Ulrich, Werner (1985) 'A Review of C.W. Churchman's The Design of Inquiring Systems, New York, Basic Books, 1971', *Journal of the Operational Research Society*, 36:9, September 1985, pp. 873 – 876

15 "He bears witness, above all, to other relations with women, with animals, because he sees all things in relations of becoming." Deleuze, Gilles, and Félix Guattari (1986) *Nomadology: The War Machine* (New York: Semiotext(e)), p. 2

16 Ingold, Tim (2019) 'Art and Anthropology for a Sustainable World', *Journal of the Royal Anthropological Institute*, 25:4, pp. 659 – 675, <doi:10.1111/1467-9655.13125>

4.2.2 The Methodological Contributions

The methodical contributions are the Immersive Behavioural Observation (IBO) method and the framework for Dissecting Organisational Systems. These have their foundation in the ethical epistemology of the work and facilitate the translation of the rather abstract ethical ideologies on to the *real life* context of the object-level enquiry.

4.2.2.1 The Immersive Behavioural Observation (IBO) Method

I have developed the IBO method to collect and analyse Human-Material-Interactions in transit spaces. IBO is used when other methods of data collection like questionnaire and interview, involving direct participant contact, are not possible or are unlikely to provide the insights needed (of course, it can also be used as a complement to these other methods but to do that would have been beyond the scope of this, or any, PhD). It is used to study the behavioural and tacit patterns of users in their natural environment. The IBO method is about perceiving fluid phenomena[17] to understand how otherwise unnoticed situations unfold in public spaces. The value of knowledge stored in the *Lebenswelt* or the life-world is stressed by the phenomenological sociologist Alfred Schütz.[18] Schütz aimed to observe and analyse the essential structures existent in the *Lebenswelt*. His approach is one where social meanings, actions and situations are subjective constructions, where intentions of the social agents reveal and manifest themselves in various interactions.[19] IBO documents the interactions of the public life in public spaces.[20]

In the recent years the EU has been stressing an evidence-based policy making strategy.[21] Policies are directed towards a messy reality and as Abhijit Banerjee & Esther Duflow[22] show us we need creativity and expertise from various fields to deal with them.[23] Design as a discipline inherently deals with shaping the interface between the human and the world around them. The designerly capabilities are acutely needed to be represented in politics and in the process of policy-making. The IBO method attempts to make field-research evidence-based and more accountable to an inter-subjective perception. The IBO method like its foundational anthropological methods collects information by dwelling together with the participants (the observed) amidst their practical everyday activity. This act of participation creates a foundation of empathy based on which the researcher on field not only collects information but also "seeks to learn and understand". The IBO method facilitates an in-depth response to realities, not an imposition of synthetic concepts. This is done by grounding the field research in a framework comprising demarcation, documentation and decoding. The information collected by this process is then validated by the agile-dialogue method.

In section 2.1 I have discussed the IBO method I developed in order to achieve evidence-based field research. As explained earlier, IBO may be used when other methods like questionnaire and user-interview are not possible, but more importantly for the distinct insights it yields. Other methods like bio-metrics, where the user is wired so as to collect bodily reactions like change in heart beat or temperature,[24] only serve the function of collecting the data from the human element, the traveller, and the material other then plays only a background role. By contrast in the IBO method the information is collected by the observer immersing herself in the chronotope of the human-material-interaction.

17 Fluid Phenomenon: This refers to a transient phenomenon that occurs in a fleeting interaction between the user and the environment and may not leave any traces.

18 Schütz, Alfred (1967) *The Phenomenology of the Social World* (Evanston, IL: Northwestern University Press)

19 Dourish, Paul, and Graham Button (1998) 'On "Technomethodology": Foundational Relationships Between Ethnomethodology and System Design', *Human-Computer Interaction* 13 : 4, pp. 395 – 432, <doi:10.1207/s15327051hci1304_2>

20 Gehl elaborates on the difference between public life and public space, saying that public space is easier to work and communicate with whereas (public) life is ephemeral, and therefore difficult to describe. Gehl, Jan, and Birgitte Svarre (2013) *How to Study Public Life* (Washington: Island Press)

21 European Commission (2019) European Commission, Directorate-General for Mobility and Transport (DG MOVE) *Transport in the European Union: Current Trends and Issues* (European Commission, 2019), p. 3 <https://ec.europa.eu/transport/sites/transport/files/2019-transport-in-the-eu-current-trends-and-issues.pdf> [accessed 21 October 2020]

22 Banerjee, Abhijit V., and Esther Duflo (2009) 'The Experimental Approach to Development Economics', *Annual Review of Economics*, 1 : 1, pp. 151 – 78, <doi:10.3386/w14467>

23 Grandin, Temple, and Richard Panek (2013) *The Autistic Brain: Thinking across the Spectrum* (New York: Houghton Mifflin Harcourt)

24 Shoval, Noam, Yonatan Schvimer, and Maya Tamir (1998) 'Tracking Technologies and Urban Analysis: Adding the Emotional Dimension'. Cities 72 (February 2018): 34–42. <https://doi.org/10.1016/j.cities.2017.08.005> [accessed 21 October 2020]

25 Aicher, Otl (2015) 'philosophy and design', in: Otl Aicher *analogous and digital* (Hoboken, NJ: Ernst & Sohn, 2015), pp. 75 – 92, p. 88. Please note the citations retain the original style of writing with only lower case.

26 Zeisel (2009), p. 113

27 Castaneda, Carlos (1991) *A Separate Reality: Further Conversations with Don Juan* (New York: Washington Square Press), p. 10

28 Glanville, Ranulph (2009) 'The Self and the Other: the Purpose of Distinction', in *The Black Boox*. 1. Vol. 1 (Wien: Echoraum), p. 485

29 Spencer-Brown, George (2011) *Laws of Form* (Leipzig: Bohmeier)

30 Glanville (2009), p. 479

31 The Other is everything that is not the Self.

32 Von Foerster, Heinz (2010) *Understanding Understanding: Essays on Cybernetics and Cognition* (New York: Springer), p. 211

IBO as a design research method asks the question what it means to not just cognize the world but to understand it as shaped by design, particularly our embodied experience within spaces. In accordance with Ludwig Wittgenstein, Otl Aicher explains that usage as a new truth criterion: "listening and looking become an act of philosophy, and not a thinking operation within a complete system anymore. wittgenstein is now saying to his pupils: 'don't think, look!'".[25] In a way, this is what IBO tries to do: to observe the interaction, in this particular case between the human and the material within transit spaces. But in order to understand the complex relationship between the user and the built environment, to simply look at it is not enough. This is the reason why the observation in IBO has to be immersive, so as to partake in it via the medium of the lived body. IBO investigates the relationship between the lived body and its interaction with the materiality of the built environment, via sharing the same chronotope as the observed. Here, the processes of immediate experience and intuition gain a certain significance in comparison to abstract rationalism and scientific approaches to understanding reality.

In section 2.2.1, I discussed the various observations collected during the field research I undertook. Sections 2.2.2 discussed the analysis of my field findings. The examples cited here were from my own field research along with few case-study exceptions, like Medellin and the Gorky Park, where the information was collected remotely from expert interviews and other sources. These sort of remote case studies were used only to understand the overall systems-intervention in designing public transit spaces. Best practice examples such as from station designs need to be understood in their "atmospheric" quality and therefore have only been cited and discussed when the field research was my own. This is because the essential point of my method is to study station designs by experiencing them at an embodied level.

The IBO method thus attempts to compensate for what Zeisel and others call a foundational lack of standardised procedures for observing and interpreting by building in a theoretical framework.[26] In the IBO method this is not only done with observation, but by immersion – it creates a structured method in which you not only observe the behaviours of others but also become highly attuned yourself to the materiality of the environment.

4.2.2.2 Framework for Dissecting Organisational Systems

"In one of his first meetings the Yaqui-Indian medicine man Don Juan Matus asked the anthropologist Carlos Castaneda, '*Do you know anything about the world around you? ... I mean do you ever feel the world around you? ... That's not enough. You must feel everything, otherwise the world loses its sense.*'"[27]

The perception of the world that Don Juan initiates the anthropologist Castaneda into is one where to make sense one must feel the world around oneself. Making a sense of the world around is an act of attentiveness, an act of engagement – one of interaction with the (material) Other. Describing the Other, Glanville writes "... the self not only implies the other but is validated by the other."[28] For Spencer-Brown this is the act of making distinction. He argues how making an indication (what the Self is not) is only possible by making a distinction;[29] Glanville and Varela argue this further to prove that the constant redrawing of distinction is shown to create "things".[30] This "constant redrawing of distinction" is what I call the interaction between the Self and the Other. This PhD has enquired into the process of interaction with the Other.[31]

The Dissecting Organisational Systems framework is part of this approach. It uses conversational strategy to ensure an effective working with an artificially organised system, and in doing so it uncovers the dominant importance of language and its use. The framework aims to bring about a democratically agreed and directed change. It has been created for the consultant (represented by Segment 5, as shown in Diagram 3.2, also the Self) to become acquainted with an artificially organised system (the Other). This framework coordinates *what we see or hear that is not "there" with that we do not see or hear what is "there"*, by negotiating, firstly the perceived and later the envisioned "reality" with the Other.[32]

4.2.2.3 Limitations

The methods of IBO and the Dissecting Organisational Systems framework show how tools for reflection may be created by an active-dialogue between theoria and praxis. This exchange brings in a consciousness of possibilities and potentials inherent in a design(ed) intervention. The IBO method elucidates the lived body experience that is structured by design and the Dissecting Organisational Systems framework negotiates a democratically agreed plan to bring about a directed change in the system and via the system. Both these tools are ways of reflecting or doing *Satyagraha* so as to inform the design practice. In both of these, the act of observing is used like listening, opening up to the other in a way that the other is more than what we assume or perceive her to be. The method and the framework are also founded on the principles of understanding the Other, like that of Levinas[33] and working with the Other, like Freire.[34]

The main limitation of the IBO method and the Dissecting Organisational Systems framework is that they have not been tested on other cases and situations. Out of the two, the IBO method has been built on traditional field research methods and is more detailed. The method requires an unobtrusive participation of the observer in the field: this means that information is collected by observing users without their knowledge and consent. Although, most of the candid photographs are taken in public spaces, for academic research purposes only, and the method abstracts users in categories defined by their purpose or by their gender and age. One does collect information without informing the users. Another issue in the IBO method is that because the researcher is not in direct contact with the user, they are only marginal participants, and their fieldwork may miss the finer details that a qualitative interaction may bring with it. To some extent the agile dialogue process is designed to counterbalance this shortcoming.

The main issue with the Dissecting Organisational Systems framework is that, (as the name already suggests) it is a framework and does not outline the finer details of interaction with an artificially organised system. To do this one needs to work on several cases and use the experience to detail and further refine the framework.

32 Von Foerster, Heinz (2010) *Understanding Understanding: Essays on Cybernetics and Cognition* (New York: Springer), p. 211

33 Levinas, Emmanuel (1999) *Alterity & Transcendence* (London: Athlone Press)

34 Freire, Paulo (2018) *Pedagogy of the Oppressed,* 50th Anniversary edition, ed. Myra Bergman Ramos et al. (New York: Bloomsbury Academic), p. 12

35 Bernays, Edward L. ,and Mark Crispin Miller (2005) *Propaganda* (Brooklyn, NY: Ig Publishing); Lippmann, Walter (1993) *The Phantom Public*, The Library of Conservative Thought (New Brunswick, NJ, USA: Transaction Publishers)

4.2.3 The Content Contribution

The content contribution of this research ensues from the ethical and methodological underpinning. Although, I identify four main content-contributions below, these form an amalgamate in the main work – difficult to distinguish and perceived more as an overall essence. These also determined the process of conscientisation with Hochbahn and other service providers.

4.2.3.1 Articulating Fluid Phenomena

Although this work does not champion the user directly, it is intrinsically using the understanding of observed phenomena to analyse meaningful bodily relationships to the built environment, particularly in the use of transit spaces. These are the *fluid phenomena* – evasive and often leaving no trace behind. To use this elevation of the fluid phenomena – that are normally either not noticed or are ignored – as *valid information* to influence the decisions of the service providers, architects, designers and policy makers has been important in this work. For example in Image 4.4 & 4.5, the passengers sitting on chipboard, rather than the "designed" metal seats, is a paradigm here of a more general hypersensitivity to detail that I then firstly make sense of and secondly I am able to convey the importance of to the decision makers of the space. Later, as seen in Image 4.6 the construction of the ticket vending machine was completed.

4.2.3.2 Bridging the Gap to Service Vision

Almost 100 years back, Edward Louis Bernays showed us how a clever manipulation of public opinion may be used to influence the decision capacity of the "phantom public".[35] Since then the art of public relations has ever been perfected and nuanced. Hochbahn's award-winning company reports are no exception to this; they are attractively laid out with bright graphic accents and perfectly staged pictures. While studying these, I identified a fundamental mis-match between the claims made in Hochbahn's publicity campaigns (as service vision) and what they are planning to deliver in stations as actual material experience for the passenger. To thematise this discrepancy (as seen in Image 4.7) and help Hochbahn translate veraciously their service vision on to the materiality of the station design, has been an important task of this work.

4.2.3.3 Design Principles for Smart Stations

The station design principles, enunciated in 3.2.2.1.3, were developed to be implemented on the new series of smart stations on the U5 line. To generate this: the passenger needs as identified in the field research and Hochbahn's company vision was brought together (refer Table 3.7). The Design Principles were thus created in negotiation with the limitations of the service providers

and the more veracious needs of the passengers. Although the Design Principles for the U5 stations emerged from the collaborative work with IXDS Berlin and Hochbahn Hamburg, my contribution was the driving force behind translating the humane-focused, ethically based approach into specific, actionable principles. The Design Principles were at two levels: first, directly at the station level and second, at the city and the station's geographical location.

Image 4.4
Bremen, 2018

Image 4.5
Field notes,
Bremen, 2018

Image 4.6
Bremen, 2019

The Design Principles for the U5 stations were as follows:

1. Humane in focus
2. Inclusive design
3. Intuitively informing / avoiding ocularcentrism
4. Availability of real human contact in the station
5. Zone-specific use of materiality

Design principles concerning the city and the station's geographical location:

1. Part of the environment
2. Planning unplanned station space
3. Supporting communal living
4. Incorporate sustainability

4.2.3.4 Questioning Smart & the Materiality of our Existence

As mentioned earlier, the expression harmonising Human-Material-Interaction (hHMI), has been constructed as a pun on the more familiar term human-machine interface (HMI). A human-machine interface denotes the interaction between a machine and a human user. Human-Material-Interaction, on the other hand, articulates the interaction between human users and the materiality that surrounds them in a built environment. Human-Material-Interaction has been the fulcrum of this work, building its core ethical and methodical content. It also uncovered and thematised the problem of the split between, on the one hand, the technocentric, primarily digital visions of the service providers and, on the other, the material experience of passengers, in their living and breathing bodies. In this research I have enquired into the nature of smartness and how this is shifting our perception of the material Other. I have highlighted and questioned this drift of attention – from the messy reality of the waning body to our endless and rather senseless striving towards the simulation of it.

Image 4.7
Inside the Emirates
EK 60 flight, 2018

4.3 The Last Note

Public transportation is the foundational structure on which cities are built. This PhD enquiry aimed to create stations that are not only technology-, functionalism- or capitalism- centred but that are also *humane*-centred. Stations are places of sojourn. On a daily basis they host and serve a diverse range of human beings who share together their services and amenities. To foster a living environment, founded on democracy, the station needs to function as a "third space" – a communal space for "being", rather than an isolated area of consumption. Public spaces that transcend function and afford care for diverse groups of "guests on a temporary stay" also have the potential to nurture responsible and respectful citizens. Creating such a topography is essential for a sustainable communal life and the celebration of it – a space where peace can be negotiated, and plurality accepted.

This PhD enabled me to pursue something which had been preoccupying me consistently since my youth. That is, what does it take to bridge the gap between *what is* and *what should be*? This rather naive enquiry gained a more concrete form in this research. Here I realised that, apart from the actual design task, the enquiry concerned many aspects – the Other, the ethics of interaction, dissecting systems, directing change... I worked tirelessly to find my answers, by travelling through geographies and reading across disciplines. The more I enquired, the more I realised on one hand the seeming complexity of things and on the other the very simplicity of that which holds everything together. In the *Tao Te Ching*, Lao Tzu states that "It was from the *Nameless* that heaven and earth sprang. The named is but the mother that rears the ten thousand creatures, each after its kind".[36] This journey has been a humbling experience for me.

During the greater part of the research I did not know how my solutions would develop. I tried to keep my focus on the enquiry and on working in a systems-centric way. With Hochbahn it has been a labour of love: I used my abilities as a designer to bring about a democratically agreed change. My association with Hochbahn was punctuated by several unsuccessful and maybe a few successful attempts. If I could go back in time, the best I could do is tell the younger me to be less angry. I need to be patient with a system that is not naturally inclined towards this kind of change. This change is also structural in nature, and it may take time. The failure with Hochbahn seems all right. My work has a strong element of solidarity and social wellbeing; with this at its core I am critical and doubtful about the advantages of the much desirable "winner archetype" associated with the capitalist system.[37]

I hope to continue on this path, to bridge the gap between *what is* and *what should be*, in a collaborative interaction with the Other. The PhD experience has shown me the value of conversation, of veracity in our interactions, and of moving between worlds to collect the wisdom that is intimately enmeshed in the physicality of our being. I hope to use my designerly capabilities to negotiate a future that ensures the wellbeing of *all*.

36 Lao Tzu (1934) *Lao Tzu tao te ching: The way and its power and its place in Chinese thought*, trans. by A. Waley (New York, NY: Grove Press), p. 141

37 Pompeo, M. (2020) 'The West Is Winning', United States Department of State, United States Government, 15 February 2020, <https://www.state.gov/the-west-is-winning/> [accessed 10 October 2020]

Image 4.8
London, 1940
People sheltering in Piccadilly tube station.

Image 4.9
The building of the Cité des Sciences et de l'Industrie, Paris, 2017
***Wahrhaftikeit* or *Satyagraha* implies being systems-centric i.e., insistence on truth and privileging the concerns of the system above any individual or private gain.**

Appendix

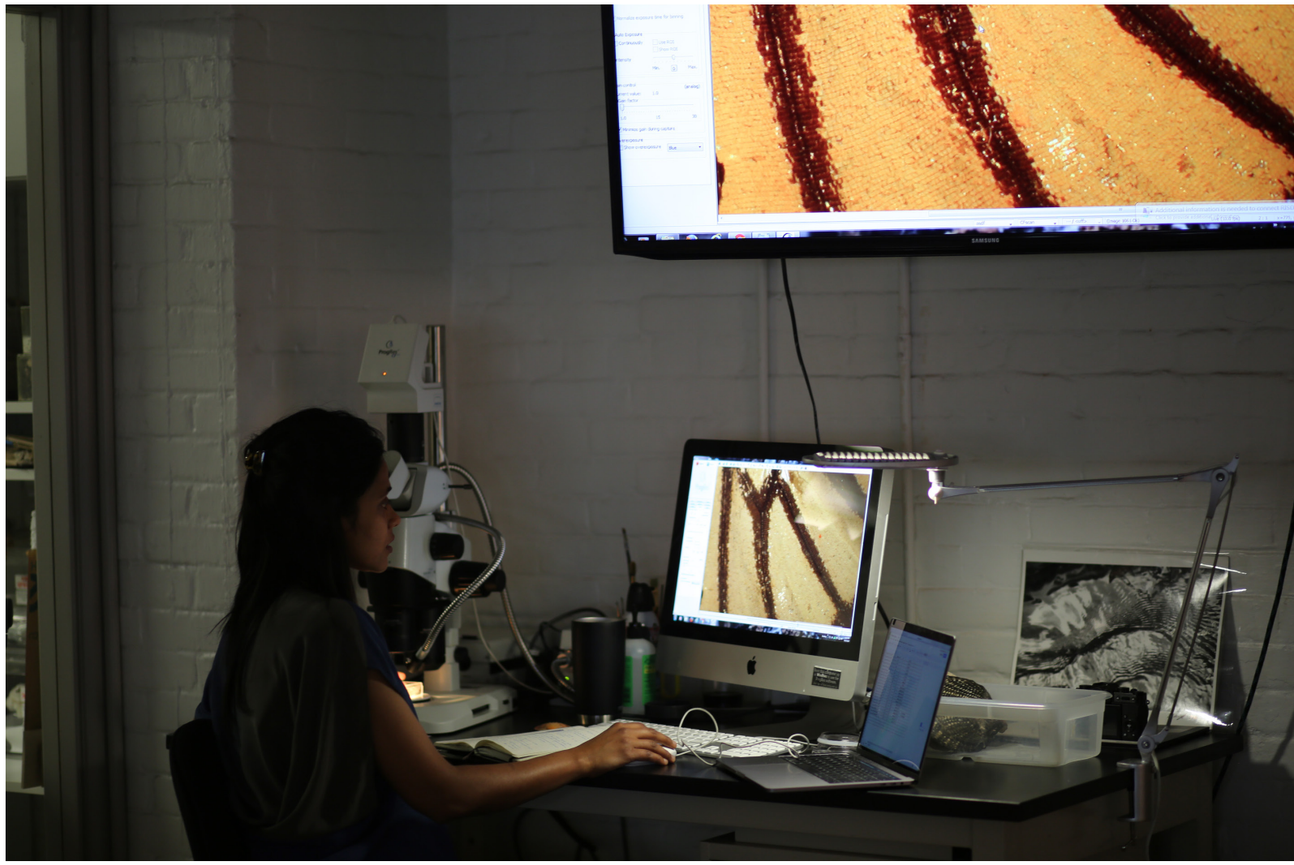
Image 5.1 & 5.2
The study in material semantics was embarked on to generate a rational understanding of surface textures and their affect on our sense of wellbeing.

The Road not Taken: Investigations in Material Semantics

Apart from this, my first approach to harmonising Human-Material-Interactions within transit spaces was to understand how material semantics infuences our sense of being in these spaces. For this I spent nearly 77 hours in the Nature Lab, at the Rhode Island School of Design, Providence. A total of 317 scans were collected from 117 different natural materials were made (Appendix: The road not taken, investigations in material semantics).

This work on material semantics started with a week spent documenting textures of different natural materials, from plant, animals and mineral origins with a spectro-microscope at the Nature Lab, Rhode Island School of Design, Providence. A total of 317 scans were collected from 117 different natural materials. The plan was to transfer a selection of textures onto four basic materials textiles, ceramic, wood and metal; use repertory grid technique for studying personal and interpersonal systems of meaning one would attach to these samples. I paused my work after the first stage after getting Hochbahn's offer to work on the U5 project.

Image 5.3
Naturally existing texture-patterns were studied with a spectro- microscope at the Nature Lab, Rhode Island School of Design, Providence, 2017.



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Research Collaborations

Name	Affiliation
Dr. Juhaani Pallasmaa	Former professor of architecture and dean of the Helsinki University of Technology, Helsinki, Finland
Harald Jordan	Civil Engineer and expert on traditional sacred architecture, Worpswede, Germany
Yo Kaminagai	Head of design, Project management department RATP, Paris, France
Evelien Tenelse	Dutch Railways, Customer Experience Consultant, Nederlandse Spoorwegen, Utrecht, Netherlands
Mark van Hagen	Dutch Railways, Customer Experience Consultant, Nederlandse Spoorwegen, Utrecht, Netherlands
Veronika Egger	Vice President, International Institute for Information Design (IIID), Vienna, Austria
Andrew Mead	Chief Architect, MTR Hong Kong
Michael Glotz-Richter	Der Senator für Umwelt, Bau und Verkehr, Referent 'nachhaltige Mobilität', Bremen, Germany
Rebecca Karbaumer	Der Senator für Umwelt, Bau und Verkehr, Referent 'nachhaltige Mobilität', Bremen, Germany
Agnès Peter	Manager – Design, Culture & Marketing, UITP: Advancing Public Transport, Brussels, Belgium
Stephanie Holk	Projektmanager Architektur U5-Ost , Hamburger Hochbahn AG, Bereich U-Bahn-Neubau U5, Hamburg, Germany
Jan Hendrik Schmidt	Projektmanager Architektur U5-Ost , Hamburger Hochbahn AG, Bereich U-Bahn-Neubau U5, Hamburg, Germany
Dr. Stefan W. Schmidt	Department of Philosophy, Bergische Universität Wuppertal, Germany
Dr. Claudius Giese and Gerda Giese	Ethno Textil Gallery, Bremen, Germany
Marcos Soares	School of Design, Royal College of Art, London
Prof. Timothy Ingold	Department of Anthropology, University of Aberdeen, Scotland
Iordanis Stylidis	Department of Architecture, University of Thessaly, Greece
Kostas Bartsokas	Kostas Bartsokas Ltd., Thessaloniki, Greece
Patrick Holz	Marketing & Sales. Konrad Hornschuch AG, Weißbach, Germany
Markus Pummer	Sales Center Upholstery, BOXMARK, Feldbach, Austria
Emily Riggs	Sales Support, Bolon Partner, Flooring Concepts, London, UK
Aurélie Duran Blanch	Sales, Concrete LCDA, London, UK
Mark Trayford	Marlborough Furniture Surfaces Ltd, Northamptonshire
Wolfgang Homola	Type and Graphic designer , Vienna, Austria

Abbreviations

The following lists and briefly explains a set of abbreviations that I use in the document.

BSAG: Bremer Straßenbahn AG (BSAG), is the public transport provider for Bremen, Germany, offering tramway and bus services.
CEO: Chief Executive Officer
EU: The European Union (EU) is a political and economic union of 27 member states that are located primarily in Europe.
hHMI: harmonising Human-Material-Interaction (hHMI), is from me created expression and acronym. It plays a pun on the term human-machine interface (HMI). A human-machine interface denotes the interaction between the machine and the human user. Human-Material-Interaction, on the other hand articulates the interaction between the human users and the materiality that surrounds them in a built environement.
IBO: Immersive Behavioural Observation (IBO) method has been developed by me, in order to analyse meaningful bodily relations to our environment, particularly in the usage of transit spaces.
IIID: The International Institute for Information Design (IIID) is a global network for people who work to make information clearer – for everyday life, business, education and science.
MTR: Mass Transit Railway (MTR) is a major public transport network serving Hong Kong. Operated by the MTR Corporation Limited.
NS: Nederlandse Spoorwegen (NS) is a Dutch state-owned company, the principal passenger railway operator in the Netherlands.
RATP: Régie Autonome des Transports Parisiens (RATP) or, Autonomous Parisian Transportation Administration, is a state-owned public transport operator and maintainer headquartered in Paris, France.
STM: Société de transport de Montréal (STM) or, Montreal Transit Corporation. As a public transportation enterprise, it is at the heart of the Montréal region's sustainable development.
TFL: Transport for London (TFL) is a local government body responsible for the transport system in Greater London, England.
UITP: Union Internationale des Transports Publics (UITP) is the International Association of Public Transport in Brussels, Belgium.
UN: United Nations (UN) is an intergovernmental organization that aims to maintain international peace and security, develop friendly relations among nations, achieve international cooperation, and be a centre for harmonizing the actions of nations.

Image Credits

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Image 4.9: People sheltering in Piccadilly tube station, London, in 1940. Getty Images

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Images

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Once when a journalist pestered Joseph Beuys on his inclination towards anthroposophical studies he remarked that the mysteries actually take place at the central station and not at Goetheanum. (‘*Die Mysterien finden im Haupt-bahnhof statt*’, Peter Brügge in an interview with Joseph Beuys on *Anthroposophie und die Zukunft der Menschheit* or, Anthroposophy and the the future of humanity, 04. 06. 1984)

Image 5.4
Liverpool Street Station,
London, 2017