Philosophy of Engineering and Technology

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**Technologies** 

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# Technology and the City

Towards a Philosophy of Urban Technologies



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### Chapter 1 Introduction



Michael Nagenborg, Taylor Stone, and Pieter E. Vermaas

**Abstract** Technology is no stranger to the city. Cities are planned, built, maintained, governed, demolished, and destroyed by technical means. Yet, the city has yet to receive much attention within the philosophy of technology. This volume addresses this gap, and in doing so contributes to the much-needed discussion on technology-enabled urban futures from the perspective of the philosophy of technology. In this introductory chapter, the larger volume is introduced by reflecting on the rationale and need for such a collection, sketching the main themes analyzed throughout, and providing an overview of the contributions.

Technology is no stranger to the city. Cities are planned, built, maintained, governed, demolished, and destroyed by technical means. Technologies can play a central role in making future cities more sustainable, making urban governance more transparent and just, and increasing the efficiency in various sectors ranging from transport to education. Conversely, poor planning and short-sited policy and design choices for urban technologies can exacerbate social, political, and ecological challenges. It should come as little surprise that questions of *why* and *how* to design and manage urban environments in the twenty-first century has emerged as a transdisciplinary topic of inquiry (e.g., Batty, 2018; Graham & Marvin, 2001; Sennett, 2019). Yet, neither does the city receive much attention by Philosophers of Technology, nor do Philosophers of the City consider technology to be a central topic. Recent volumes on Philosophy of the City offer important contributions to the burgeoning field via historical, ethical, aesthetic, ecological, and political analyses (e.g., Jacobs & Malpas, 2019; Meagher, 2008; Meagher, Noll, & Biehl, 2020; Stefanovic &

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Scharper, 2012). However, explicit and focused reflections on the technological nature of urban environments have occupied a peripheral role. Indeed, the last widely recognized contribution from a prominent representative of Philosophy of Technology on the city is Lewis Mumford's *The City in History* (1961).

The notable exception is discussions of "smart cities" and "smart urban technologies." All over the world massive investments are being made to realize visions of the smart city. This has spurred a growing body of (largely critical) scholarship on the ethical and political ramifications of said visions from adjacent disciplines (Cardullo, Di Feliciantonio, & Kitchin, 2019; Kitchin, 2016a, 2016b; Mitchell, 1996; Sadowski & Bendor, 2019; Sadowski & Pasquale, 2015). However, discourse on smart cities or smart urban technologies from within Philosophy of Technology has only begun to take shape (e.g., Epting, 2019; Martens, 2017; Nagenborg, 2018; Nagenborg, Albrechtslund, Klamt, & Murakami Wood, 2010; Ryan & Gregory, 2019; Stone, Santoni de Sio, & Vermaas, 2019; Voordijk & Dorrestijn, 2019).<sup>1</sup> Yet, even in these writings, the fundamental role of technologies in the urban lifeworld is taken for granted. Technologies of all scales-artefacts, buildings, systems, and infrastructures-are inexorably intertwined with the very concept of "city." To discuss social and political facets without appreciating and analysing the interrelated technological components is therefore to omit a defining feature of cities. Rather than framing smart city technologies as invaders into the urban lifeworld, we need to understand their role in discourse and praxis from within the context of an already technologically constituted urban lifeworld. We may still remain critical and ultimately reject these developments, but the reason should not be that we are addressing a technological development.

Philosophy of Technology can help to understand the role of urban technologies, and in doing so contribute to a more sophisticated and comprehensive approach to developing smart cities. As in Philosophy of Technology in general, we need to move from Capital-T Technology, which appears as a monolithic threat to Capital-C Culture (Franssen, Lokhorst, & van de Poel, 2018). Rather, we need to recognize the ambivalence and ubiquity of technologies in the life of city users, towards a more nuanced understanding of *how* different technologies foster or disrupt perceptions, behaviours, values, and politics. The contributions in this volume demonstrate how urban technologies shape—and are shaped by—fundamental concepts and principles, such as citizenship, publicness, democracy, and nature. And, they explore how to think about technologically mediated urban space as part of the human condition. Through these explorations, "smart" technologies come to be understood via critical and constructive examinations of philosophical concepts (e.g., authenticity), human experience (e.g., soundscapes), socio-technical practices (e.g., mainte-

<sup>&</sup>lt;sup>1</sup>Within Philosophy of Technology there is also a large body of literature that focuses on technologies and technology-related issues that can be categorized as "smart" (e.g., cell phones and apps, sensors, wearable devices, drones, AI, big data, etc.). However, the scope of these investigations remains at the level of individual artefacts or specific use cases, and are to a lesser extent contributions to Philosophy of the City.

nance), socio-political institutions (e.g., policing), urban form and planning (e.g., public space), and specific domains of application (e.g., streetlights).

The volume consists of three parts. The first part is dedicated to exploring technologies of the city. The chapters in this part are aimed at answering questions of how we can understand and know the city by means of technological mediation, technology-enabled practices, and technology-city relations. The second part features contributions to the responsible design of urban technologies. The focus here is on applying insights from the ethics (and politics) of technology to contemporary developments and concrete projects in urban planning and design. The final part broadens the scope and addresses potential urban futures, especially the underlying ideas of so-called "smart cities." In doing so, timely questions regarding, for example, the future of public space are brought to the fore.

#### 1.1 Part 1: Ontological Foundations: City-Technology Relations

The first three chapters study the city through the lens of aesthetics and artistic practices. Sanna Lehtinen and Vesa Vihanninjoki (Chap. 2) address the challenges of new and emerging urban technologies from the perspective of everyday aesthetics. They argue that we need to understand the impact of such technologies on our experience in order to improve the skills and capacities of city dwellers to adequately deal with these changes. The authors demonstrate how aesthetics and Philosophy of Technology can be brought together to better understand currently under-researched phenomena.

Tea Lobo (Chap. 3) highlights the value of contemporary literature as a "strange tool" to grasp the interplay between technology and city life. She argues that urban technologies also bring about new forms of life and are therefore also poetic in the sense of *poiesis*. Going back to the seminal writings of Georg Simmel and Walter Benjamin she first shows how the process of industrialization has been reflected and captured in the works of Charles Baudelaire and others. She then turns to three prominent examples of contemporary works, namely Zadie Smith, Rana Dasgupta, and Tom McCarthy to analyse how the process of digitalization can be explored through twenty-first century writings. She further argues that literature allows us to gain insights into what she calls "subjective modes of urban experience" which are not accessible via quantitative data analytics.

EL Putnam (Chap. 4) invites us to pay closer attention to the sound of urban spaces through a critical engagement with artistic works. In the first part, she discusses various projects that aim to map urban soundscapes, and thereby mediate the way that urban dwellers perceive such soundscapes. However, she also shows how such projects may not be sufficient to challenge dominant perceptions of the city. The case in point here is the reliance on Google Maps as the unchallenged base map. Therefore, she turns to different projects that challenge the base map by making use of re-designed listening technologies.

Vlad Niculescu-Dincă (Chap. 5) investigates an important facet of cities that, alongside many other practices and professions, is changing with new smart technologies: policing. For this, insights from Postphenomenology are applied to the role and effects of new digital technologies on the strategies used by law enforcement, combined with a detailed ethnographic study of policing practices in England and The Netherlands. Through this combination, Niculescu-Dincă shows how new profiling techniques can have certain biases layered into the system itself—an issue highlighted via drawing a comparison to *sedimentation* in geology. As smart technologies continue to mediate the perceptions and actions shaping policing practices, explains Niculescu-Dincă, there is an imperative to actively "dig up" these layers and examine the ethical issues at stake therein.

Mark Thomas Young (Chap. 6) and Marcel Müller (Chap. 7) offer philosophical explorations of a prominent subject in urban research: infrastructures. Young (Chap. 6) challenges the prominent role of infrastructure failure in the philosophical discussion. His main concern is that the sole focus on failures, which reveal what is otherwise hidden, stops us from paying due attention to other important aspects, namely the everyday work of maintenance, repair, and modification. Without denying the epistemic value of breakdowns, he argues that we will not be able to fully grasp the nature and role of infrastructures unless we also understand these other practices.

Marcel Müller (Chap. 7) combines critical infrastructure research, Philosophy of Technology, Phenomenology, and the work of Jean-Paul Sartre to study what it means to live within infrastructures. By going back to Sartre, Müller succeeds in addressing a blind spot in current works of the Philosophy of Technology caused by the emphasis on technological artefacts in use. As Müller shows, living within infrastructures has the desirable consequence of living in a stable and, thus, secure environment. Yet, infrastructures can also trap city dwellers in their routines.

In the final chapter of the first part, Jaana Parviainen and Seija Ridell (Chap. 8) bring together the topics of infrastructure and human bodies. While resonating with Müller's contribution, they offer a specific tool to understand the multiple ways in which power is enacted through infrastructures: choreography. Through analysing the technologically mediated kinaesthesia and movement trajectories of lived bodies, the authors demonstrate how city dwellers become enrolled in global cybernetic feedback loops on various levels.

#### **1.2 Part 2: Responsible Design of Urban Technologies**

The chapters of part two explore the needs and the opportunities for the responsible design of urban technologies. Rockwell F. Clancy and Aline Chevalier (Chap. 9) offer a rich case study on dockless app-based bicycle-sharing systems in China. The lessons to be learned from the particular and localized case go beyond the single technology. While the systems have been widely adapted, specific design choices in combination with lack of public policy-making resulted in contested spaces and

significant waste issues rather than a viable addition to existing transportation systems. The chapter, thus, makes a significant contribution by raising questions about design, the privatization of transport services, and the challenges of integrating new alternatives into existing transportation infrastructures. Further, it offers an in-depth case study exploring the impacts of emergent technologies and the important role that cultural factors play in their ultimate use patterns.

Kevin Mintz (Chap. 10) addresses the need for universal design to ensure that people with disabilities have equal access to a city. He also addresses the tension between assistive technologies and universal design by arguing that technologies assisting people with disabilities are an important element in realizing universal design principles. Mintz not only provides illustrative examples of disabiling urban design, but also grounds his work in the ongoing debate about disabilities and distributive justice.

The next two contributions investigate the opportunities for the value-sensitive design of particular technologies. Taylor Stone (Chap. 11) focuses on a seemingly mundane technology system, street lighting, and recent developments in making streetlights more sustainable by using LEDs and "smart" technologies. He proposes the value-sensitive framework of *designing for darkness*, which aims at incorporating substantive environmental values and making room for meaningful nighttime experiences. The chapter includes three design proposals to show the alternatives available and to highlight the differences responsible design can make to future urban nightscapes.

Pieter E. Vermaas and Sara Eloy (Chap. 12) provide us with a critical reflection on digital tools for urban and architectural design. They consider 'shape grammar' design systems that allow inhabitants to generate new designs and adjustments of existing designs of apartments on the basis of design rules. On the one hand, such systems may allow for a more participatory approach to architecture while respecting the structure of the existing built environment. On the other hand, the approach raises interesting questions about the role of expert knowledge. The chapter's findings are illustrated by presenting two cases. First the authors look into the potential integration of a shape grammar system into the open-source software The HouseMaker© by the Dutch architectural office MVRDV. The second case is the Rabo-de-Bacalhau Transformation Grammar developed for the refurbishment of apartments built in the mid-twentieth century in Lisbon.

Ryan Mitchell Wittingslow (Chap. 13) makes the case that the design of smart cities needs to allow for an authentic experience. In order to outline the design requirements to facilitate an authentic city, he turns to Albert Borgmann's device paradigm and the idea of focal practices. In contrast to Borgmann, he considers "authenticity" as an aesthetic rather than an ontological category. In turn, the experience of inauthenticity becomes an indicator for design failures, which allows for an exploration of how to design for an authentic experiences in—and of—the smart city.

Finally, Henry Dicks (Chap. 14) examines the implications of biomimicry for urban design and planning through an in-depth look at the idea of modelling the city like a forest. In the first part of the chapter, the author presents three arguments (about "fittingness", "scale", and "complexity") to make the overall idea plausible.

In the second part, he explores the implications of the forest-model in the domains of urban planning, urban water systems, urban energy and transport systems, and urban agriculture.

#### 1.3 Part 3: Urban Futures and "Smart" Cities

Udo Pesch (Chap. 15) proposes a historically informed normative understanding of urban spaces. He argues that the introduction of smart systems leads to the emergence of the experimental city, which allows for new forms of civic engagement. However, the experimental city needs to accommodate for the normative understanding of public spaces developed in the context of the ideals of the liberal, sanitary, and rational city.

Bart van der Sloot and Marjolein Lanzing (Chap. 16) offer a critical evaluation of a prominent element of the smart city: the Living Lab. By studying three contemporary cases (Singapore, Toronto, and Eindhoven), the authors show how the idea of testing various "smart" products in public urban spaces changes the meaning of the public sphere, thereby undermining the foundation of a deliberative democratic society. Thus, they support Pesch's (Chap. 15) argument that the experimental city needs to accommodate the liberal city. At the same time, they offer insights into how we can safeguard the experimental use of technologies in urban space.

In a similar spirit, Germán Bula (Chap. 17) mobilizes Jane Jacobs' writings, notably her 1961 book *The Death and Life of Great American Cities*, to counter what he calls *control cartesianism* rooted in the *planner's itch*, that is: the "drive to anticipate and control every future state of a system" (Bula, this volume). By contrasting the Cartesian tradition with Spinoza's approach, Bula works towards the idea of planning for self-organization, which is underlying Jacobs' work. Taking this idea as a starting point, he arrives at three conditions for the smart city, namely: the political power of cities and neighborhoods, the willingness to engage in participatory democracy, and the possibility to reclaim urban spaces by communities.

Stefano Borgo, Dino Borri, Domenico Camarda, and Maria Rosaria Stufano Melone (Chap. 18) enter the discussion on the smart city by demonstrating the lack of a clear understanding of what a city is. They propose an ontological-grounded and historically informed analysis of the city as a complex system consisting of three components: *city-place*, *city-agency*, and *city-knowledge*. The outcome is a unifying framework for understanding cities, which does justice to the traditional ("non-smart") city as well as the smart city, which is marked by the dominant role of the *city-knowledge* component.

In contrast, Brandt Dainow (Chap. 19) builds on insights from Actor Network Theory and system-theory. He takes as a starting point that human beings and the (smart) city do not directly encounter each other but interact through the medium of digital systems. Persons and their digital devices are thus fused to nodes, which he refers to as "Integrated Personages." The communication between various nodes gives rise to an "Integrated Domain," such as a smart city. This process-oriented framework allows Dainow to show that an analysis of ethical issues within a given Integrated Domain must focus on connectivity and processing. He explicates his findings in a discussion on how autonomy may come into play within such an Integrated Personage.

Wang Qian and Yu Xue (Chap. 20) offer an analysis of the smart city from the perspective of the Philosophy of Organism and the Tao of the city. The vocabulary in this chapter may deviate at points from the one that comes with the European or American tradition of Philosophy. Yet, Wang and Yu provide useful links to Western Philosophy, and reveal a similarity between Chinese Philosophy and Western discourses about the city as a system of systems that invites a comparison with Dainow's account of the integrated domain.

We conclude the third part and our volume with Robert Seddon's reflections on the city of tomorrow after tomorrow (Chap. 21). Echoing Vlad Niculescu-Dincă's contribution (Chap. 5), Seddon argues that the city is made up of various historical layers, which form the memory of a city. In the process of digitalisation, data not only represents the past in the form of VR and AR application and data records. On the long run, data captured today and in the future will become the next layer. Seddon thus leaves us wondering: what will be discovered in and under that layer in a more distant future?

#### 1.4 Conclusion: Towards a Philosophy of Urban Technologies

As a new direction for the Philosophy of Technology, the chapters present a multiplicity of methodological approaches, and many incorporate insights from adjacent fields (e.g., STS, environmental philosophy, political philosophy, geography, and urban design). However, they are unified in the common starting point and final output: providing conceptual and practical insights into how technologies can—and in many chapters *should*—interact with cities and city life. The volume thus contributes to the much-needed discussion on technology-enabled urban futures from the perspective of Philosophy of Technology. In doing so, it opens new directions for inquiry at the intersection of Philosophy of Technology and Philosophy of the City.

Acknowledgements The volume we present you has been initiated by three events in 2017 and 2018. In 2017, Michael Nagenborg and Shane Epting organized a session on "ITC and the City" at the Ethicomp/CEPE 2017 conference in Turin. Also in 2017 the editors (together with Remmon Barbaza) organized a special track on "Technology and the City" at the Society for Philosophy and Technology's bi-annual conference in Darmstadt. In 2018, the first Summer Colloquium of the Philosophy of the City Research Group was held at the University of Twente. Various authors presented the first draft of their chapters at these three meetings and we are grateful for all the encouragement and valuable critique provided by the participants. We also express out gratitude to the 4TU.Center for Ethics and Technology for providing additional support for the Philosophy of the City Summer Colloquium, as well as covering some of the costs connected to the previous events. Finally, we would like to thank Brandt Dainow for his support in proof-reading and copyediting, as well as many of the volume's authors for providing written feedback on earlier drafts of their colleague's chapters.

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#### 1 Introduction

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# Part I Ontological Foundations: City-Technology Relations



# Chapter 2 Aesthetic Perspectives on Urban Technologies: Conceptualizing and Evaluating the Technology-Driven Changes in the Urban Everyday Experience

#### Sanna Lehtinen and Vesa Vihanninjoki

**Abstract** The pervasiveness of technology has changed the way urban everyday is structured and experienced. An understanding of the deep impact of this development on everyday experience and its foundational aesthetic components is necessary in order to determine how skills and capacities can be improved in coping with such change, as well as managing it. Urban technology solutions—how they are defined, applied and used—are changing the sphere of everyday experience for urban dwellers. Philosophical and applied approaches to urban aesthetics offer perspectives on understanding technologically mediated sensory experiences within the urban realm. This chapter shows how new urban technologies act as *an agent of change* within the familiar urban environment. We outline how the perspective of philosophical aesthetics can be used to understand urban technologies and their role in the constitution of everyday urban lifeworlds.

Keywords Urban technologies  $\cdot$  Urban aesthetics  $\cdot$  Everyday experience  $\cdot$  Urban lifeworld  $\cdot$  Wayfinding  $\cdot$  Affordances

#### 2.1 Introduction

In order to understand life in contemporary cities, one must develop a refined understanding of how technology contributes to it. The urban everyday lifeworld consists increasingly of objects, activities and relations that combine advances in technology and design in complex ways. Technology has already profoundly changed the way urban environments are perceived and experienced. Our aim in this chapter is to

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describe how this development and process of change within the experiential sphere is affecting urban dwellers and their relationship with the urban environment in which they live their everyday lives.

One of the aims is to introduce *urban aesthetics*, a relatively new strand of philosophical aesthetics, into the philosophical discussion about urban technology, and the various ways it affects the experience and use of contemporary cities. Even though aesthetics is still most commonly considered to concern only the form, appearance or even just the visual look within the extraordinary sphere of art or other creative human pursuits, we emphasize that it is also useful in understanding multi-sensory, embodied and much more basal levels of everyday experience. This comprehensive understanding of aesthetics offers valuable insight into the experiential repercussions that incremental change through adaptation of technologies has caused, and will continue to cause, as cities change in the future. Urban aesthetics is thus used as a framework for discerning and assessing not only the qualitative changes that urban technologies set in motion but also beyond their most immediate implications for the formation of the experience. This is done more specifically through selected approaches from urban and everyday aesthetics and reflecting them through current theories about affordances of urban technologies.

An aesthetic perspective on technologies emphasizes the view that everyday experiences are to a great extent grounded in the materiality and sensory formation of the surrounding conditions, even though these become altered by imaginary and interpretative extensions that point beyond the most immediate experiential qualities. A central question is, how does each new urban technology affect this sensory basis and the socio-cultural interpretations of it? The intention on a larger scale is to reveal the complex interdependencies between applications of new urban technologies and the human agents within the urban sphere.

Our hypothesis is that technology often acts as *an agent of change* in urban environments. Since many elements in urban environments are relatively long-lasting, new technologies are added to an already existing framework of meanings and functionalities. Technological solutions can thus be experienced as a mere addition to previously existing conditions, even though their effect would actually be more fundamental. However, in most cases, we argue, they initiate a process of deeper adaptation which transforms the everyday experience of urban dwellers by changing their behavior, habits, expectations, and preferences. What this actually entails is beyond the scope of this article, but we are raising some relevant points for future debate. We see clear value, for example, for planning and design processes in discussing urban experience as technologically mediated, and in doing this more specifically through the lens of philosophical aesthetics. So far this has been done fairly little and even then, the notion of aesthetics is often reduced to refer only to artistic or other kinds of creative practices.

Our interest in this topic stems from the realization that technology significantly alters not only how the city is experienced directly but also regarding the everyday habits and activities beyond the most immediate effects of how a city is perceived. In this chapter, first, we take a look at urban aesthetics in general. This is important since it is still a fairly unrecognized area of study, yet its attention to the experiential quality of everyday life is particularly apt for discussing the effects of contemporary uses of technologies. These effects are analyzed in more depth in the third part which focuses on technologization of the urban everyday. Throughout the chapter, GPS-based navigation technologies are used as an example of new urban technologies in everyday use: the focus is on how their use via mobile phones in, for example, bicycle and pedestrian wayfinding (map apps, route planners) is affecting how even the familiar and otherwise unaltered urban environment is perceived and experienced. This is studied more precisely through the notion of affordance, which is central to understanding how advanced technologies have acquired a fundamental and formative role in the contemporary urban lifeworld.

#### 2.2 Urban Aesthetics

Since the look and feel of urban environments affect their inhabitants in both explicit and implicit ways, aesthetic factors play a central role in urban lifeworld and its constitution (cf. Madsen & Plunz, 2002). It is thus reasonable to assume that philosophical aesthetics offers a relevant framework for assessing both *what* the urban context is and *how* it becomes processed in human experience and the sphere of human action. One has different types of relationships with many different cities, especially in the contemporary globalised world, but it is also fair to state that urban life is about experiencing urban environments—their material, social and symbolic dimensions—mostly in the context of the *everyday*.

Even though the everyday is "an essentially contested concept" (Saito, 2017), it does provide an obvious framework for looking at how different functions of cities have been traditionally planned. It thus makes sense to focus on the concept of the everyday in order to discuss how cities are used and experienced as well. The every-day attitude of an urban dweller is pronouncedly "colored with routines, familiarity, continuity, normalcy, habits, the slow process of acclimatization, even superficiality and a sort of half-consciousness" (Naukkarinen, 2013). Through everyday actions many elements of the urban environment 'make sense' that might not even exist otherwise. These elements include everything from the systematically planned temporal rhythms of urban transportation to how different functions and services are located geographically, for example.

What, then, is specifically *aesthetic* about the everyday urban experience and what makes aesthetics in general a relevant approach in studying the relationship we necessarily have with the urban surroundings? According to some views in the field of everyday and urban aesthetics, there are two ways of relating aesthetically to one's environment. The first is what is most often understood by aesthetic experiences: the extraordinary experiences of beauty or otherwise exquisite and outstanding experiential qualities of the environment. This view emphasises the highlights, those moments that truly make one pay attention to the perceivable features of the city. The "intentional attention to aesthetics" (Saito, 2017, p. 9) marks a break in one's everyday life. It speaks of peak moments that make one admire or detest

something for the sake of its appearance (for the role of "negative aesthetics", see e.g. Berleant, 2010). This idea is linked to the traditional view in the philosophy of art which regards *disinterestedness* as a core feature of aesthetic judgment. In the context of the built environment, this is also the traditional perspective on architectural aesthetics, conceiving buildings and other structures as something to be evaluated primarily through their visual and spatial appearance. Even though the multisensory aspects of experience are acknowledged, the emphasis tends to be on visual qualities, experienced even statically and as detached from the actual use of these spaces.

The concept of the "tourist gaze" (Urry & Larsen, 2011) offers one way of characterising the aesthetic relationship to a city that one is only visiting or assessing from an otherwise distanced position. In this case the experience is defined by the very lack of most everyday associations with places. The place is not "our place", and we are able to examine it in a way that is detached from how it is used on a daily basis. One of the main motivations for observing the features of a city as a tourist is to satisfy our interest in things that are new to us. The camera is the emblematic technology of the tourist, and is used in an attempt to *record* the experience of our visit. This kind of relationship risks reducing urban environments to aloofly observed landscapes and fixed backdrops for taking selfies. When interested in the appearance of the city in this way, one does not need knowledge about the more or less hidden structures that make everyday life possible within it (Latour & Hermant, 1998). Neither does one have access to how familiarity with a certain place will emphasise some aesthetic features and suppress others. The tourist gaze is thus emblematic of one end of the scale of aesthetic interest in urban environments.

The other end of the scale of aesthetic interest points towards understanding the aesthetics of the urban environment as it emerges from one's everyday experience. This kind of experience is defined by *familiarity* and takes place in the everyday engagement with the city (Haapala, 1998, 2005, 2017). Routine, repetition and temporally-based habits characterise everyday life in the urban environment. Aesthetic value is traditionally ascribed to the new (Saito, 2007) or the extraordinary (Leddy, 2012) as something that piques interest, but recent views in the philosophical study of everyday aesthetics also find fundamental aesthetic value in that which is most familiar to us (e.g. Haapala, 2005; Saito, 2007). Aesthetic pleasure (or displeasure) thus forms one significant or even fundamental part of this basal level of experience that defines our relationship to our particular everyday environment. This relationship is further defined by individual variations in using and interpreting the particular environment in question.

Making this distinction between two modes of aesthetic attitude towards urban environments is based on the experience of *strangeness* and *familiarity* (Haapala, 1998; see also Tuan, 1974). It also emphasises that either the environment and its physical features are in one's direct focus of attention—and subjected as such to aesthetic judgment—or they are understood to be experienced through their functioning as the wider, experiential and enabling context of everyday life. Implementing new urban technologies also adds elements of strangeness to the familiar urban lifeworld. The manifold and even contested effects of such implementation are the

focus here. It is important to bear in mind, though, that any actual separation of technology from its field of operation would be illusory. Neither is it possible to separate technology from the urban lifeform, however the co-evolvement of urban experience and technology can be studied through the themes of the everyday, familiarity, and strangeness.

The two aforementioned ways of relating to one's environment aesthetically are not contradictory or mutually exclusive, even if they become easily presented in a way that emphasizes the difference in experience. On the contrary, both elements co-exist in the urban experience, and they support each other to a considerable degree (Lehtinen, 2015). In this chapter, however, we are more interested in the latter perspective-how the everyday as such constitutes the urban lifeworld as aesthetic. The everyday as characterised by repetition, routines and familiarity emphasizes that one reacts to and thus also experiences in a different way that which has with time become most familiar and mundane to oneself (Saito, 2017). Unintuitive, new, or otherwise abrupt phenomena in the urban sphere might result in rupture or even collapse of experiential familiarity, which together with a smooth seamlessness created by a certain continuity in experience is characteristic of our individual set of quotidian activities (Haapala, 2005). In abrupt situations, the relationship with the familiar environment becomes cracked, unbalanced and even unsatisfactory, and the normalised reliance on the presence of technology may become problematic as a consequence.

The role of technology within the framework of familiarity in the urban environment is indiscernible from the very goals that one has within one's everyday life. New technologies, when successfully adopted, merge with other ways of doing and thinking in inseparable ways. Different types of user interface are generally designed with intuitiveness and ease of use in mind, even though it is a difficult and highly case-specific goal to reach. Home automation, for example, aims at facilitating the use of the most immediately experienced and familiar surroundings, therefore interfering with a very intimate sphere of personal life. Achieving the desired level of intuitiveness through the design process is a complex task, and failing to do so will risk leaving the end-user discontented with and estranged from the new technological component.

New technologies that are implemented into existing structures and uses of the urban environment build new experiential layers that are more or less based on already existing networks of affordances. These layers refer directly to how affordances build up and become experienced and interpreted. The intertwining of experiential layers affects and constitutes the current conditions of the urban lifeworld as it is. These layers are essentially related to the physical features of objects in the environment, but they are also more or less mediated by the technologies used. GPS and location-based or—aware mobile applications are a good example of this: besides the universally valid spatial co-ordinates, many uses of these technologies are firmly based on the material features of the environment, such as buildings, conventional route patterns and different types of natural and man-made objects that create the detailed urban landscape. But these technologies also add a significantly different layer to the perceived elements: by making relations visible and by giving

new, advanced form to previously intuitive modes of wayfinding, they contribute to the experiential fabric of the urban sphere even more than might have been thought. Besides this actionable layer, the skilled use of mobile applications gives them other dimensions too: for example, by stimulating memories and imagination tied to the familiarity of places, or to the technologies themselves, as well as a possibility of creative and strategic variations in the use of urban space.

The description of experiential layers is not used in this context to prove the existence of some type of original, basal level of experience beneath the socially conditioned skills. On the contrary, this points towards understanding how human behaviour, the ensuing actions and especially the prevailing preferences, are the product of a deep and multi-level experiential engagement with the environment. This perspective also emphasises that, in fact, most technologies are based on older technologies and that their overlap is also reflected in the process of learning, unlearning and re-learning the skills and habits required to use them. New technologies emerge at a fast pace and these changes affect the human experiential sphere. Change as such, however, is difficult to grasp conceptually, even though it is a central part of the urban everyday experience. Technology-induced change—whether incremental, disruptive or transformative—is a key factor in understanding how the urban everyday is experienced, and how the urban environment is perceived and evaluated as a part of this experience.

#### 2.3 Technologisation of the Urban Everyday

As a starting point for our experiential analysis of urban technologies, we acknowledge the fundamental role of practices and routines in the constitution of the urban experience. We thus rely on the Heideggerian (1978) approach to the human condition as the "focal point" of various and practically innumerable functional relationships between human beings and their surroundings. What is important here is that the essence of technological things—their functionality or "toolness"—can never be completely understood via a traditional, instrumental view of technology. According to this instrumentalism, technologies are basically neutral connectors between intentions and effects; that is, they are mere means-to-an-end. On the contrary, as postphenomenological philosophy of technology acknowledges (see, e.g. Ihde, 1990, 1993, 2010; Verbeek, 2005, 2011), tools and technologies open up and make comprehensible new possibilities of use and action: they mediate our experience of reality, and it is often the various tools and technologies we make use of in our everyday lives that eventually allow us to conceive our pursued ends as ends in the first place.

As Ingold (2000) has convincingly pointed out, technologies are always embedded at various levels in the structures of society, and thus the effects that the changes in technological realities have on society turn out to be pervasive and widespread. For example, thinking of the technologically induced changes in the forms and structures of production in Western societies, "the development of [production] forces has transformed the entire system of relations between worker, tool and raw material, replacing subject-centred knowledge and skills with objective principles of mechanical functioning" (p. 319).

What is more, this embeddedness of technologies in the structural foundations of any society is opaque by nature: the technology-laden societal structures and mechanisms do not reveal themselves, but they remain implicit in the practices and conventions that constitute the socio-material realities of a culture. The exact role that various technologies have in a society is seldom (if ever) observable as such, but may be addressed through anthropological study: only by examining in more detail the concrete practices and the related socio-cultural ways of experiencing reality, can we access the role in the mediation process that commonly used technologies have.

In order to understand more thoroughly the experiential implications that presentday urban technologies might have, certain conceptual clarifications are required and, above all, the relationship between mere tools and "full-blown" technologies has to be elaborated. The central point seems to be that tools compose a very general and open-ended category of practical items (the usage of tools is most likely not even restricted to mankind), whereas technologies pertain to particular types of socio-material forms of life—that is, to the so-called modernised societies. In other words, "tool" is a more general category, and "technology" is a sub-category of tools, presumably characteristic of modernity. Hence the question concerning the essence of technology turns out to be a question concerning the essence of modernity.

However, as Verbeek (2005) has argued, such approaches to the essence of technology tend to be overly abstract and monolithic, thus losing sight of the significance that particular, concrete technologies have. According to Verbeek's view, the fundamental problem in such a line of thought lies in focusing on Technology as the determining condition of modernity, instead of examining various technologies as practical and useful entities that open up new possibilities for acting in the world as well as experiencing it through a course of action. Moreover, the coupling of modernity and the technological seems to rely on a circular mode of argumentation, for the technological mode of thinking is already assumed as a necessary precondition for the occurrence of concrete modern technological practices. The question of where, exactly, the technological thinking itself originates remains unanswered.

Contrary to the traditional approaches, the supposed "technologization" of our worldly relations—that is, how modern technologies substitute for more traditional tools—ought to be seen as an essentially socio-material process. Such a process, in turn, consists of the lengthy and laborious development of concrete engineering and design practices, taking place in certain particular societal contexts, thus exemplifying the prevailing ideologies and values of the time. Indeed, it is the gradual emergence of an established engineering industry that is of central importance here, for such a development enables—and perhaps even forces—viewing the everyday and its contents externally, from an external point of view. This, in turn, has far-reaching implications regarding our relationship to the various devices we encounter in our everyday life.

For example, Ingold has analyzed the emergence of proper technologies as a process of externalisation, of "a progressive cutting out of technical from social relations" (Ingold, 2000, p. 314), which removes the productive force of tools and devices from the user's everyday experience of them. In short, the subject-based skills and techniques that the adequate use of tools requires are thus replaced by objective technological knowledge that lies "elsewhere"—outside the context of application—altering and potentially impoverishing the relationship between user and device. Though such an externalisation may be a phenomenon that primarily affects society on the "objective", structural level, it also has profound consequences for the "subjective", experiential level. The experiential implications, which are the proper scope of this chapter, can in turn be approached through an analysis of particular devices and their materiality that shape people's everyday lives and experience.

The Ingoldian (2000, p. 316) concept of "machine" is helpful in understanding the essence of a technological device, since at the level of material instruments, it is precisely "the machine [that] has come to signify the independence of technical operations from human sensibility". The difference between a tool and a machine has to be viewed from the perspective of goal-oriented everyday practices: a tool is essentially an integral part of a user's day-to-day activities, withdrawing from attention in order to enable its user more means of worldly actions for achieving various objectives; a machine, in turn, has an objective logic of its own, demanding a user's attention and forcing them to concentrate on the operation of the machine itself, thus leaving other daily tasks aside (Raudaskoski, 2009).

It has to be emphasised that the distinction between tools and machines refers to the two modes of user experience that often overlap, and in any case do not exclude each other; the distinction merely points out the two different dimensions of a user's relation to a single material device. Considering, for instance, mobile phones, it is clear that "on the one hand [a mobile phone] is a tool that extends our 'bodies' by giving us more means for mutual communication, on the other hand it is a machine, a technological device that operates under technical rules and processes of its own" (Raudaskoski, 2009, p. 44). A mobile phone—as well as any other technological device—thus has a kind of "dual identity" as part tool and part machine, and the development of a device's identity is, in principle, a matter of contingency: a technological device might either become a handy tool, or it might remain as a mere disruptive machine.

Now the interesting question is how, and under what circumstances, do complex machines actually become tools, as they seem to do: how, exactly, does a machine become involved in practical activities in such a manner that the machine-side of a device eventually yields to the tool-side? As applied and underlying technologies are becoming more and more fine-tuned and complex, and thus more distant from the user's everyday experience, this is a topical and urgent question. In any case, technologies simply have to gain a "tool-identity" by various means of familiarisation in order to enter the sphere of the everyday—and to have practical value within it.

Despite the fact that complex technological devices become integral parts of our everyday life, this is merely a partial truth. It is due to their dynamic dual identity as part tool and part machine that technological devices tend to inject a certain instability or even vulnerability into the everyday sphere of uses and actions. This means that even though various devices have become ordinary parts of our activity systems, and thus experientially familiar, the machine-side of their identity and the related experiential strangeness has not completely disappeared.

A comparison of a more "traditional" tool with a technological device illustrates the idea of vulnerability, and helps to understand the existential condition of the farreaching technologisation of our everyday lives. Here we may, in part, rely on Heidegger's (1978) classic analysis of the broken tool: the breakdown of the hammer halts the everyday procedures of the workshop and thus reveals the normally hidden functional connections (the referential in-order-to structures) that are based on the handiness of the various interrelated tools and utensils. In short, when the hammer does not fulfil its task, it no longer exists as a genuine tool but as a mere object that is present to us, demanding our attention.

Such a "standard interpretation" of a broken tool also applies to technological devices: just as the breakdown of the hammer paralyses the operations of the workshop, the breakdown of a smartphone prevents us from doing what we normally do with it—whether that "normality" consists of being in touch with our friends, answering work-related e-mails on the go, or getting to places with the aid of a navigation application. However, despite these similarities, there are still notable differences between the "toolness" of a hammer and that of a smartphone; this becomes apparent when one asks what, exactly, will happen next, if (and when) the tool de facto breaks down? To be more precise: what will the user do in order to restore and maintain the normal functions that the tool affords?

It is likely that the blacksmith—who in Heidegger's original example runs the workshop—is capable of either fixing the hammer on their own, or at least replacing it with an alternative tool from the workshop. The smartphone user, on the contrary, is helpless: they may try to switch the device on and off, or remove the battery for a while and hope for the best. Probably they will have to rely on the expertise of a repair service or replace the device altogether by purchasing a new one.

Here the machine-side of the smartphone is apparent: despite the seeming familiarity of a technological device, even a relatively minor event of hardship allows the fundamental strangeness of the machine reappear. Indeed, even if we learn to use technologies as tools—that is, if we manage to integrate various technologies into our daily lives quite seamlessly—we do not necessarily familiarise ourselves "with the functioning of the technology as a machine", as Raudaskoski (2009, p. 45) has suggested. For example, not many smartphone users actually learn to use the device as a tool by getting acquainted with the internal logic of the software or the details of the hardware, though it is precisely these dimensions that eventually constitute the functioning of the technology as a machine.

Indeed, while integrating various devices into our everyday, we remain on the superficial level of *interface*, and it is these different interfaces that practically constitute our relation to technology in general (see Hookway, 2014, especially pp. 44–46).

Thus one can argue that the "tool-interpretation" of a machine or a technological device in itself remains necessarily at the level of interface: "the machine as a tool" then means technology as conditioned by the human perspective of various intentional uses and actions. Even further, technological devices may present themselves as mere tools, though there is always more to them, for the "objective logic of the machine" is typically inaccessible through the ordinary user interface.

Design also typically operates at the level of interface, rather than the level of the machine that lies "behind" the interface, potentially blurring our understanding of the complexity of various technologies. This is why the excessive refining of design processes—the pursuit of ever "easier" and "more intuitive" user experience—might even foster the above-mentioned vulnerability inherent in the technological dimension of various devices. As the everyday use of a technological device does not call for any kind of understanding of the machine-side of it, we are rather defenseless against its inevitable malfunctions. Indeed, it is not too exceptional that every now and then our "smart" devices can leave us quite helpless in an everyday situation—whether due to a run-down battery, an unnoticeably outdated application, or some other kind of temporary jam.

The ever-increasing amount of "superficial" interfaces in our everyday life has, along with the apparent political and power-related implications (see e.g. Galloway, 2012), certain experiential consequences that have so far been barely addressed, if at all. If the penetrating technologisation of our everyday truly gives rise to an emerging vulnerability, this may eventually pose a threat to the experiential quality of the everyday, and even to its *everydayness* itself. This has to do with the fundamental relationship between tools and the everyday or, to be more exact, the role that tools have in the constitution of everydayness as a specific mode of experience. According to the Heideggerian argument, it is precisely the unobtrusiveness of tools (their ability to withdraw from experience) that enables the peculiar smoothness characteristic of an (valuable) everyday experience. The unobtrusiveness of tools is ultimately based on their essence as being something *reliable*—i.e., *not* vulnerable (Heidegger, 2002). The overall reliability of tools (that is apparently at stake here) can thus be seen as a ground or essential prerequisite for the everyday experience of smoothness, and the related aesthetics of familiarity.

When discussing in general the reliability of the tools that afford our everyday uses and actions, we are dealing with the normally tacit meaning-structures that eventually make our everyday sensible to us, and thus comprise the substantive basis of everyday aesthetics as a whole. In addition, the smoothness of the everyday can be seen as a necessary prerequisite for experiencing other, perhaps more traditional types of aesthetic values that stand out and pique our conscious interest. Hence a reliability-based experiential smoothness has aesthetic relevance in two different senses: as an aesthetically valuable phenomenon in itself, and as a "preaesthetic" condition for further-refined and conceptually analysable aesthetic experiences (Lehtinen, 2015). These fundamental-level remarks have to be taken into consideration when evaluating the various aesthetic potentialities—both towards positive or negative outcomes—that are necessarily involved in introducing new technologies to our urban everyday.

#### 2.4 New and Emerging Technologies as Agents of Change

Urban environments are by no means homogenous or stable, and the particular aesthetic fascination of cities can be linked to their diversity (von Bonsdorff, 2007) and even to some extent to their fast pace of change. With a focus on urban technologies, futurity and change in general are central themes to be addressed. The aesthetic dimension of experience related to urban technologies necessarily affects and is affected by the responsibilities and prospects of urban planning and understanding the experiential impact of particular technologies would help in determining what exactly is changing and in what type of time frame.

Implementing new urban technologies realigns various functions in urban environments according to their current norms and projected technological level of the city in question. How new technologies are brought into use also raises questions regarding the status of the elements that are most affected by the implementation and adoption of these technologies. "Conservatism" versus "futurism" are two approaches regarding whether and to what extent the existing features of the urban environment should, or could, be changed. Traditionalist perspectives emphasise the "precious quality of human continuity" (Berleant, 2007, p. 81) even going as far as preserving urban environments for the sake of their "museum value". Innovationoriented paradigms such as the smart city ideology lean towards fascination for change for its own sake and emphasise assessing the old through its relationship to that which is new or emerging. Interestingly, both of these value discourses tend to be rather limited in the way they focus on the given conditions or some strong interpretation of the current situation and thus neglect the inherent potentiality of the environment. In other words, a conservation perspective is overly suspicious of change, whereas a futurist perspective idealises change led by new and emerging technologies.

When adopting new technologies, small features can have relatively large experiential consequences. The "clumsiness" resulting from early steps in learning new technology-mediated habits is a reminder of this. These inescapable side-effects of change have fuelled suspicions towards new technologies. Change can be feared as generating more change that would affect everyday routines and habit patterns in negative ways. If technologically-induced change becomes naturalised, it might also be easy to lose track of the actual drivers directing the development. Some of these change-related blind spots of implementing new technologies might thus be avoided by focusing more systematically on the *quality* of experiences (Sanakulov & Karjaluoto, 2015).

The aesthetics of the city is also of concern in the process of making as accurate as possible different technological representations of an urban environment. It is possible to generate digital representations of urban environments, for example, through building or city information modelling (BIM & CIM). The focus of these techniques is often on making the functional features of a city visible, but the aim is to make the representation as realistic as possible. Existing and chosen technologies dictate many of the parameters, but choices are also made as to which perceptual features are interpreted as being close to the average everyday experience of the actual conditions. The fascination of these virtual representations is that they can be used to replace the real city: for example, making it possible to perceive the city at one glance, something that is not physically possible for an individual without some kind of technology. Applications of information modelling technologies are increasingly finding their way to the urban everyday: they are used for example in route planning, urban game design and people-finding. These applications represent a paradigm that naturalises technology-induced change in the development of the urban lifeform.

If technology is seen as an agent of change in the context of urban environments, technological development or technologicality in general could be understood to drive a "culture of change" even more widely. The desired smoothness of the everyday urban experience is subject to variation in quantity and quality, depending on the quality and quantity of technological mediation. This development is driven further by overlapping and interlacing of various technologies. Traditional objects in the urban environment are not fixed either, as technologies have expanded the range and amount of these changes and objects significantly. Also the pace of technology-induced change is different compared to, for example, many natural processes that take place in the timescale of the urban environment.

The implementation of a technological innovation is a paradigmatic example of how change actually takes place. Many contingent elements in conditions determine the logic by which technologies come into use. For an analysis of experiential change, it is crucial to focus on the actual everyday experience instead of the idealised experience of a certain technology. This distinction is often difficult to pinpoint, especially because designing technology understandably relies on an imagined and streamlined idea of how the everyday experience will unfold. In reality, everyday experiences are marked by interruptions, abrupt changes, failed attempts and other irregularities that are difficult to anticipate (Naukkarinen, 2013).

Technologies direct and fix attention to certain features of the environment. They are thus affecting how and what of the urban everyday realm is distributed to the sensory perception and thus categorisable for further evaluation (on applying the Rancièrean notion of the distribution of the sensible into everyday aesthetics, see e.g. Highmore, 2011). Some technologies enlarge perceptual possibilities within the urban sphere: drones, for example, record visual data from a height above the regular level of human visual perception. These images stimulate interest and elicit reactions by making everyday urban environments visible from previously unseen or rare angles.

Emerging technologies challenge the Heideggerian notion of the pre-reflexive familiarity of the world in everyday life. This is linked to how the new becomes interpreted in terms of and related to that which is familiar. This is true even in cases when there is little of no difference in the resemblance between the new technology and the technology it is replacing. Advancing the implementation of new technologies through relatively small adjustments makes maintaining the prevailing ways of doing things easier, but on the other hand, some unnecessarily demanding and antiquated action patterns might also be retained long past their actual usefulness. This can be seen, for example, in how many of the initial uses and behaviours related to