This is an electronic reprint of the original article.
This reprint may differ from the original in pagination and typographic detail.

Luusua, Aale; Ylipulli, Johanna
Nordic Cities Meet Artificial Intelligence

Published in:
C and T 2021 - Proceedings of the 10th International Conference on Communities and Technologies

DOI:
[10.1145/3461564.3461571](https://doi.org/10.1145/3461564.3461571)

Published: 20/06/2021

Document Version
Peer reviewed version

Please cite the original version:
Luusua, A., & Ylipulli, J. (2021). Nordic Cities Meet Artificial Intelligence. In F. Cech, & S. Farnham (Eds.), *C and T 2021 - Proceedings of the 10th International Conference on Communities and Technologies: Wicked Problems in the Age of Tech* (pp. 51-60). ACM. <https://doi.org/10.1145/3461564.3461571>

This material is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the repository collections is not permitted, except that material may be duplicated by you for your research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered, whether for sale or otherwise to anyone who is not an authorised user.

Nordic Cities Meet Artificial Intelligence

City Officials' Views on Artificial Intelligence and Citizen Data in Finland

Aale Luusua

University of Oulu, INTERACT research group

Johanna Ylipulli

Aalto University, Department of Computer Science

ABSTRACT

In this paper, we explore Finnish city officials' attitudes, knowledge and relationship towards the use of artificial intelligence (AI) in their cities through topical expert interviews. Our interviewees came from two metropolitan area cities, Helsinki and Espoo, which have taken an active role in attempting to utilize various novel technologies. Through these interviews, we identify and discuss key issues in the infusion of AI into cities. These interviewees were key players in their respective cities' response to the challenge and opportunity of novel technologies, including AI. As such, while our sampling is small, these interviewees are a good representation of the relevant individuals who hold sway over the thoughts, visions, ideas and challenges that are recognized in their respective organizations. We ask, how do these individuals understand AI and gauged through their views, how are these cities prepared for the increasing and continuous infusion of artificial intelligence technologies in these cities' agendas, practices and projects?

CCS CONCEPTS

• **Applied computing** → Law, social and behavioral sciences; • **Human-centered computing** → Ubiquitous and mobile computing; Human computer interaction (HCI); • **Computing methodologies** → Artificial intelligence.

KEYWORDS

Cities, city officials, city strategy, urban computing, urban data, artificial intelligence, interview

ACM Reference Format:

Aale Luusua and Johanna Ylipulli. 2021. Nordic Cities Meet Artificial Intelligence: City Officials' Views on Artificial Intelligence and Citizen Data in Finland. In *C&T '21: Proceedings of the 10th International Conference on Communities & Technologies - Wicked Problems in the Age of Tech (C&T '21)*, June 20–25, 2021, Seattle, WA, USA. ACM, New York, NY, USA, 10 pages. <https://doi.org/10.1145/xxxxxx.xxxxxx>

1 INTRODUCTION

In this paper, we explore Finnish city officials' attitudes, perspectives and relationship towards artificial intelligence (AI) through topical expert interviews. Our interviewees came from two metropolitan area cities, Helsinki and Espoo, which have taken an active

role in attempting to utilize various new technologies. Through these interviews, we identify and discuss some key issues in the infusion of AI into cities. These interviewees were key players in their respective cities' response to the challenge and opportunity of novel technologies, including AI. As such, while our sampling is small, these interviewees are a thorough representation of the relevant individuals who hold sway over the thoughts, visions, ideas and challenges that are recognized in their respective city organizations.

Our central research questions in this article concern how these individuals understand AI and, gauged through their views, how are these cities prepared for the increasing and continuous infusion of artificial intelligence technologies in these cities' agendas, practices and projects? What does the inclusion of AIs mean for city services? What benefits and risks do these city officials foresee in the use of AIs?

This questioning is pertinent and timely, since AIs are being developed at an ever more rapid pace. Thus, we can hypothesize that both the hype and the real potential of these technologies as applied to urban settings is increasing. There is much to be done here, and a singular case study can only touch the surface of this novel research theme, which we can refer to as 'urban AI' [37, 38]. However, we deem it important to begin to study this phenomenon empirically, and from multidisciplinary perspectives. The phenomenon is important for societies at large, and especially poignant for research fields relating to cities and computing, such as urban computing, human-computer interaction (HCI), urban planning, urban governance and urban studies, to name only a few. Furthermore, the malleable nature of AI systems has been speculated to present challenges to Participatory Design (PD) [10] and democratic or community-driven approaches.

Additionally, our Finnish case study has some particularities which makes it interesting. Firstly, Finland is a country that enjoys a high level of citizen freedoms and mutual trust among citizens and the authorities [46, 55], which makes it interesting from the point of view of AI and trust, a major research theme around AI [54]. Second, Finland is a Nordic welfare state with plenty of power being distributed onto the city or municipal level authorities. As such, cities are responsible, for example, for organizing health, education, welfare and cultural services to its citizens on a local level. Thus, city organizations wield a lot of power in the country, and as such, they play a key role in the country's digitalization aims as well. Third, Finland is urbanizing and centralizing around its capital city metropolitan area rapidly, which makes our case study cities interesting and important in their context and in the context of global urbanization. Finally, Finland is a technology-oriented country with a sizeable ICT sector; this is reflected in the cities and municipalities of the nation, many of which have declared themselves as "Smart Cities" [68].

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from permissions@acm.org.

C&T '21, June 20–25, 2021, Seattle, WA, USA

© 2021 Copyright held by the owner/author(s). Publication rights licensed to ACM.

ACM ISBN xxx-x-xxxx-xxxx-x

<https://doi.org/10.1145/xxxxxx.xxxxxx>

1.1 Bottom up: Urban technologies, community participation and AI

Various societal discourses, or even hype, around artificial intelligence (AI) technologies have been reignited over the past decade or so after another “AI winter”, a period of relative uninterest [9]. The new-found interest has emerged due to some rapid advances that have been made in AI engineering and research. This entails most notably advances in the form of neural networks that are capable of learning autonomously from data. While there is no singular definition of AI, in much of AI literature, AI is described as a technology or technologies that mimic human intelligence and may also theoretically surpass it; and this human-like intelligence is also a salient idea among the founders of AI [6, 40, 41] and futurists [36]. However, views among researchers vary considerably; while at one end of this spectrum, [41] were definite AI optimists, lately, scholars such as [9] have argued that (general) AI may be an unpredictable and risky technology. At the other end of this debate are some AI engineers, such as Andrew Ng [27, 63], who argue instead that there is still a long way to go to make AI applications even somewhat ‘intelligent’.

Nevertheless, applications of ‘narrow’ AI are now a part of everyday reality, infusing themselves as parts of other technologies, including urban technologies. For this reason, we argue that AI developments are necessarily connected with the Smart City agenda; after all, SC aims to integrate digital technologies of various types into urban environments [30]. In general, autonomous and self-learning algorithms are being integrated into computing systems. Since computing systems are now a part of urban lives and urban places and spaces, we argue that these existing urban technologies can act as a gateway for the introduction of AIs into cities [37]. Observed from the point of view of urban places and spaces, applications of AIs may be found everywhere in cities; they have permeated homes, workplaces, public urban places and travel spaces. In short, these technologies mold our experiences of the environment subtly, but in a novel way. The most obvious, transparent uses of these technologies are arguably end user applications such as smart speakers, search engines, facial recognition systems, and the gradually increasing autonomy of vehicles. However, on a fundamental level, many of the potential applications of AI are also invisible to urban inhabitants, as illustrated by our participants’ accounts of the health data use in the City of Espoo. This is important since the development of AIs raises also many ethical issues [2, 3, 5, 8, 9, 15, 25, 31, 34, 54, 65] and as AI systems in cities are developed further, these become entangled with questions of urban ethics, namely, who has the right to design and live in cities, and who may benefit and who may suffer as a result of use of AI in cities [22, 28, 34]. AI systems will have an important role in urban life, spaces, places and experiences. Furthermore, they will touch on important aspects of democracy and participation.

This has been a concern especially in the HCI literature, where works relating to AI are beginning to emerge. These point towards the challenges that AI presents to participatory design (PD), ethics, trust and fairness [3, 10, 11, 23]. In the Communities and Technologies research area specifically, some studies that relate to the relationship between urban communities and ICTs have already been carried out. These revolve around certain themes, such as

enabling participation through technological and designerly means, indeed, even using city spaces themselves as a contexts and conduits of civic participation [4, 7, 12, 29, 49, 51, 53, 64], and with different kinds of citizen stakeholders [52] in different kinds of contexts, such as urban and rural locations [57, 61, 64]. Indeed, our own efforts in the design of virtual public amenities [67] dealt with these issues as well. This literature at large points us toward the importance of communities’ participation in the design of their everyday technology and surroundings. However, this literature is by no means exhaustive and much work still needs to be done, especially in relation to AI systems, which have not been represented in the research community in a significant manner.

On this basis, we deem it important to study AI applications in cities from an interdisciplinary point of view. Our respective backgrounds in the fields of architecture and urban planning, and cultural anthropology, with a research focus on urban technologies, offer a good starting point for this work. Indeed, we find it important to bring together various viewpoints and to reflect on the backgrounds of all those who participate in technology and city making and research. Similarly, it is important to connect separate research literatures that relate to the topic of urban AI.

1.2 Top down: The Smart City agenda and urban data production

As such, we deem it necessary to bridge the gaps between the various computing literatures – which largely deal with deployments, critiques and design methods of specific urban technologies – and the Smart City (SC) research literature, which deals with macro scale urban governance and urban development trends and initiatives. Bridging these two views means to bridge a technology-focused perspective with an urban and governance focused perspective. This is necessary not only for our specific study of city officials’ views, but also crucial for gaining a fuller picture of how cities, and citizens, are currently intertwined with digital technologies.

As demonstrated by the SC research literature, various kinds of SC initiatives have been fairly common around the world for several decades. By and large, SCs can be described as urban environments which are being intentionally infused with digital technologies. Yet, there is no consensus regarding what really makes a city ‘smart’ – for instance, what goals, policies, services or infrastructures it should have. [21, 26, 32, 44, 45, 62]. The SC agenda has its origins in the corporate world; companies offer SC technologies as solutions to urban problems and challenges: e.g., sustainability, rapid urban growth, competition between cities, and economic issues [14, 16, 59].

Importantly, cities are often seen as kinds of *platforms* in these visions; specifically, as platforms for these companies’ technological products on which urban services are provided and urban data can be harvested. Through the SC model, various characteristics of urban life are to be transformed, ranging from open data to smart meters, smart security, smart mobility, smart infrastructure management, smart workers and smart citizen experience [22]. Thus, necessary questions arise regarding how this overhauling of urban contexts would affect democratic systems and the life quality and agency of citizens. Subsequently, these developments have also given rise to critical SC scholarship. These scholars are well-known

to argue that SC developments are overly business-oriented and technology-oriented instead of being led by human centered or citizen empowerment principles [14, 30, 59].

Interestingly, contemporary ICT business models revolve around the combined dynamics of data collection and economic interests. These models are made possible by what Shoshana Zuboff [69, 70] has called the ‘informating’ quality of digital technology: the ability of digital technologies to produce data about their own use, and resultingly, about their users. Analogue technologies, while also being able to automate tasks and jobs, are unable to ‘informate’, to use Zuboff’s terminology. This fact is fundamental, as we would argue that informating is the issue that makes urban environments into potentially powerful places of data production. What will happen as a result of this transformation – and how will this affect citizens’ rights – is an open question of crucial importance.

A further issue affecting citizenship in the context of SCs is digital surveillance, or dataveillance. Dataveillance is “the systematic monitoring of people’s actions or communications through the application of information technology” [19, 20]. This issue is further intensified in the era of new AI technologies that enable an unseen level of analysis and utilization of data. Even though dataveillance as a concept is clearly connected with Zuboff’s surveillance capitalism [69, 70] it does not seem to be inherently tied to any societal model, and instead, can be readily adopted all around the world. China apparently has ambitions to develop a state-led AI dataveillance society via, e.g., AI facial recognition algorithms, cameras and sensors. During these last years, China has also attempted to introduce a social credit system. Even though many of the technologies that China has invested in do not function exactly as planned or have complete coverage, there is apparently a strong will to create a government-led dataveillance society. Large ICT companies are keenly interested in this novel market [24, 35, 42, 65]. Dataveillance practices, then, may be utilized to any extent that is allowed by prevailing legislation, economy and society. These developments were also brought to the forefront during the COVID-19 pandemic, as governments and corporations around the world approached the possibility of using data surveillance to track and control the disease [47].

To summarize, then, our viewpoint is informed by (1) the identification of the relevant and timely phenomenon of AI technologies being infused into cities through existing ICT technologies, the SC agenda and other means, or ‘urban AI’; (2) the identification of the questions and challenges introduced by AI’s in general to PD approaches, AI ethics, trust and fairness, (3) a view of SC as an agenda that is partly driven by city interests but also informed by economic interests; and (3) the recognition of ‘informating’ as a fundamental driving force of digitalization and its economic viability, transforming cities potentially into lucrative places of data production. This chain of phenomena folds back into itself, as AI needs data: AI is the tool, and data is the raw material. Against this background, we deem it important to study cities’ readiness and viewpoints into these developments on a general level. Within this study, the goal was to research how ‘key players’ (officials working with digitalization strategy and implementation in their city) in the cities of Helsinki and Espoo understand and think about AI; and how are these cities prepared for the increasing and continuous infusion of artificial intelligence technologies in these cities’ agendas,

practices and projects? What does the inclusion of AIs mean for city services? What benefits and risks do these cities foresee in the use of AIs? To study these questions, we employed topical expert interviews [39, 48] as a method. Next, we will briefly discuss our method, the materials it produced, and the analysis we performed.

2 MATERIALS AND METHODS

In order to collect a set of data for these interviews, we performed twelve *semi-structured, topical expert interviews* [39, 48] with high-ranking city officials in the City of Helsinki and the City of Espoo organizations. These officials were individuals we deemed to be ‘key players’ in regard to digitalization in their cities: They were employed in positions where they contributed in various ways to the urban digitalization and SC development projects of their cities, either directly or by following these processes closely. They were also at least responsible leaders in specialist positions in their organization; some were very high ranking in their city organization. The goal was to interview persons with somewhat equivalent responsibilities; however, the organizations are not entirely similar, and as such, officials’ job titles and descriptions also vary. Yet the goal was achieved to a satisfactory degree, as all participants were knowledgeable about their cities’ digital development projects.

The interviewees educational and professional backgrounds prior to their current position varied widely, and this clearly had an influence in their viewpoints. However, we will not delve here further into the demographic details of our participants. This is due to two reasons: Firstly, due to the unique positions of our participants, we cannot disclose too many personal details to ensure anonymity. Secondly, our method was the *topical expert interview*; it draws from the *topical interview* where the interviewee gives a point of view to a certain subject which can be an issue, a program or a process [39]; in keeping with this method, we understand that our participants primarily speak from their professional positions, both having professional viewpoints of their own, and reproducing their organizations’ generally accepted viewpoints and jargon. Furthermore, during our analysis, significant gender or age-related observations did not arise; however, participants’ educational and professional backgrounds seemed to have a large impact on their views. In this regard, then, it is important to note that our participants’ background were very varied. Concerning their education, our participants often had Master’s degrees in the social sciences (e.g. sociology, political science, international politics), in an ICT related degree (e.g. information science), or a business oriented Master’s degree. They also had wide ranging professional backgrounds from leadership and research roles in public and third sector development projects, or as experts in industry prior to their current positions. Two interviewees had spatially oriented degrees relating to urban planning and geography.

These interviews occurred during the spring of 2019 and the winter of 2019-2020. Importantly, they occurred right before the COVID-19 pandemic, and thus, precede any possible considerations relating to the changes since. Reaching the officials was somewhat demanding and naturally the interviews had to take place according to their schedules. Also, as the overall number of the relevant key players in these organizations is rather limited, we deemed it necessary to wait to be able to interview them. Thus, the overall

process took a fairly long time. The participants were informed of the study's aims at initial point of contact, and this information was repeated at the outset of the interviews, in conjunction with the signing of consent forms. The interviews were recorded using audio recorders and were subsequently transcribed. Each interview lasted approximately from 1 hour to 2.5 hours. The themes of the interview consisted of several topics, including for example: the participants' professional background and education; their city's ongoing and past ICT projects; digitalization as a topic in general, including equality issues; SC conceptualizations; virtual reality and augmented reality; and AI. Thus, AI was only one of the topics that were deliberately explored, but the topic of AI emerged also organically over the course of the interview.

In this paper, we perform a thematic content analysis of the abovementioned materials [48], focusing on tracing how these officials conceptualized AI in general, as well as in relation to urban development and their city. The interviewees have been anonymized in this paper and are referred to as H1-H6 (Helsinki) and E1-E6 (Espoo).

3 FINNISH METROPOLITAN AREA – CASE HELSINKI AND ESPOO

In the following chapter, we will analyze our materials. To begin, we will discuss some themes that were common to both of these adjacent cities, such as overall attitudes, concerns and definitions. Then, we will discuss some differences between the two neighbors.

3.1 Definitions of AI and hype around the concept

The question of how participants would personally define AI did not yield many straightforward answers among the interviewees representing the City of Helsinki, which is not a surprise as the concept is fuzzy in itself. This fuzziness was also mentioned by the interviewees, followed by their reflections on how AI used to be understood as something narrower, involving learning, but nowadays it also covers optimization and analytics. The discussions highlighted that their city organizations were especially interested in machine learning and data science, and officials were aware that these represent just some facets of AI. One interviewee remarked that from the city's perspective, it does not even matter whether we are talking about AI, learning algorithms or basic algorithms – ethical questions are linked to all of them (H2). Further, almost all the interviewees mentioned that AI is currently surrounded by hype. AI was seen as a buzzword which may still be a rather modest tool in practice from their point of view. A couple of officials also critiqued the naïve attitudes and solutionism sometimes connected with data and AI. For instance, H5 highlighted the importance of not seeing the algorithms and the data as a black box (a “mysterious mill”, verbatim) that produces neutral knowledge; instead, H5 advocated for really getting to know the data in a scientific manner, and the importance of being able to ask relevant questions from it.

In Espoo, the situation was very similar, with nearly all participants remarking at some point that the term AI is “hyped” or even “sexy”, but that people do not know what it means. E2 had also tried to ask her colleagues what they thought constituted AI, and indeed, these colleagues had vastly differing opinions about what

AI was. In conjunction with the discussion on definitions, E1 stated that citizen's AI comprehension skills were lacking, but that on the other hand, he was not able to write AI algorithms either. Within the organization, however, apparently there had been discussions regarding the nature or use of AIs, since a couple of interviewees, when asked to define AI, replied that it should be a “supporting intelligence” (“tukiäly”), a pun on the Finnish word for AI (“tekoäly”). However, it was unanimously agreed by our Espoo interviewees that real AI is something that is able to learn in some way; E1 also remarked that it needs to be able to make independent decisions. One seemed to be skeptical of whether such a thing as AI really even exists, since she did not consider optimization and analytics to be true AI (E5). The lack of clarity and presence of hype seemed to be a source of worry for our interviewees, especially when it came to collaboration with companies. E5 stated that there's all kinds of companies out there selling all kinds of products, and that people on the buyer's side (in this case, their city) should be knowledgeable, and to pick partners very carefully to make sure they have the same ethical principles in their work that the city has (E5).

3.2 Ethics, transparency and trust

In Helsinki, interviewees emphasized the importance of transparency and trust when applying AI. It was considered crucial that the residents of the city do not lose their trust in the authorities. Helsinki has been building principles for the ethical use of AI with other large cities, including Amsterdam. One of the approaches that the City of Helsinki was exploring was the possibility of the city to act as a “MyData” (<https://mydata.org/>) operator. As stated in the city's strategic aims, residents can have their say on how their data is used; this means that the city would, for example, provide a platform that would enable residents to deny or permit the use of their data for different purposes.

In Espoo, there was similarly a concern for ethics, especially when it came to third-party products and services, stating that they must make sure that any third parties share their ethical principles. Almost all expressed that the ethics of AI is an important issue. However, one interviewee seemed to be somewhat of an outlier in all of this; he stated that he had trouble really imagining how AI could be misused or how someone's personal data could be used wrongly (E2). This was quite surprising, since the misuse of personal data occurs quite regularly: e.g. in Finland, identity theft as a phenomenon has been growing in recent years [66]. This particular interviewee also hoped that the government would not interpret the European Union's new General Data Protection Regulation (GDPR) strictly. In other words, for him the risk was rather that of *non-appropriation* than wrongful *misappropriation* of these technologies. However, as stated, this person represented an outlier, and others were very concerned with AI and data misappropriation.

E1, for example, presented wide and varied views of ethics. He was concerned about the previous national government introducing a law that enabled third-party use of citizens' health and welfare data; this actually came as a surprise to us, the interviewers, as well. The new law (“*toisiolaki*”) had been enacted in 2019, and it enabled the secondary use of health and social data, which means that citizens' register data created during health and social service sector activities can be used for purposes other than the primary reason

for which they were originally saved [58]. These include: “scientific research, statistics, development and innovation activities, steering and supervision of authorities, planning and reporting duties by authorities, teaching, and knowledge management” [58]. Interestingly for our research here, “development and innovation” are specifically mentioned. This arguably may open up the utilization of Finnish citizen data for private corporations’ use. This worried E1; however, he also reflected on whether it was unethical to *not* use the health data if human suffering can be alleviated. While on the surface this seems like a reasonable and ethical proposition, it can also be contested; in our previous work, we have also reflected on the question of how far societies should be willing to go in order to remove risk, and consequently, suffering, from human lives with technology [38]. While such a topic is outside the scope of this paper, overall, we interpret from our discussions that the introduction of AI had taken the officials into a place of forced ethical problem-solving that was very convoluted, difficult and, to some extent, perhaps outside of their job descriptions. It can be reasonably argued that they would have benefited from set policies to guide their work; nonetheless, applying those policies locally will likely require much attention from local officials, and thus, also internal strategies and agreements.

3.3 Nordic cities as producers, repositories and guardians of citizen data

Our interviewees underscored it as very important that Finnish cities are in possession of vast amounts of data; a feature of the Finnish welfare system, much of which is implemented on the local level. This is due to the fact that, as we earlier discussed, local governments, i.e., cities and municipalities, are responsible for organizing almost all the public sector services that citizens use in their everyday lives. For example, E1 recounted in considerable detail how the city produces lots of different kinds of services. To his knowledge, not many other European cities were responsible for schools, social services, etc. This had been evident when E1 participated in the EuroCities network, where representatives from major European cities were more interested in issues such as urban biking, whereas his own city’s representatives would have wanted to talk to other cities’ representatives about the issues surrounding research projects that combine various types of citizen data. Up until recent decades, these data have been kept more or less where they were produced: in the governing bodies of schools, hospitals and welfare services. E6 stated that the particular objective of the City of Espoo was to make the data “less siloed”; to enable cross-departmental use of the data. Most participants were fully aware of the potential that lay in the creation of larger data sets, and AI was seen as being key in being able to utilize that data. E1 was aware of both the potential benefits and dangers involved in combining these millions of data points and reflected also on the possibility of foreign interest towards these data sets.

Perhaps surprisingly, the job of maintaining and protecting the social and health customer data base in the City of Espoo is actually privatized. Espoo has a social and health customer data base (Efica) where all the information goes: diagnostic information about patients, welfare data, and so forth. However, E3 saw it as an issue that this was controlled by a company and that the City of Espoo is

a customer in this arrangement. The city is able to request reports from the database for management and experts, but city officials were not allowed there, not all the way to the database with the individualized information, save for a couple of individuals in the city organization who had the rights to dig deeper and retrieve individualized information. Unfortunately, the ownership of the actual data was not discussed; this commentary pertained to the control and maintenance of the repository. However, in general, cities did not seem very enthusiastic to surrender the ownership of these data to third parties. It was mentioned by interviewees from both cities (H2, E3) that in certain projects, they had made decisions not to hand the ownership of citizen data to private sector actors. This had led them to turn down some collaboration proposals by large companies.

Overall, the need for third parties in the development of digital services for the city was due to the fact that the city officials will never be the biggest experts on AI, as E3 stated. Thus, there is a need to relegate some of the duties and development projects to outside parties. However, the risk there, as he saw it, was that the city might not be strict and proactive enough with their demands and needs for technology development. As a result, Espoo had already devised a sort of an ethical playbook for the use of AI, and was also collaborating with research institutions nationally to establish joint norms.

3.4 Helsinki – a big push for data use to serve customer-residents

The general strategy of Helsinki, the capital city of Finland, is built around the slogan “the most functional city in the world”. Currently the capital city has a general city strategy that underscores the centrality of digitalization, and additionally, a specific digitalization strategy that came into effect in 2019. Furthermore, different divisions of the city organization have created their own digitalization programs. Helsinki has recently begun to operationalize its goals connected to digitalization by establishing new positions such as Chief Digital Officer (2018-) and Head of Data (2019-). Further, the city has organized its operations by creating an operating committee of digitalization and an office in charge of digital transformation. In general, then, digital technologies are being approached from various viewpoints, and a significant amount of attention is paid to their role in city development.

Unsurprisingly, the Helsinki interviewees saw data as a central facet of the city’s digitalization process and strategic aims – and AI was understood as something that is vital for processing large amounts of urban data. Helsinki’s digitalization program has six strategic aims, and four of these are directly linked to data.

- 1) Customers are to be served proactively and in a targeted manner
- 2) Residents can have their say on how their data is used
- 3) Data will support leadership, decision making and the development of services
- 4) Helsinki will produce, utilize and share the best open data in the world
- 5) Thanks to automation, employees can focus on being truly present for customers

- 6) The City will provide services in collaboration with other operators
(Digitalization program of Helsinki 2019).

In light of our literature review, it is quite interesting that these objectives do not use of the word ‘citizen’, opting to use of the word ‘customer’ and ‘resident’ instead. True enough, all of our participants also frequently talked about customers instead of citizens. This terminology would indeed support the kind of a value system described by [14]. Granted, the word citizen is also quite loaded – citizenship is also used to refer to national citizenship, and not all residents of these cities are citizens of the country, which makes it potentially awkward. In this sense, the word ‘resident’ may be seen as more inclusive. However, the use of the term ‘customer’ is a straightforward application of commercial language.

3.4.1 AI in strategies and in practice. Overall, in our interviews, AI was discussed especially in conjunction with city services; how data sets that the City already has about its residents and their service usage, could be combined and processed with AI. The central aim of the digitalization process of Helsinki is to move towards a city which is steered with data and which utilizes data to inform administration to produce what is termed proactive services. As, for instance, H2 informed us, the city tries to make use of data in order to produce “proactive services”. The overall goal was to move towards a city that predicts service needs and which can offer people service instead of making them look for the services. Another major goal was to act as a platform, to offer interfaces and data on top of which various third parties could produce their services.

The desire for predictive services seems quite novel from a governance point of view and is rather more reminiscent of some science fiction narratives around predictive AI. Another point of interest here is the use of the term ‘platform’ which is in accordance with general SC language. The awareness and willingness to provide a platform for third parties is, for its part, in alignment with the practices of ICT giants as recounted by. [14, 70]

According to our participants, Helsinki cannot become the city that will make “the best use of digitalization” without investing in AI. AI is part of the city’s digitalization strategy, and the city actively wants to study, understand, and apply it. At the time of doing the interviews, this process was in its initial phases. One interviewee (H5) described that Helsinki is on “an expedition” to explore and understand the potentials of AI. In practice, this meant providing funding for small trials or projects connected to AI for different divisions of the city. The city has also arranged training on the subject for its employees and is conducting some experimentation. Since the interviews, the city has also published an AI register, through which “you can get acquainted with the quick overviews of the city’s artificial intelligence systems or examine their more detailed information based on your own interests. You can also give feedback and thus participate in building human-centered AI in Helsinki.” [18] Thus, there is a notable effort toward transparency in AI implementation as well.

3.5 Espoo’s minor report – predicting child protective services use

The City of Espoo has a small team that is responsible for AI experimentation in the city. The team’s mission is to think how the

extensive pools of city data could be utilized in a beneficial and ethical way, as illustrated by one of our participants. She stated that the overall aim to create a wise and sustainable city, which to them meant a City as a Service, achieved through data and platforms. In their view, this City as a Service could then subsequently produce all city services in a way that promotes citizen wellbeing, vitality of businesses, and maintains the city’s economic balance.

At the time of the interviews the city organization had a certain kind of a governmental “add-on” (as it was termed by E5) called cross-governmental or cross-organizational programs (“poikkihallinnolliset ohjelmat”). One of these programs is called Sustainable Espoo, and the program contains five main goals, which were: smart city, mobility, energy, sustainable ways of life, and immediate environments. Overall, the program contained 24 projects. AI was not explicitly one of these goals or programs, although it could easily be seen as part of the SC goal. Yet, matters of AI had been relegated to the city services team, and the sustainability program was not directly involved in AI goals.

From this perspective, it was especially interesting that E5, the leader of the sustainability program, had some of the most wide-ranging commentary in regard to AI. E5’s background and expertise were clearly different; this interviewee’s point of view was that of a city planner as well as a city organization official. This interviewee was the only one that really brought up the physical risks along with privacy risks in conjunction with AI. For instance, E5 spoke about the autonomous vehicles test site in Espoo at length and was very happy with the fact that AI was being investigated in such a concrete way, while also being also aware of the service team’s efforts. This finding may suggest that it would be important to involve experts from all city organizations’ branches to start thinking about AI from all the necessary points of view; and moreover, that it would be especially critical to include experts of the physical and material city (the planners) as well as those who work in city services.

3.5.1 Predicting child protective services use. Clearly the most powerful example of AI use in Espoo thus far was a collaboration between the corporation that controls the database of all the social and health data from the city. This experiment took place in 2017 [1, 17, 60]. As recounted by our interviewees, city officials are not allowed to use this database themselves (except for a couple of employees who may view the data), but they are allowed to commission the company to deliver batches of its data. These officials then decided to experiment with whether or not this data could be used to identify and predict “heavy users” (as termed by interviewees) of city services. As an example, one official stated that every child taken into custody costs the city approximately a hundred thousand euros. This motivated our officials to experiment with AI to identify these heavy users through data and even predict individuals who are at high risk of becoming customers of the city’s child protective services. The experiment was a success, and a host of variables were identified by the AI – however, the European Union’s new General Data Protection Regulation (GDPR) brought the experiment to an end and the data was destroyed.

The term ‘heavy user’ seems to point towards the realm of computing in general, as the interviewees used the English language term amid the Finnish language interview. ‘User’ in general is a stable but contested term in the fields of, e.g., product design, service

design, interaction design and the ICT industry [43, 50]. Along with it, the terms ‘power user’ and ‘heavy user’ are employed [13, 33]. The former is usually seen to denote a level of competency, whereas the latter only seems to refer to the frequency of use. Since the term ‘user’ has gained significant popularity in public discourse over the past decades, it is perhaps not surprising that it has made its way into city official’s parlance as well, given especially that our officials were specifically involved with services and ICT. However, it might be beneficial to also scrutinize this new rhetoric somewhat since the concerns over the term ‘user’ that have been raised in HCI and elsewhere clearly apply to city service and systems design as well.

There were powerful incentives behind this experiment, as the target group of this experiment was, undoubtedly, in need of some sort of help. As recounted by, for example, E3, these families have problems such as drug use, unemployment, unpaid rent, and children who do not attend school regularly. The project did indeed succeed to predict these issues, and the child protective services officials were excited about the results. It was considered important to be able to make targeted actions into at-risk groups in order to help their plight, reduce costs and make people’s living situations better. Thus, certainly, there is an ethical incentive here to do the work; but it also raises the question, would these individuals be able to resist the use of their personal data at all? We argue that this would warrant further research and ethical reflection. However, we recognize and do not belittle the struggles of the group that was to receive help in this way; however, if measures are taken to use this type of data, Participatory Design (PD) and AI ethics principles should be adhered to. Indeed, this type of communicative and ethics work is underway [1]. While not all individuals care about how their data is used, and whether or not they are singled out as a vulnerable group based on their circumstances, these groups of people and individuals should have a voice in the design and implementation of these technologies, and a chance to opt out as well.

E3 recounted that from the point of wellbeing, AI is very useful when people do the work of understanding how things relate to one another and what direction to go to. However, in the case of the child protective services data, the AI did much of the thinking, going through the data, bringing the officials the eventual highlights from it. E3 was not sure of the parameters which were used to accomplish this but recounted that they had no preconceived notions of what the AI should do. The AI brought them the highlights and then city officials began to think what they should focus on in the points that were brought up. Since the purpose of AI is to serve as a way to offload human cognitive tasks, this approach makes complete sense and was highly effective. However, an enormous amount of ethical responsibility seemed to be placed on the AI in this experiment.

Finally, we will discuss our results to discuss their meaning for cities, technology development and society at large. We also present some recommendations for the various stakeholders involved, including academia, city organizations and policy makers.

4 DISCUSSION AND CONCLUSIONS

In this paper, we explored city officials’ attitudes, knowledge and relationship towards Artificial Intelligence (AI) through topical

expert interviews in two Finnish metropolitan cities. Our interviewees were key players in their respective cities’ response to the challenge and opportunity of novel technologies. We investigated these materials through a theoretically informed viewpoint. Firstly, we identified a relevant and timely phenomenon where AI technologies are being infused into cities through consumer products and the SC agenda. Second, we used research literature to build an understanding of SC as an agenda that is partly driven by city interests, needs and issues, but also informed by corporate interests. Third, we recognized informing, or data production, as the crucial driving force behind digitalization; in cities, the informing qualities of SC technologies produce landscapes of urban data production. This chain of phenomena circles back into AI: AI is the tool, and data is the raw material.

Overall, these viewpoints can be recognized in our materials. These cities had actually been producers of digital data for a long time, probably for as long as there had been any digital databases in use. The origins of these developments, then, go back decades. While participants expressed skepticism over the very concept of SC, they had adopted a view wherein the city was seen as a platform, even though this was a platform of services. The citizens were often seen as customers, which seems to align with the overall SC literature we reviewed in section 1.2. Importantly for our work here, both participants in Helsinki and Espoo outright recognized that AI is the tool that is needed to make use of citizen data. However, participants almost unanimously agreed that there were sizeable ethical issues and risks involved with the AI driven utilization of unified data sets. As such, efforts had been made to address these needs via experiments, education and collaboration with research institutions and other partners.

Naturally, our data also has limitations and potential needs and trajectories for further work by ourselves and other researchers to address these topics. Firstly, while our data set reached satiety, and many topics or ideas kept re-emerging across the interviews, AI is a very fast-moving target. This means that a longitudinal approach to a city’s “AI story” would be more illuminating than a snapshot in teasing out AI trajectories in cities. Secondly, we focused our efforts on the capital city area. More research should be done in other midsize and small cities in the country; furthermore, a comparison between, for example, Nordic countries would enable us to explore the relation between the welfare state model and AI in cities more accurately. Additionally, a comparative study between, e.g., cities in the Global South countries and elsewhere in the Global North would also be of interest. Third, our qualitative, context-driven approach means that these results may not simply be taken as generalizable truths. Rather, the knowledge gained through this data should be applied with its context in mind. Finally, it is an unexpected limitation of our data that these interviews concern the pre-COVID-19 era. This means that some of the cities’ activities around non-urgent issues may have been slowed down. This also means that there is an even greater need to continue this work. The pandemic has put much pressure on the organization and city officials, and any deep reflections on the effect of the pandemic will have to happen as the most urgent state of emergency is lifted. At the time of writing this article, the country, and especially its capital region area, was entering a new lockdown-like status as infections were spiking due to more effective mutations of the virus

entering the country. As vaccinations progress in 2021 and a better coverage is reached, possibilities for re-visiting these themes in a post-pandemic world will be opened up. Bearing in mind these caveats, our findings point to some observations and implications:

AI and the welfare state model seem to be tightly coupled through data. This is due to the fact that cities and municipalities offer a large array of everyday public services in the Finnish model, and thus have been collecting extensive data for a long time. In recent decades, these systems have been digitalized, which opens up the possibility to combining these data and using AI assisted analysis on them, as identified by our interviewees. What should be done with this potent combination is a sizeable question. Our interviewees were equally concerned with the consequences of *not* using this technology to help those at risk, and with the consequences of using them. We argue that this calls for societal discussion in general, participatory processes on the level of technology design, as well as professional legal and ethical consideration on the level of policies.

There is a need for AI and data policies on cities, which should be carefully examined and, as much as possible, shared among different city organizations and stakeholders. Along with policies, it is important to produce clearly presented reports on the state of the art regarding AIs. Our participants were mostly highly in-tune with digitalization processes and technologies, and even they freely admitted that they did not really know what AI entails, even though there was wide-spread agreement that they do involve a system that is able to learn and adapt. Our participants did not take the words ‘artificial intelligence’ at face value. They expressed fundamental doubt over the concept and even distaste around the AI hype, yet they were eager to discuss actual implementations of it in detail. General AI policies would also help midsize and small cities to apply knowledge of AI systems in cities with less resources. However, this will nevertheless warrant significant localization and reflection on how city size affects the application and effects of AI and urban data systems. After collecting our materials, this type of work has been begun in these cities, and also in the country through networked projects, the results of which will be of interest to our study as well. Some of these projects specifically aim to further citizens’ data agency and personal ownership.

There is a need to understand and disseminate reflections, debate and knowledge of what AI actually means among city officials. This issue is twofold. We need to understand and enumerate actual applications of AI to begin to transport this knowledge across disciplines on a very practical level; what sorts of applications of AI exist now and in the near future, and under what circumstances is it acceptable to use them? This work is surely underway due to the hype related to these technologies; however, we will stress the importance of deliberative work of disseminating this knowledge within city organizations to cater to urban developers and policy makers. Importantly, on a more fundamental level, we argue that the concept of AI is also inherently ambiguous and underexamined on a deep level, and that this should be addressed by the academic communities around AIs through interdisciplinary work. The current academic works are overly siloed into various engineering, computing and urban research literatures, and as such, are not able to address urban AIs in an effective manner.

There is a need to introduce transparent and participatory design practices with AI use in cities globally. We deem it a crucial finding here, that the most persuasive use case involved a citizen group that could be described as an underprivileged, at risk group. This should give anyone pause, as it arguably did to our interviewees as well. The officials nevertheless considered the case mostly as a positive one; and indeed, it is entirely necessary to help struggling families and children. However, from a more global perspective, the identification of groups of people for the purposes of intervention is a fairly dangerous idea. There are many disenfranchised groups in societies, some of which are subject to stigmatization. The development of methods, wherein data is used for an AI to learn what features point to a member of an at-risk group, presents us with a high-stakes scenario. We are intently aware of the use of technology that was implemented by China and South Korea to battle the COVID-190 epidemic [47, 65]. However, even within the European Union there are governments that are intent on the erasure of certain communities and the dissolution of democratic principles, if not indeed the enshrinement of authoritarianism [24, 56]. City officials should certainly be keenly aware of these global developments as they disseminate their practices across cities in the EU and globally, and as they work in public-private partnerships. In the Nordic context, where trust in government is mostly seen as being justified, there is a high-level of freedom of press [55], there is a long tradition of reasonable data collection. However, these very features could also make Nordic countries and cities an attractive site for companies and cities to develop and test technologies that can then be spread around the globe into much less favorable conditions. It is quite obvious that within these design processes, open ethical reflection and the principles of participatory design should be applied. It should also be a given principle that representatives of the particularly affected citizen group themselves should be a part of the design process.

For cities, these findings point to the importance of establishing at least some in-house expertise and policies that can handle the onslaught of novel digital technologies to a high degree. Our cities here certainly benefited greatly from having dedicated teams and personnel that were in charge of data, digitalization and AI. But we must bear in mind that these were metropolitan cities in the Global North. Their concern is to compete with other metropolitan cities while maintaining a good level of services. For them, AI and citizen data represented significant challenges, but also opportunities. However, what will become of most cities in the world? Those who are middle-tier, nationally important cities; or small, even declining rural towns; or cities of various sizes in the Global South? The introduction of urban AI necessitates much more investigation over the coming decades. Further questions include: what participatory design processes could we use to involve citizens and to design with groups of citizens; what dynamics does urban AI introduce into the competition between cities; what will urban AI mean for midsize and small cities; what does urban AI mean in different parts of the world, including the Global North and South; what dataveillance practices will emerge and how can we prevent their unethical use; how can governments be assured that third parties share, or at least act according to, common ethical guidelines; how can citizens be sure that their rights are respected; how can we preserve, and hopefully strengthen, democracy through AI use rather than weaken it;

and finally, how will AI in cities affect sustainability targets of the coming century?

ACKNOWLEDGMENTS

We would like to extend our sincerest thanks to our interviewees, without whom this study would not have been possible, as well as our reviewers for their valuable insights. Dr. Luusua would also like to acknowledge the grant n:o 316136 from the Academy of Finland for the project Experiencing Artificial Intelligence in the Smart City (AICity). Dr. Ylipulli would like to acknowledge grant n:o 332143 from the Academy of Finland for the project Digital Inequality in Smart Cities (DISC).

REFERENCES

- [1] 6 Aika. 2019. Espoon tekoälykokeilun jatko: syrjäytymisriskin tekijöihin päästy kiinni, merkittäviä kustannussäästöjä jo nyt. Accessed 30 Apr 2021. <https://6aika.fi/espoo-tekoalykokeilun-jatko-syrjautymisriskin-tekijoihin-paasty-kiinni-merkittavia-kustannussastoja-jo-nyt/>
- [2] Yoseph Bar-Cohen and David Hanson. 2009. The coming robot revolution: Expectations and fears about emerging intelligent, humanlike machines. Springer Science & Business Media.
- [3] Christoph Bartneck, Christoph Lütge, Alan Wagner, and Sean Welsh. 2021. Trust and Fairness in AI Systems. 27–38. DOI: https://doi.org/10.1007/978-3-030-51110-4_4
- [4] Karl Baumann, Benjamin Stokes, François Bar, and Ben Caldwell. 2017. Infrastructures of the Imagination: Community Design for Speculative Urban Technologies. In Proceedings of the 8th International Conference on Communities and Technologies (C&T '17). Association for Computing Machinery, New York, NY, USA, 266–269. DOI: <https://doi.org/10.1145/3083671.3083700>
- [5] British Broadcasting Corporation. 2020. Facial recognition: EU considers ban of up to five years. Accessed 30 Jan 2020 <https://www.bbc.com/news/technology-51148501>
- [6] Margaret A Boden. 2016. AI: Its nature and future. Oxford University Press.
- [7] Morten Bohøj, Nikolaj Borchorst, Susanne Bødker, Matthias Korn, and Pär-Ola Zander. 2011. Public deliberation in municipal planning: supporting action and reflection with mobile technology. In Proceedings of the 5th International Conference on Communities and Technologies (C&T '11). Association for Computing Machinery, New York, NY, USA, 88–97. DOI: <https://doi.org/10.1145/2103354.2103367>
- [8] Nick Bostrom and Eliezer Yudkowsky. 2014. The ethics of artificial intelligence. The Cambridge handbook of artificial intelligence, 1, pp.316–334.
- [9] Nick Bostrom. 2019. Superintelligence: Paths, dangers, strategies. Oxford University Press.
- [10] Tone Bratteteig and Guri Verne. 2018. Does AI make PD obsolete? exploring challenges from artificial intelligence to participatory design. In Proceedings of the 15th Participatory Design Conference: Short Papers, Situated Actions, Workshops and Tutorial - Volume 2 (PDC '18). Association for Computing Machinery, New York, NY, USA, Article 8, 1–5. DOI: <https://doi.org/10.1145/3210604.3210646>
- [11] Joy Buolamwini. 2019. Artificial Intelligence Has a Problem With Gender and Racial Bias. Here's How to Solve It. Accessed Jan 30, 2020. <https://time.com/5520558/artificial-intelligence-racial-gender-bias/>
- [12] Susanne Bødker and Pär-Ola Zander. 2015. Participation in design between public sector and local communities. In Proceedings of the 7th International Conference on Communities and Technologies (C&T '15). Association for Computing Machinery, New York, NY, USA, 49–58. DOI: <https://doi.org/10.1145/2768545.2768546>
- [13] Jonathan Bright, Sandra Bermudez, Jean-Benoit Pilet, and Thomas Soubiran. 2020. Power users in online democracy: their origins and impact. null 23, 13 (November 2020), 1838–1853. DOI: <https://doi.org/10.1080/1369118X.2019.1621920>
- [14] Paolo Cardullo and Rob Kitchin. 2019. Smart urbanism and smart citizenship: The neoliberal logic of 'citizen-focused' smart cities in Europe. Environment and planning C: politics and space, 37(5), pp.813–830.
- [15] Stephen Cave and Kanta Dihal. 2019. Hopes and fears for intelligent machines in fiction and reality. Nature Machine Intelligence, 1(2), pp.74–78.
- [16] Cisco Systems. 2019. Smart decisions make smart cities. Accessed Feb 2, 2019. <https://discover.cisco.com/en/us/iot/whitepaper/smart-cities-digital-value>
- [17] City of Espoo. 2017. Espoo and Tieto testing artificial intelligence to identify service pathways. [https://www.espooli.fi/en-US/Childcare_and_education/Early_childhood_education/Espoo_and_Tieto_testing_artificial_intel\(121565\)](https://www.espooli.fi/en-US/Childcare_and_education/Early_childhood_education/Espoo_and_Tieto_testing_artificial_intel(121565))
- [18] City of Helsinki. 2021. What is AI register? Accessed 26 Feb 2021. < <https://ai.hel.fi/en/ai-register/>>
- [19] Roger Clarke. 1988. Information technology and dataveillance. Communications of the ACM, 31(5), pp.498–512.
- [20] Roger Clarke. 2003, March. Dataveillance—15 years on. In Privacy Issues Forum, Wellington (Vol. 28).
- [21] Ayona Datta. 2015. New urban utopias of postcolonial India: 'Entrepreneurial urbanization' in Dholera smart city, Gujarat. Dialogues in Human Geography, 5(1), pp.3–22.
- [22] Deloitte Ltd. 2019. Forces of change: Smart cities. Accessed Feb 2, 2021. <https://www2.deloitte.com/insights/us/en/focus/smart-city/overview.html>
- [23] Graham Dove and Anne-Laure Fayard. 2020. Monsters, Metaphors, and Machine Learning. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, ACM, Honolulu HI USA, 1–17. DOI: <https://doi.org/10.1145/3313831.3376275>
- [24] Steven Erlanger. 2020. Poland and Hungary Use Coronavirus to Punish Opposition. Retrieved May 2, 2020. <https://www.nytimes.com/2020/04/22/world/europe/poland-hungary-coronavirus.html>
- [25] Steven Feldstein. 2019. The road to digital unfreedom: How artificial intelligence is reshaping repression. Journal of Democracy, 30(1), pp.40–52.
- [26] Kees Brants and Valere Frissen. 2017. Inclusion and exclusion in the information society. In Media, technology and everyday life in Europe (pp. 39–50). Routledge.
- [27] Caleb Garling. 2020. Andrew Ng: Why 'Deep Learning' Is a Mandate for Humans, Not Just Machines. Accessed Jan 30 2020. <https://www.wired.com/brandlab/2015/05/andrew-ng-deep-learning-mandate-humans-not-just-machines/>
- [28] David Harvey. 2003. The right to the city. International journal of urban and regional research, 27(4), pp.939–941.
- [29] Luke Hespanhol. 2017. More than Smart, Beyond Resilient: Networking Communities for Antifragile Cities. In Proceedings of the 8th International Conference on Communities and Technologies (C&T '17). Association for Computing Machinery, New York, NY, USA, 105–114. DOI: <https://doi.org/10.1145/3083671.3083683>
- [30] Robert Hollands. 2008. Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?. City, 12(3), pp.303–320.
- [31] Nassim Jafari Naimi. 2018. Our bodies in the trolley's path, or why self-driving cars must* be programmed to kill. Science, Technology, & Human Values, 43(2), pp.302–323.
- [32] Simon Joss, Frans Sengers, Daan Schraven, Federico Caprotti and Youri Dayot. 2019. The smart city as global discourse: Storylines and critical junctures across 27 cities. Journal of Urban Technology, 26(1), pp.3–34.
- [33] Hyunhoon Jung, Hyeji Kim, and Jung-Woo Ha. 2020. Understanding Differences between Heavy Users and Light Users in Difficulties with Voice User Interfaces. In Proceedings of the 2nd Conference on Conversational User Interfaces (CUI '20). Association for Computing Machinery, New York, NY, USA, Article 51, 1–4. DOI: <https://doi.org/10.1145/3405755.3406170>
- [34] Leo Kelion. 2019. Met Police gave images for King's Cross facial recognition scans. BBC News Accessed 30 Jan 2021. <https://www.bbc.com/news/technology-49586582>
- [35] Nicole Kobie. 2019. The complicated truth about China's social credit system. Accessed Feb 19, 2019. <https://www.wired.co.uk/article/china-social-credit-system-explained>
- [36] Raymond Kurzweil. 2005. The singularity is near: When humans transcend biology. Penguin.
- [37] Aale Luusua and Johanna Ylipulli. 2020a. Urban AI: Formulating an Agenda for the Interdisciplinary Research of Artificial Intelligence in Cities. In Companion Publication of the 2020 ACM Designing Interactive Systems Conference (DIS'20 Companion). Association for Computing Machinery, New York, NY, USA, 373–376. DOI: <https://doi.org/10.1145/3393914.3395905>
- [38] Aale Luusua and Johanna Ylipulli. 2020b. Artificial Intelligence and Risk in Design. In Proceedings of the 2020 ACM Designing Interactive Systems Conference (DIS'20). Association for Computing Machinery, New York, NY, USA, 1235–1244. DOI: <https://doi.org/10.1145/3357236.3395491>
- [39] DS Madison. 2012. Critical ethnography: Method, ethics, and performance, 2nd Edition. Sage.
- [40] John McCarthy and PJ Hayes. 1981. Some philosophical problems from the standpoint of artificial intelligence. In Readings in artificial intelligence (pp. 431–450).
- [41] John McCarthy, ML Minsky, N Rochester, and CE Shannon. 1955. A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence. 13.
- [42] P Mozur. 2017. Inside China's Dystopian Dreams: A.I., Shame and Lots of Cameras. New York Times. Accessed Feb 2, 2019 <https://www.nytimes.com/2018/07/08/business/china-surveillance-technology.html>
- [43] Don Norman. 2018. Words Matter. Talk About People: Not Customers, Not Consumers, Not Users. jnd.org. Retrieved April 26, 2021 from https://jnd.org/words_matter_talk_about_people_not_customers_not_consumers_not_users/
- [44] Nancy Odendaal. 2015. Getting smart about smart cities in Cape Town: Beyond the rhetoric. In Smart Urbanism (pp. 87–103). Routledge.
- [45] Nancy Odendaal. 2011. The spaces between: ICT and marginalization in the South African city. In Proceedings of the 5th International Conference on Communities and Technologies (C&T '11). Association for Computing Machinery, New York, NY, USA, 150–158. DOI: <https://doi.org/10.1145/2103354.2103374>

- [46] The Organisation for Economic Co-operation and Development. 2019 Country Fact Sheet: Finland. Retrieved May 3, 2020. <https://www.oecd.org/gov/gov-at-a-glance-2019-finland.pdf>
- [47] The Organisation for Economic Co-operation and Development. 2020. Tracking and tracing COVID: Protecting privacy and data. Retrieved May 3, 2020. <https://www.oecd.org/coronavirus/policy-responses/tracking-and-tracing-covid-protecting-privacy-and-data-while-using-apps-and-biometrics/>
- [48] Michael Quinn Patton. 2015. Qualitative research & evaluation methods: integrating theory and practice (Fourth edition ed.). SAGE Publications, Inc, Thousand Oaks, California.
- [49] Manuel Portela and Lucia Paz Errandonea. 2017. The role of Participatory Social Mapping in the struggle of the territory and the right to the city: A case study in Buenos Aires. In Proceedings of the 8th International Conference on Communities and Technologies (C&T '17). Association for Computing Machinery, New York, NY, USA, 100–104. DOI:<https://doi.org/10.1145/3083671.3083676>
- [50] Elaine Rich. 1983. Users are individuals: individualizing user models. International Journal of Man-Machine Studies 18, 3 (March 1983), 199–214. DOI:[https://doi.org/10.1016/S0020-7373\(83\)80007-8](https://doi.org/10.1016/S0020-7373(83)80007-8)
- [51] Dan Richardson, Clara Crivellaro, Ahmed Kharrufa, Kyle Montague, and Patrick Olivier. 2017. Exploring Public Places as Infrastructures for Civic M-Learning. In Proceedings of the 8th International Conference on Communities and Technologies (C&T '17). Association for Computing Machinery, New York, NY, USA, 222–231. DOI:<https://doi.org/10.1145/3083671.3083678>
- [52] Valeria Righi, Sergio Sayago, and Josep Blat. 2015. Urban ageing: technology, agency and community in smarter cities for older people. In Proceedings of the 7th International Conference on Communities and Technologies (C&T '15). Association for Computing Machinery, New York, NY, USA, 119–128. DOI:<https://doi.org/10.1145/2768545.2768552>
- [53] Dimitrios Ringas and Eleni Christopoulou. 2013. Collective city memory: field experience on the effect of urban computing on community. In Proceedings of the 6th International Conference on Communities and Technologies (C&T '13). Association for Computing Machinery, New York, NY, USA, 157–165. DOI:<https://doi.org/10.1145/2482991.2482996>
- [54] Francesca Rossi. 2018. Building Trust in Artificial Intelligence. Journal of International Affairs 72, 1 (2018), 127–133.
- [55] Reporters without Borders. 2020. Land of the free press – and its enemies. Accessed 1 May 2020. <https://rsf.org/en/finland/>
- [56] Yasmeen Sherhan. 2020. The EU Watches as Hungary Kills Democracy. The Atlantic. Retrieved May 2, 2020 <https://www.theatlantic.com/international/archive/2020/04/europe-hungary-viktor-orban-coronavirus-covid19-democracy/609313/>
- [57] Geertje Slingerland, Ingrid Mulder, and Tomasz Jaskiewicz. 2019. Join the Park! Exploring Opportunities to Lower the Participation Divide in Park Communities. In Proceedings of the 9th International Conference on Communities & Technologies - Transforming Communities (C&T '19). Association for Computing Machinery, New York, NY, USA, 131–135. DOI:<https://doi.org/10.1145/3328320.3328382>
- [58] Social and Health Ministry of Finland. 2020. Secondary use of health and social data. Retrieved May 3, 2020 from https://stm.fi/en/article/-/asset_publisher/sosiaali-ja-terveys-tietojen-tietoturvallinen-hyodyntaminen
- [59] Ola Söderström, Till Paasche, and Francisco Klausner. 2014. Smart cities as corporate storytelling. City 18, 3 (May 2014), 307–320. DOI:<https://doi.org/10.1080/13604813.2014.906716>
- [60] Tietoevry. 2018. The City of Espoo: a unique experiment with AI. Accessed Apr 30, 2021 from <https://www.tietoevry.com/en/success-stories/2018/the-city-of-espoo-a-unique-experiment/>
- [61] Ina Wagner, Maria Basile, Lisa Ehrenstrasser, Valérie Maquil, Jean-Jacques Terrin, and Mira Wagner. 2009. Supporting community engagement in the city: urban planning in the MR-tent. In Proceedings of the fourth international conference on Communities and technologies (C&T '09). Association for Computing Machinery, New York, NY, USA, 185–194. DOI:<https://doi.org/10.1145/1556460.1556488>
- [62] Alan Wiig. 2016. The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia. Urban Geography 37, 4 (May 2016), 535–553. DOI:<https://doi.org/10.1080/02723638.2015.1065686>
- [63] Chris Williams. 2015. AI guru Ng: Fearing a rise of killer robots is like worrying about overpopulation on Mars. Accessed Jan 30 2020 from https://www.theregister.co.uk/2015/03/19/andrew_ng_baidu_ai/
- [64] Katharine S Willis. 2019. Making a 'Place' for ICTs in Rural Communities: The role of village halls in digital inclusion. In Proceedings of the 9th International Conference on Communities & Technologies - Transforming Communities (C&T '19). Association for Computing Machinery, New York, NY, USA, 136–142. DOI:<https://doi.org/10.1145/3328320.3328401>
- [65] Xiao Qiang. 2019. The Road to Digital Unfreedom: President Xi's Surveillance State. Journal of Democracy, 30(1), pp.53–67.
- [66] YLE Finnish Broadcasting Corporation. 2018. Hämeen poliisi huolissaan identiteettivarkauksista. Accessed May 1, 2020. <https://yle.fi/uutiset/3-10221044>
- [67] Johanna Ylipulli and Aale Luusua. 2019. "Without Libraries What Have We?" Public Libraries as Nodes for Technological Empowerment in the Era of Smart Cities, AI and Big Data. Proceedings of the 9th International Conference on Communities and Technologies, Vienna, Austria, 3–7 June 2019. ACM Press: 92–101.
- [68] Johanna Ylipulli and Aale Luusua. 2020. Smart cities with a Nordic twist? Public sector digitalization in Finnish data-rich cities." Telematics and Informatics 55: 101457.
- [69] Shoshana Zuboff. 1985. Automate/informate: The two faces of intelligent technology. Organizational dynamics, 14(2), pp.5–18.
- [70] Shoshana Zuboff. 2015. Big other: surveillance capitalism and the prospects of an information civilization. Journal of Information Technology, 30(1), pp.75–89.