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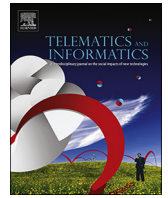
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Historicizing the smart cities: Genealogy as a method of critique for smart urbanism

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ABSTRACT

This study explores the utility of genealogy as a method of critiquing the history of the present in the smart cities. Taking a South Korean smart city of Songdo as a point of departure, this paper offers a genealogical understanding of a smart city that situates the current technics and technologies of data-driven urban governance within the broader context of South Korean history. Given the scarcity of a historically informed understanding of a smart city in the existing literatures on smart urbanism, this paper argues that a genealogical method helps us to counter the sweeping binarism that obscures the complexity and diversity of actually existing smart cities today. Through genealogy, this study underscores the multifaceted nature of the smart city, which consists of a combination of multiple urban diagrams that grows out of distinct problems and objectives of urban management – mobility, security, environment, and futurity. This paper illustrates how a smart city emerged out of multiple strings of history and problematizations that are contingently interwoven at a given time and space in multiple and diffused forms.

1. Introduction

It is often said that smart cities are going to alter our lives in the future urban world. The smart city is defined as a city that collects and utilizes data gathered from distributed sensors and video cameras that connect everything from trash bins to streetlights. The smart city is the ultimate dream of urban scientists who want to do away with the human factor in urban management. It is often justified by aims to maximize efficiency and functionality, pass the drudgery on to the machines and create new revenue streams. Narratives that have saturated our public discussions about the future cast smart city as an intriguing new urban imaginary and an ongoing frontier of technological innovation.

Yet, we hear very few stories that tell how any particular smart city came into being – the stories that gauge the influences of different histories of different cities and nations, the governmental and institutional settings (Kitchin, 2015). We also hear very little about the affective charge associated with futurity, globalization, technological advancement, the aspirations for a quality of life that are entangled with data-driven urbanism. Instead, we are frequently stuck with the "corporate storytelling of smart cities" (Söderström et al., 2014) that take technological changes associated with the smart city for granted and limit our task to modify and improve their *effects*.

Using genealogy as both a theoretical and methodological intervention into the existing literature on smart cities, this paper charts a distinctive path of research that composes a *cultural history of the smart city* articulated in a South Korean (hereafter Korean) city of Songdo. By genealogy, I mean a form of historical critique which traces the network of associations between seemingly disparate historical events. The premise that I am working with in this paper is that the smart city is neither a fixed nor a singular idea

that can be grasped in full totality. Instead, I argue that each smart city is a contingent emergence out of multiple strings of history that are interweaved at a given time and space. The work of genealogy then is to inquire how these strings of history have coalesced in the present to establish the current form of smart city and more importantly, to understand what social needs and problems that the smart city was brought to address through its emergence.

In 2013, when I first visited Songdo, the term 'smart city' was starting to gain tractions. Songdo was cited as one of the early case studies discussed along with the Masdar City (United Arab Emirates) and the PlanIT Valley (Portugal). In these accounts, Songdo has been depicted as a "failed project" (Greenfield, 2013), a "stupefying smart city" (Sennett, 2012), a "no man's city" (James, 2016), a "ghetto for the affluent" (Mesmer, 2017), and even a "Chernobyl-like ghost town" (Pettit and White, 2018). It was viewed as a city deprived of an organic liveliness and messiness of the good old community life that Jane Jacobs would have reminisced in the 1960s. Hopes and aspirations (and desperations) that drove Songdo into existence were reduced to a corporate hype or a cover for a project of advancing "neoliberalism."

There are a number of limitations to the above kind of critique and we see the repertoire of critique applied to many other smart city developments. The accounts like the above overlook the internal point of view of the city, including the fact that the population has steadily grown over the course of years in Songdo (as of 2019, the number of registered residents in Songdo is 159,326, according to "IFEZ Seen by Statistics" published by the Incheon Free Economic Zone Authority) and that many Korean families express their aspirations to live in a place like Songdo. From a critical point of view, one should ask then, what that aspiration consists of, how the elements of that aspiration reflect the deep historical grid that pertains to the present, and how these cultural forces persist and traverse the different domains of public concerns about the economy, safety, environment, and the way of a desirable life. In other words, a deep critical understanding of Songdo, as with many other smart cities in the world, should look beyond the immediate decisions and activities that attempt to build or modify the technical infrastructures, but instead, uncover the historical and cultural conditions of its emergence, as a complex, multiple, and non-individual formation, which are not subjected to the present only.

In this vein, a genealogical approach deployed in this paper charts the smart city as consisting of multiple urban diagrams. By diagram, I do not only mean the literal sense of the term that refers to plans, schemes, drawings, and programs that problematize certain aspects of a city and seek to idealize its potentials. My diagrammatic reading of smart city is akin to Osborne and Rose (1999) mapping of the historical a priori immanent to the abstract schemes of "advanced" liberal cities. In their analysis, the diagram is used as a way of capturing how the cities have become integral to the government's projection of its truth claims, with regard to how regularities are ought to be imposed upon our urban everyday life. For Osborne and Rose (1999), the contemporary liberal urbanism is diagrammed as "healthy cities," "risky cities," "cities of enterprise," and "cities of pleasure," and each of these planes is interweaved with moral techniques of fostering ethical and civic subject.

In this paper, I appropriate Osborne and Rose's liberal urban diagram to chart the genealogy of smart urbanism diagrammed as "mobile city," "secure city," "eco city," and "future city" and pair these diagrams with related histories and large scale-social transformations that were co-eval with the development of Songdo. By large scale transformations, I mean the Korean history of urbanization, militarization, industrialization, and democratization. Sections of this paper are organized according to the following scheme: after presenting a literature review on smart cities, I add a brief reflection on identifying genealogy as a method that can complement the existing critique for smart urbanism. Based on a broad array of materials analyzed, I present the summary of the findings grouped under four urban diagrams – mobile city, secure city, eco-city, and future city.[1]

2. Literature review

This study's philosophical disposition is distinct from those inherent in other critical literature on smart cities in two major aspects. First, this research recognizes that smart city is often seen as symptomatic of macro-social *structure* in many accounts: a lens to read off and critique the universal politico-economic logic such as the expansion of neoliberal capitalism and corporate surveillance (Greenfield, 2013; Hollands, 2008, 2015; Morozov and Bria, 2018). In this view, smart cities are often conflated with the dominant capitalist system, which is seen as the cause of problems such as differential access and mobility, privacy invasion, limitation of freedom, and people's entitled right to the city. While these critical accounts of the smart city bring enlightening facts about the dominant corporate influence that generates utopian, homogeneous, and soulless "stupefying smart cities" (Sennett, 2012) and show that a provider's good intention alone is inadequate to fulfill their egalitarian promise, they tend to under-theorize the local specificities of these problems.

As a result, the critical approaches to the smart cities undertaken by the scholars from the Global North produced sweeping statements about the smart city's potential to exacerbate the corporate structure of control, surveillance, and exclusivity, while not taking a cautious approach to the different cultural norms, historical conditions, and political regimes in different parts of the world. While the structuralist approach serves as a corrective to the instrumentalist approach to the smart city, its macro-view of society, uncritically embedded in liberal democratic values, underestimates the mattering of culture in the deployment of technologies. When a new type of technology emerges, it is not deployed across a flat and homogeneous terrain; it is overlaid on a heterogeneous domain that has developed in response to preexisting imaginaries (Jasanoff, 2015) and cultures that are not reducible to any overarching structure.

Alternatively, the STS approach to the smart city offers a more close-up view of technology in *actions*, including the human

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[1] It should be noted that this paper is adapted from a larger research project that culminated in my doctoral dissertation, *Remapping Songdo: A Genealogy of Smart City in South Korea.*

practices of manufacturing, designing, fabricating, and using the technological products as well as the cultural and historical conditions that frame those actions. In Heideggerian sense, the emphasis is placed on the existence rather than the essence of technology that reveals its truthfulness in a given situation, as it goes through the processes of "translations" and "frictions." This approach does not necessarily attempt to grasp technology in its full totality through structural or phenomenological dimension but instead, attend to the localized process in which technology reveals through the discursive and material practices in an "actually existing smart city" (Shelton et al., 2015).

The topic of this paper shares the philosophy and goal with the scholarship in the postcolonial STS that challenges the "digital universalism" (Chan, 2013; Milan and Treré, 2019) and takes a localized lens to decentralize and pluralize the flat ontology of smart cities. There has been a steady increase in the smart city research undertaken beyond the context of the global North that draw cases from South Korea (Shwayri, 2013; Halpern et al., 2013; Shin, 2017; Sonn et al., 2017), India (Datta, 2016, 2019, Mertia, 2017), Turkey (Hoyng, 2016), and Singapore (Ho, 2017; Gonzaga, 2018; Tay, 2019). As an illustrative example, consider Ayona Datta (2019)'s study of India's national "100 Smart Cities Mission" and her interpretation of intersecting popular myths and the underlying power relations of postcolonial urbanism that are articulated in the scale of the smart city. Datta shows how smart cities in India break the universal mold of the smart city that is primarily data-driven and instead are situated in the range of intersecting narratives and temporalities including the postcolonial futurism, the conflation of urbanism and nationalism, and the myth of speed and technology.

With that being said, although this research borrows many insights from the postcolonial STS, ethnographies of technological infrastructures, and for that matter, from cultural geography, it is not entirely about how one might actually experience the smart city. This paper problematizes the privilege accorded to the "actual" in the accounts of the "actually existing smart city" that gives primacy to the present and the material encounters, which leaves us unable to address the "immanent" aspirations, anxieties, and normativities that are produced by, and productive of, the historical and cultural formation of a smart city.

What is instead, distinct about this study and its contribution to the field of smart city scholarship is that it foregrounds a crucial dimension of research with regard to the *cultural and historical formation of smart city*. This paper adopts an analytical position that attends to the "immanent" qualities of smart urban diagrams that are not as visible as the "actual" implementation of smart city programs.[2] For instance, consider the disciplinary mechanism of the smart city captured by Vanolo's (2014) account of "smart-mentality" in Italy which operates through certain framing of urban problems in terms of multivalent normativities. Klauser and Albrechtslund (2014) raise a similar point about the relative, flexible, and plural characteristics of normativities in the smart cities that traverse from the scale of smart infrastructures to the micro-level of events and activities. Smart city's control is thus incomplete, indeterminate, and immanent, as is "intrinsically relating to individual experiences, motivations, and perceptions" (p. 284) as well as to the variant cultural norms and expectations.[3] These immanent thus not empirically observable aspects of smart cities are not reducible to corporate logic or governmental policies, but nevertheless play an important role in shaping the current forms of smart cities.

To trace these immanent factors that constitute the internal drivers and/or recalcitrants of smart city, in the next section, I explore the utility of genealogy as a method.

3. Genealogy as a method

Foucauldian genealogy is of a particular relevance for this paper for its distinct emphasis on multiplicity and flexibility. To be sure, genealogy is a critique in the form of the historical problematization of the present, which involves identifying a network of multiple strategies of power and various thread of thought and practices that are woven together to shape the present (Koopman, 2013, p. 2). Departing from traditional social scientific "methods" which imposes a unitary necessity, Foucault refuses his method to be captured by totalizing schemas. The range of sources used in his study is markedly broad as he focuses on how multiple elements are brought into relations and what effects – what is out to be done (effects of jurisdiction) and what is to be known (effects of veridiction) – those relations generate.

In studying smart urbanism through Foucauldian lens, this paper converses with Foucault not only as a philosopher of power and governmentality (Vanolo, 2014; Klauser et al., 2014; Ho, 2017) but also with him as a historian of morality and modernity (Rabinow and Rose, 2003; Koopman, 2013; Packer, 2013; Monea and Packer, 2016). It should be noted that the genealogy of a smart city offered in this study is neither a linear nor a comprehensive "history of smart city." It is an inquiry that takes a historical but not historically periodized form. Designed as *a* genealogy, not *the* genealogy, of smart urbanism, this paper grapples with spatial and

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[2] Diagram is a map of dispersed social relations through which power is exercised (Deleuze, 1988). Osborne and Rose (1999) appropriated this term to propose the concept of 'urban diagram' to denote both the discursive and non-discursive ways in which the government has been territorialized in an urban form. The diagram is a way of displaying assemblage of multiple social forces that constitute power that is not reducible to a single logic of economic structure or technological infrastructure. Consisting of spatio-temporal multiplicity, the diagram shows how power is realized and exercised through relations that are distributed in space and how in that process, the diagram itself changes and evolves through combinations and recombinations with different diagrams.

[3] The immanent plane of smart urban diagram consists of little known points of references such as the techniques of self-improvement and self-care, privacy and security maintenance, and imaginative association of the city with violent crimes, viral contagion, and bad air quality that function as voluntary regulations that are not imposed externally but laterally through the practice of the self and the life itself. Besides, the way that such normativities are shaped and enacted derives its resources not only from an internal space of individual desire for self-cultivation and prosperity but also from the values and meanings shared by the collectivity of imagined communities.

temporal multiplicity that are contingently interweaved in Songdo.[4] The path charted in this study benefits from the flexibility and polyvalence of Foucault to approach how seemingly contradictory elements of a Korean city coalesce into diagrammatic forms. As a Korean urban sociologist Cho (1997) observes, cities in Korea exhibit "bi-polar" and "schizophrenic" features due to the persistent endurance of modern and pre-modern statist power relations, even as the surrounding economic conditions are seemingly changing into a more open, transnational, and flexible ones. A genealogy of smart urbanism offered in this paper, analyzes the confluence of large scale socio-material transformation (e.g., urbanization, industrialization, militarization) and a genealogy of mentality tracing the lines of transformation of "moral technologies" (Foucault, 1991, p. 74)[5] that are specifically derived from the networked histories pertaining to Korea. Bringing multiple strings of histories into relations allow us to unearth the submerged and immanent aspect of smart city that is not readily apparent.

To illuminate multiplicity, a broad array of source materials was gathered through a nine-month-long research program that incorporated ethnography and archival research in Songdo and Korea. Initially, the analysis focused on the websites and magazines published by the IFEZA (Incheon Free Economic Zone Authority), maps, newspaper articles, and popular texts such as advertisements, TV dramas, and K-pop music videos shot in Songdo to conduct a discourse analysis. Second level of analysis involved materials that helped the author to further contextualize the accounts of smart city, including the audio recordings of 30 interviews and meetings (with diverse actors such as a construction manager, IFEZ officials, real estate agents, small business owners, startup company owners, university faculty in Songdo, an expat teaching English, and residents living in Songdo) and notes and photos taken by the author during her visits to Smart City Forum organized by the National Assembly, Smart City Expo, and IFEZ's Smart City Operation Center. Archival research was conducted on materials including the autobiographies of a former Incheon mayor Choi Ki-Sun and an urban planner Park Yeon-Su (whose Songdo New Information City Plan conceived in 1986 served as a template for later developments in Songdo), the National Archives of Korea, Incheon City History Museum, and Naver old newspaper archive.

Data collected through the first and second level of analysis became sources of composing a genealogy of the smart city in Songdo. The rest of the paper presents the finding of this study as a mosaic of four interrelated diagrams: mobile city, secure city, eco city, and future city.

4. Four diagrams

4.1 Mobile city

Extending Foucault's concept of governmentality, Baerenholdt (2013) coins the term 'governmobility' to point at how society is increasingly governed through mobility. This perspective is useful in analyzing how the infrastructure in Songdo's smart city is organized in such a way to manage and optimize mobility. Mobility in this sense, is infused with power and is deployed as a political technology. The approach I take here is distinct from other mobility studies that focus on the micro dimensions of personal movements and the politics of access and border-crossing such as migration and tourism, in that I attend to the macro dimension of how mobility organizes and governs societies.

Since its conception in 1986, Songdo has been presented as Korea's new node of informational, financial, and logistical flows in Northeast Asia (Park, 2008). Songdo New Information City Plan proposed by the Incheon Urban Development Committee at that time was a direct response to the perceived challenges of globalization and digitalization that unsettled the 1980's Korea, and to the marginalized status of industrial city Incheon, which seemed to be "shut out from its future," as "everything went away to Seoul, except factories, pollution, and regulations" (p. 21). The ambitious mega-urban construction project aimed to revitalize the city's existing mobility infrastructures (seaports, airports, and telecommunication networks) to reorganize its territorial relations to the network of other cities within and beyond Korea, such as Hong Kong, Shanghai, and Singapore. Thanks to the government's support and South Korea's competitive high-tech industry, Songdo New Information City scheme anticipated a synergistic effect of combining the transportation infrastructures, such as the Incheon International Airport (opened in 2001) with the new telecommunication infrastructure. The expected mutual benefit was that the airport would bring in new businesses and tourists to the city, that the cutting-edge living environment would add permanent value to the city, and that more investments would be directed toward Songdo.

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[4] One genealogy could trace the diverse evolution of the concept from the "architecture machine" (Negroponte, 1970), "city of bits" (Mitchell, 1995), "cyber city" (Graham, 2004), "cyborg city" (Gandy, 2005), "digital city" (Aurigi, 2005), "smart homes" (Allon, 2004; Kember and Zylinska, 2012), as well as many other related models including the "information city," and "ubiquitous city."

[5] Apparently, this work is significantly influenced by Foucault's methodological shift from archaeology to genealogy in the 70s, which reflects his attempt to counter the positivistic and totalizing account of history, especially as he says the goal of writing history is to construct a "historical knowledge of struggle." The primary objective of his struggle would be the scientific forms of knowledge that hierarchize and centralize power, which is then linked to the organization and function of a society dependent on the scientific discourse – so much so that Foucault goes on to declare that "genealogies are precisely anti-sciences" (Foucault, 1980a,b, p. 83). The distinction between archaeology and genealogy further lends significance to the Foucault's later aim to analyze power more systematically (Monea and Packer, 2016). Whereas Foucauldian archaeology investigates the historical constitution of a specific field of knowledge (such as psychology, medicine, human sciences, economics, biology, linguistics), genealogy more holistically investigates how power has been historically constituted and resisted through governmental rationalities, forms of knowledge, and practices of the self. Archaeology is "an analysis of local discursivities" and genealogy is "tactics on the basis of the descriptions of these local discursivities" through which "the subjected knowledges [sic] which were thus released would be brought into play" (Foucault, 1980a,b, p. 85).

Envisioning Songdo as a frictionless space of flow, the planners deployed an array of measures to ensure and expedite the smooth flow of physical and informational mobility. In 1996, the committee proposed the "Tri-Port Strategy," supported by the then mayor Choi Ki-Sun, which involved creating an intermodal logistics hub that combined seaport, airport, and telecommunication port (Choi, 2016). In this scheme, Songdo was also designated as the central zone for technology-related research facilities, such as the Techno Parks, as well as for the international businesses and trade facilities. This strategy further articulated the committee's vision to foster mobility across local and global scale, which would constitute the material foundation for Songdo's efforts to claim the global city status.[6]

In today's Songdo, the idea of fostering mobility is integrated in the instrumentation of digital technologies that distribute computational function into objects and urban environment, in ways that optimize movements of information and the capital. Historically, the management of mobility has long been the primary aim of Korean government, which perceived mobility as a condition of national freedom and independence. In Korea, freedom and movement have a distinct sociocultural meaning due to its particular historical context, in that each was thought of as a necessary condition of one another. Ever since Korea was inducted as the liberal Frontier of the US Cold War security policy in the 1960s when the US declared its struggle against communism as a global proposition, Korean government saw a rational mobility management as a prerequisite for economic development, national security, and liberal democracy. Highly centralized mega-infrastructure projects such as highways, apartment complex, and industrial zones were carried out by workers, whom the authoritarian leader Park Chung-Hee often extolled as the "crusaders of freedom" (Jeon, 2010).

Development of transportation and communication infrastructures (e.g., highways, microwave networks, airports, seaports) afforded the government's programs to guide rapid industrial development and national securitization with extraordinary efficiency and speed, albeit in a highly unilateral manner. The birth of Songdo, arguably, is an outgrowth of this history within which urban forms have been organized and managed to serve social activities that were increasingly becoming mobile throughout the long twentieth century. Merging of transportation and communication infrastructures, coupled with a special zoning law that granted the Free Economic Zone (FEZ) status to Songdo, extends this long-term strategy of government that sought to enable mobility across all sectors, in the hopes of attaining "freedom," which, in this case, only selectively, if not exclusively, merits the movement of capital and information (Park, 2005; Yang, 2016).

Charting the history of Songdo diagrammed as a "mobile city" shows how its transition into a smart city can be understood as a part of Korean history of mobility governance. Even the banal instances of smart mobility, such as self-driving cars, app-based ride-sharing services, traffic navigation services that merge communication technologies with transportation infrastructure, extend the scope of governance in a dispersed yet coordinated manner. The difference in smart city is that the mobility principle no longer has to be externally imposed as a mode of rule since it is internalized and followed intuitively by people as they instantaneously economize everyday mobility-related actions. The seemingly liberating potential of increased mobility, however, is circumscribed by indirect modes of regulation and security, which is another crucial aspect of smart city that I explain below.

4.2 Secure city

In this section, I argue that the seemingly contradictory diagrams of "mobile city" and "secure city" overlap with each other, in ways that one could not do without the other. In fact, security management is intrinsic to the art of governing mobility, which requires adjustment of the dialectic between freedom and regulation. Appropriating Virilio's term, "paradox of mobility," I have argued elsewhere that Songdo's global aspirations to achieve open, flexible, and transparent urban governance have depended on a program of highly disciplining and centralizing tendencies (Yang, 2016; see also Graham and Marvin, 2001). At one level, such paradox is observed in the arrangement of media technologies (cameras, sensors) that are simultaneously dispersed and synchronized across the city. At a broader level, the rapid process of urbanization in the twentieth century Korea rationalized mobility infrastructures in ways to anticipate danger and procure security. The dual architecture of smart city, which is at once centrifugal and centripetal, is accomplished not least through the ways in which data are extracted from the distributed sensors, but through the ways in which the analysis derived from the aggregate data are synthesized and made useful to manage both mobility and security. Here I focus on two ways in which security in smart city is problematized and managed.

On the one hand, smart city's prioritization of security and safety draw resources not only from technical advancement to capture, visualize, and analyze risk through data but also from the deep-seated security anxiety that perpetually conjure risk and danger as an "affective fact" of urban everyday life. Through the process of highly militarized modernization (see Moon, 2005), Koreans have responsibilized themselves to anticipate and manage various forms of risks (war, violent crimes, financial crisis, natural disasters, viral disease, and so on) individually (Joung, 2011). Mandatory conscription, civil defense training, and high school defense drills are mundane instances that constituted the culture of militarism and defensive citizenship in post-war Korea. While the ostensible language of national security has been gradually replaced by a less-overtly militant program of personal safety and self-care in the

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[6] The transportation and logistics designs in Songdo considered not only the efficient flow of movement within the city but also the city's temporal relations with the other cities in East Asia and beyond, the prime example of which is Incheon Bridge. The Incheon Bridge, one of the world's longest bridges, stretches for twelve miles across the Yellow Sea, connecting Songdo and Incheon international airport on Yeongjong Island. The bridge became the symbol of Songdo's proximity with the outside world, supported by the fact that the airport gave people access to megacities in East Asia (e.g. Shanghai (accessible within 1 h flying time), Tokyo (1.5 h), Hong Kong (2.5 h), and Singapore (5.5 h)), rendering Songdo "a gateway to more than a third of the world's population in just 3.5 h of flying time (Songdo International Business District (IBD) official website)."

twenty-first century, there exists an enduring, yet constantly evolving forms of governance that construct and problematizes various forms of risks.

As Halpern and Günel (2017) notes, crisis and catastrophe are evoked as a constantly assumed reality in a city primarily pre-occupied with security procurement. The findings of this study suggest that Korean history of militarism that has fostered the defensive and vigilant subject produced a cultural landscape conducive to smart city. For instance, a visible surge of domestic CCTV, black-box cameras, and mobile safety apps illustrates how the technologies of self-surveillance have become normalized part of living in Korean cities. Surveillance is "immanent" in the sense that it is accomplished through fostering defensive subjects who understand themselves as the willing locus of risk management and security responsibility.

On the other hand, the individualization of risk and security, through which individuals are brought to monitor their own movements, parallels with smart city's distributed sensors and computational networks that "environmentalize" risk. Songdo's participation in Crime Prevention through Environmental Design (CPTED) program, for instance, relies on risk increasingly defined in situational terms of space and time (O'Malley, 1996).[7] This means, as far as the security management in the smart cities is concerned, risks are defined less in terms of demographic traits than of probabilities and environmental/situational traits. In 2017, Songdo's Smart City Operation Center showcased its new platform service that integrates different forms of environment and building data and shares that data with fire and police department in the city. A special emphasis was placed on ensuring citizen safety and preventing natural and artificial disasters. Such security strategy signals a change in the way in which risk is conceptualized in the smart city. Unlike in the preceding decades when the risk was associated with specific profiles of dangerous people (communists, North Korean spies, street gangs, and so on), risk is increasingly thought in terms of probabilities and locatabilities, which legitimates the monitoring of the population and the environment enmeshed as a continuous whole.[8]

As a result, the growing ambiguities of surveillance blur the distinction between the private and the public spheres, making it more difficult to distinguish whether people consent to have their data harvested. It becomes even more problematic when the government justifies surveillance as care for public safety, health, and quality of life in their communities.

4.3 Eco city

Problematizing how smart city is articulated as eco, green, and sustainable city in the present, this section traces how the environment has mattered as an objective and instruments of urban governance. As discussed above, the new mode of rule enacted through smart cities enrolls the environment to the network of urban governance in a datafied and standardized terms, with which the government extends its aim of governing population to that of governing environment. As Jennifer Gabrys (2016) observes, the environmental mode of governance denotes a broader trend of contemporary governance that modifies the way of governing through milieu, instead of directly affecting the individual or population as the governing subject. Although the goal may be the same – i.e., to change the behavior – the environmental mode of governance indirectly pursues that goal, for instance, by embedding and distributing the ubiquitous computing across the urban environment.

Environmental mode of governance is symptomatic of a certain way of imagining the relationship between cities, environment, and a way of life that is increasingly managed and modulated in the face of a crisis conjured at a global scale. In Korea, the environment came to be problematized in salient ways within the context of liberal democratization since the late 1980s. Issues had been mostly raised by the pro-democratic party and civil society groups, who criticized the unilateral implementation of urban policies and its bureaucratic focus confined to the technical management of zoning, density, and size. Jung (2013) points out that the sociopolitical shift in the 1990s directly influenced and fostered what she calls the "new urban discourse" in Korea, which brought forth the issues of urban ecology to the civic political agenda. The built environment, it was said, should be viewed as an integral part of natural ecology, instead of its anti-thesis – the demand reflected in terms like "city environment" [doshi hwan'gyŏng], "eco city" [saengt'ae doshi], and "culture city" [munhwa doshi] that appeared regularly in Korean civic and public discussions.

Cognizant of the growing consensus to seek an alternative development framework, the Korean government set the Green Growth as the main thrust of national policy in 2008. Songdo's promotion as the green and sustainable city at the time reflected this shift in the national government's development strategy, which hybridized the green initiatives with Korea's long-entrenched industrial economic model (Kim, 2010; Kim and Thurbon, 2015). Technoscientific mediations such as digital environmental sensors, smart grid, smart home monitoring panels, and green certification programs such as Leadership in Energy and Environmental Design (LEED) have been often-promoted points for selling smartness of Songdo, backed by research on the impact of digital technologies in saving

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[7] Crime Prevention Through Environmental Design (CPTED) is a design-centered approach to crime that started in the early 1970s. The underlying logic behind this program is the assumption that the human behavior is primarily influenced by their environment, the environment is liable for criminal activity, and that we can create a kind of environment that can deter illegal behavior and encourage law-abiding behavior that promotes feelings of safety. Newman (1971)'s *Defensible Space* was one of the foundational texts for the CPTED idea, which generated guidelines to design out crimes in the cities, through strategies of territorial reinforcement, surveillance, access control, and legitimate activity support. These suggestions have been developed and applied to a series of urban design manuals regarding how to appropriately build walls, windows, gates, and fences. CPTED is currently adopted by the US Department of Transportation, Department of Education, Center for Disease Control and Prevention among others and is supported by the United Nations and many governments around the world.

[8] There is a resemblance between this trend toward the environmentalizing notion of risk and Foucault (2007)'s discussion of the power that operates through security. Whereas the disciplinary forms of power was associated with the totalizing gaze of the panopticon, the latter conceptualization of power (operated through security) does away with a central locus of power and instead distributes the gaze through techniques and mechanism.

energy consumption. Smart urban designs in Songdo (i.e., bicycle paths, garbage recycling system, and public parks) suffused with environmental concerns for health, resilience, and well-being of communities are seen as encouraging ethical and future-oriented life for the citizens.

In smart cities, the environment functions both as the end and the means for the government, in a sense that several aspects of urban infrastructures – energy use, air quality, waste disposal, traffic – are implicated in the efforts to economize urban governmental actions to meet the sustainability goals. Every household, objects, and persons connected to the smart systems instantaneously measure their levels of "environmental performance" that are registered back into the feedback loop of the smart urban and environmental governance. In this way, the dwellers of smart cities are brought to play their integral part in the system that governs them.

Analyzed through the diagrammatic lens of "eco city," smart city is an articulation of general social transformation that occurs in the way we imagine, problematize, and govern cities in relation to the global environmental system. The environmentalist objective of the government has to do less with a technical matter of digitalizing the environment than with shaping the ecology of the city to maximize the health and well-being of each inhabitant and their communities, who are directly or indirectly called out as subjects as responsible for the environment.

5. Future city

The last section of this study interrogates how smart city is presented as a city of future, especially within the context of the Korean national government's program of supporting information and technology-driven development. This contextualization also draws upon the long history of Korea's export-oriented industrialization, during which a special privilege was given to science and technology. The idea that the future is attainable through technoscientific development has been combined with the moral imperative of Korean nationalism during the 1960s and 1970s, which constitutes what I call the *technonationalist mythology of speed and futurity*. The technonationalist mythology functions as a collective mentality of contemporary Koreans even today, which is a necessary aspect of understanding Korean smart cities in the present.

The idea of the future has been exhibited and performed through multiple modalities in Songdo. For instance, in 2009, Incheon Metropolitan City government organized the "Incheon Global City Fair & Festival" in Songdo, with support from the Korean government. Throughout the eighty days of the fair, which included conferences on the green growth and urban future, multimedia water fountain shows, robot exhibitions, K-Pop concert, and interactive screens displaying the prototypes of the 'ubiquitous city', Songdo was promoted as the future city of Korea. Here, Songdo was turned into a site for demonstrating Korean cultural and technological excellence, which was perceived as the bridge between the nation's present and the future.

To be sure, such an exhibitionist aspect of asserting Songdo as a future city bears upon how the past is brought to the present. At the IFEZ's I-vision center, a narrative connecting the past, the present, and the future of Songdo is more explicitly articulated – from Incheon's opening of the port to foreign colonial powers in the late nineteenth century and its development into a gateway to the international trade. The teleological narrativization of this history is completed by Songdo's current international city status as proudly representing "Another Face of Dynamic Korea." The glory of Korea's past technological advancements, such as automobile and ship manufacturing that had been Incheon's main industry, it was said, was transforming into future-oriented developments in information and bio-tech industry strategically cultivated in Songdo.

The findings from the study suggest that the Korean smart city developments are largely a statist affair, embedded in technonationalist mythology and nostalgia for the rapid and export-oriented industrialization (EOI) model implemented since the 1960s. It was in this period that large-scale social quantification occurred, through extensive use of numbers and statistics to systematically manage the deadlines, budgets, and growth rate (Han and Downey, 2014). The state-led industrialization fostered the national economy dependent on export, which is an enduring aspect of Korean economy today. Following this tradition, the Ministry of Science, ICT, and Future Planning and Ministry of Land, Infrastructure, and Transport (MOLIT) developed the K-Smart City initiative (2016), seeking to export Korean smart city software and technology to overseas market. The hope was that Korea could claim the "smart city" as a nationally-branded technology and increase the export of Korean-made products.

Over the course of changing national development agenda, from Globalization and Digitalization (1994–1997), Cyber Korea 21 (1999), u-Korea (2006), Broadband IT Korea (2007), Green Growth (2008–2012), Creative Economy (2013–2017), and Fourth Industrial Revolution (2017-present), narratives surrounding Songdo shifted accordingly: "international city," "new information city," "u-city," "future city," "green city," and "smart city." Through these changing statist interventions, different aspects of urban function have been emphasized, which gave rise to the contingent condition of Songdo shaped by residual and emergent urban diagrams. This point ties back to my earlier argument about Songdo being emerged out of multiple strings of history, which renders the city as a source of optimism and aspiration oriented toward the future, as a testbed of R&D and innovation, an exhibition site for showcasing the latest technologies, and an exportable commodity that manifests Korea's futurist and globalist ambitions.

6. Conclusion

In this short essay, I examined a genealogical formation of a smart city in Songdo comprised of multiple urban diagrams, including "mobile city," "secure city," "eco city," and "future city." Specific genealogies of each urban diagram drew upon related histories of urbanization, digitalization, globalization, militarization, and industrialization articulated in the long twentieth century of South Korea. Through these genealogies, I emphasized the necessity to look beyond the direct relationship between the digital technologies and their effects on the citizens and to adopt a holistic approach to consider the cultural and historical context of the smart cities. If

my attempts were successful, this study provided an alternative analytical framework for future smart city research that takes into account the diverse cultures and histories of smart urbanism more substantially.

Key takeaways from this research can be summarized as following: first, factoring in large scale sociohistorical transformations as crucial elements conditioning smart city corrects the presentism and solutionism prevalent in many accounts of smart cities. Instead of viewing smart city as a part of a series of innovative disruptions, future smart city research should look into the heterogeneous configurations of specific locality and historicity that shape contingent formation of a particular smart city. On a related front, this study demonstrated that the smart city is neither a fixed nor a singular idea that can be grasped in full totality. The genealogical method is one useful way to account for the variations across cultures, as it helps us understand what specific social needs and problems had existed prior to the smart city and what aspirations and social norms reflective of the broad historical context of technology gave rise to the smart city in the present. Lastly, this study's adoption of diagrammatic reading of the city resists the attempts to essentialize and/or reduce the local into the institutional settings or government policy. For a detailed analysis, future observers of a smart city should look not only at the immediate individual practices of interacting with the smart infrastructures, but also at the not readily apparent affective and immanent plane of individual desire and anxiety for self-cultivation and prosperity as well as collective memory, mentality, and value systems that serve as important momentums driving the smart city developments.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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