PLATFORM CAPITALISM IN NEOLIBERAL TIMES

Echo Chambers of Urban Design
Platformization in Architecture and Planning

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Digital information and computation are about to change the worlds of urban design.[1] Cities and buildings have assumed a two-fold existence in analog and virtual spaces. Everyday moves, spatial practices, and individual decisions leave their traces in both. What was once planned as a one-off building project can now be stored, modified, recombined, and reproduced again and again. Every path, every decision, every building is now a potential object of optimization. Henri Lefebvre (1991) has described the social production of space as a triad emerging from the entangled and contradictory interactions of spatial practices, socio-political concepts, and utopian visions, materializing in the form of buildings, monuments, streets, and cities, shaping and being shaped by social agency and power. In the 21st century, these spatial practices, concepts, and visions are increasingly being absorbed by a new form of digitally mediated space production. In the following, we consider the emergence of echo chambers of digitally conceived and perceived cities that could lead to an era of platform urbanism driven by large technology companies. However, this digital production of space seems strangely detached from previous planning principles. Yet, the critical questions of political economy, "'Who produces?', 'What?', 'How?', 'Why and for whom?'" (ibid.: 69) can still help us decode the emerging patterns of platform urbanism. To do so, we contend, it is useful to take recent analyses of digital capitalism and, specifically, the role of platforms into account.

Until recently, debates on digital capitalism rather focused on citizens' use of mobile phones and the world wide web, their individual clicks, and volatile preferences than on solid urban structures and the built environment.

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The promises of the networked smart city moved infrastructure systems and their control and surveillance apparatuses into the focus of digital capitalism (Kitchin 2014; Zukin 2020). City governments started to invest in digital tools and platforms, making the digital transformation of urban infrastructures and services a rewarding long-term business for hardware- and software vendors. The latter could "quietly stay in the background" and steer urban flows following an underlying "informational diagrammatic of control" (Marvin/Luque-Ayala 2017: 84). These developments laid the foundations for an urban policy characterized by entrepreneurialism, privatization, and austerity, and following the mantra "spend less; grow more; cede control" (Sadowski 2020b: 449).

The next step, we hypothesize, could be the digital transformation of structural urban development, a highly robust business field for the coming decades. Private corporations and start-ups have already created new platform markets for an urban tech economy to build on, "from fintech for banks and other financial institutions to proptech for real estate and construction companies and property managers to healthtech for hospitals and insurance companies" (Zukin 2020: 944). Under these conditions, a variant of platform capitalism based on building data from urban planning, architecture, and construction is emerging, which may profoundly impact cities. Its data-driven planning strategies reconfigure not only the actions of city dwellers, urban infrastructures, and services but also the socio-material reality of buildings and places we live in.

In the following, we outline the role digitalization, platform capitalism, and planning data may play in the future of urban design. In a first step, we sketch out the conditions of urban design in times of techno-utopian narratives and "corporate sociotechnical imaginaries" (Hockenhull/Cohn 2021) translated into platform urbanism. Next, we draw on critical political-economic analyses of platformization and platform capitalism and indicate how these are reconfiguring actor and power relations in architecture and construction. We then describe how building information modeling (BIM) in architecture and planning is driving this version of digitalization through government policies and empowering technology providers and software vendors, particularly Autodesk, to gain influence in the world of building data. The goal is to better understand how platform capitalism's logic is gaining traction in architecture, construction, and urban design and what this may mean for cities in the future.

Cities in an age of techno-utopian narratives

"Smart umbrellas light up to alert you that rain is in the forecast. Smart vehicles take over the drudgery of driving during rush hour. Smart, virtual assistants obey your every command, learn your preferences and routines, and automatically adjust accordingly", writes Jathan Sadowski (2020a: 1) in his examination of digital capitalism. Urban life, in particular, is being reconfigured by pervasive communication and sensing technologies collecting data from an ever-growing array of mobile shopping, navigation, and socialization apps. Alison Powell analyzes how the "move, from technologies of access to technologies of data" is driving the vision of a "big data optimized city" (2021: 5). Digital platforms brokering transport, accommodation, music, dating, gastronomic, and other services as well as energy and healthcare provision, municipal traffic planning, and city administration offer to meet all our needs in ever smarter and efficient ways. Typically, the providers, mostly ICT companies, but also municipal governments and some digital activist groups, promise many things at once: more efficient infrastructures, accessibility, customized offers for individual needs, more convenience, individuality, safety, and sustainability.

The basis for all their aspirations and applications, from delivery and mobility services to e-participation and urban planning projects, is the ubiquitous gathering and processing of data. Yet, data alone, especially unclassified data, do neither map social realities nor can they be easily turned into values. They have to be cleaned, ordered, and analyzed to work out statistical patterns. Municipal authorities can rarely do this by themselves; mostly, they lack the necessary tools, resources, and skills. Instead, they outsource these tasks to private companies, losing direct access to the insights generated and the opportunity to stand up for democratic values of equality, transparency, and a focus on the common good (Brauneis/Goodman 2018). The data analytics they need is provided by IT firms offering to optimize the operation of public infrastructures and the delivery of urban services. Data analysts, however, do not reinvent the software each time but take many thousands of lines of code from existing program libraries and other data workers', data brokers', or data scientists' work and apply them to the municipal tasks, according to their own values and assumptions or the perceived interests of their internal and external contractors. At the same time, the traces of previous priorities and classification practices persist in code and computational rules and continue to shape the outcomes.

Tracing their origins to the beginnings of post-war defense applications, organizational IT systems, and urban operating systems, Simon Marvin and Andrés Luque-Ayala draw our attention to the "potentially transformative implications for how the city is imagined, planned and governed" (2017: 86). Software programming based on logistic rationalities, for example, has been shown to reconfigure organizational functions, agents, and relationships by shaping and governing actions following a "variety of strategies of *functional simplification* and *reification* by which it lays out its prescriptive order" (Kallinikos 2007: 7; original emphasis). Computational capacities that enable the functional and informational integration and coordination of heterogeneous urban spheres and dimensions meet older cybernetic thinking of the city as a complex system to be digitally synthesized and controlled (Marvin/Luque-Ayala 2017). They are flanked by the renewed conviction that computer modeling of processes and operations is not only an efficient but a unique approach to managing the dynamics of urban complexity.

Predictive algorithms take over planning responsibilities in city politics and administration in many cases. In the last decade, technology companies with their techno-utopian narratives of superior smart cities have pushed far into the realms of urban planners and architects, raising the question "how 'smartness' and the production of normative knowledge through datafication, platformisation and algorithms shape urban everyday life" (Bauriedl/Strüver 2020: 268). Their narratives draw a picture of better information and control, efficient management, technical synergies, tailored solutions, and "a more livable future" (Woethzel et al. 2018) in general. These visions are promoted by technology and consulting companies "connected to strong advertising, publishing and marketing industries" (Zukin 2020: 942). At the same time, they show a longstanding connection to scientific concepts of cities as communication systems and ideas of "dashboard governance" (Mattern 2015), propagated by governments. Together, such opinion-leaders are advancing techno-utopian imaginaries of smart, autonomous technologies that could and actually should replace human planning, knowledge, desires, and decisions.

However, behind the algorithms and calculations are people and networks, namely the data analysts, programmers, tech gurus, platforms, and corporations, whose ideas and interests are inscribed into the new production of space. Their mostly invisible work makes economic efficiency, technocratic ideals, and datafication the goals of public planning (Powell 2021). Tools and technologies to achieve these goals permeate the heterogeneous fabric of modern networked urbanism and its sentient infrastructures (Graham/Thrift

2007; Kropp 2018; Wilde 2021). This is why techno-utopian fantasies about smart cities are not just discursive beliefs and visions but are strongly entangled with sociotechnical systems and assemblages (Amin/Thrift 2017; Powell 2021). They result in specific regimes of urban development and design. These are built on the techno-utopian promise of making the complexity of cities manageable through data-based 'evidence', connectivity, algorithmic governance, and a more rational selection of optimized solutions from the endless shelves of rapidly iterated virtual combinations. As a result, cities are becoming a major business domain of large tech companies such as Alphabet, Alibaba, or Autodesk, allowing them to consolidate their economic power and digital dominance in the built environment.

Building information modeling, platforms, data, and a new political techno-economy

Building information modeling (BIM) could play a key role in opening the gates towards platform urbanism through facilitating the digital transformation of architecture and construction. BIM is a digital method for planning and construction that adds semantic information about geometry, materials, components, costs, or simulations to 2D- and 3D building models, and shares these through an interface for multidisciplinary collaboration. According to its proponents, mostly governments, consultancies, and pertinent software providers, BIM will solve the construction sector's efficiency, productivity, coordination, and quality problems, in addition to reducing 'cost and carbon', as it is often said. Whether and for whom the promised benefits actually materialize remains to be seen. For now, it is not clear to which extent this potential has, in fact, been realized and what, if any, monitoring mechanisms have been established to check.

In what follows, we explore the potentials and implications of BIM for transforming urban design and the social production of space in light of data-driven, digital platform capitalism (Gillespie 2010; Srnicek 2017; Staab 2019; Sadowski 2020a). We draw on empirical material from in-depth interviews with architecture, engineering, and construction professionals in Germany, carried out in 2019 and 2020 (and translated form German), along with document analysis and a literature review.

The rise of platforms as the core of digital capitalism has nurtured a new regime of techno-capitalist production and accumulation, with the commercial digital platform as its core model (Srnicek 2017; Staab 2019). Digital platforms are techno-economic and cyber-physical arrangements that enable, mediate, structure, and constrain economic or social activities by bringing together different actors (Kenney/Zysman 2016). Although non-proprietary platform models are possible, the dominant type is proprietary. One can distinguish between technology platforms and market platforms, noting that many platforms show attributes of both (Gawer 2014). BIM can be seen as a technology platform in that it entails a modular technological architecture composed of a core and a periphery that allows to create value by generating and harnessing an economy of scope. However, it also shows characteristics of a platform as a market that mediates transactions between planners or clients and producers of building components, such as doors, windows, walls, stairs, or others who can offer their products for sale through BIM software.

Digital platforms expand through self-reinforcing network and feedback effects (Srnicek 2017; Mayer-Schönberger/Ramge 2018). The result is an expansive winner-take-all logic, pushed further through aggressive acquisitions, often beyond the original domain and the creation or takeover of digital infrastructures, such as clouds or payment services. A further characteristic is the tendency of platform firms to enter the 'old' economy and challenge incumbent firms through disruption (Montalban/Frigant/Jullien 2019: 808f.). In this vein, Google, Facebook, Autodesk, and others invested in off-site construction start-up Factory_OS, and Alphabet subsidiary and Google's sister Sidewalk Labs launched Delve, a generative design tool powered by machine learning for urban development.

BIM: Promises of data-generated modeling and policies

Data-generated 3D building information models allow to represent and store the design results and process in a model. It takes the form of an "editable, re-executable design history" (Aish/Bredella 2017: 69), which can be re-winded, edited, and re-executed several times in different ways leading to varying project-related results. At the same time, BIM models allow the extraction of large amounts of data on costing, materials, collaborative relationships; semantic details of the model, results of design work, and the operations performed on the model create various data that can be rearranged, exchanged, reused, and transferred to further projects and actors.

BIM thus constitutes a data-based sociotechnical infrastructure that profoundly changes the nature of design processes (ibid.: 66). Decision-making about materialities and forms, for example, were previously left to designers' experience and expertise, but now often are implicitly shaped by product libraries from financially strong construction companies defining designers' and clients' scope of options. As the range of project parties and the types of data stored are expanding to include maintenance, facility management, and demolition, BIM is evolving from a way of cooperative modeling to a way of digital management. At the same time, interoperability issues, common standards, cloud services, and the question of who controls these become ever more critical.

Worldwide, the diffusion of BIM is strongly promoted by governments. The last few years have seen a proliferation of policy programs, strategy papers, conferences, and reports produced by a variety of actors such as associations of architects, software providers, consulting firms, governments, international governmental and non-governmental organizations[2]. In the architecture, construction, and engineering (AEC) sector, governments act in various capacities: as major clients of construction projects, as promoters of national competitiveness, as regulators, and policymakers. As clients, they see BIM as an instrument to better control risks, improve time and cost efficiency as well as quality and performance of public construction or infrastructure projects, and optimize admission procedures. In their capacity as promoters of the national industry, they see it as a means to increase its productivity and competitiveness in global markets. As regulators and policymakers, they can prescribe the use of BIM for segments of the construction sector or by creating the conditions for a general diffusion of BIM, be it through guidance, regulatory frameworks, mandates, training programs, or common standards.

In Germany, for instance, the 2015 Road Map for BIM stipulates its use for all public projects procured in Germany from the end of 2020 onwards (BMVI 2015). On a supranational level, the EU BIM Task Group launched a handbook (EU BIM Task Group 2017) that guides public procurers when introducing BIM. Environmental objectives are mentioned only once and in passing as

2 For an overview of government BIM policies in the EU, see (McAuley/Hore/West 2017; Panteli et al. 2020). Other authors of programmatic policy documents include the World Economic Forum (2017), the EU BIM Task Group (2017), buildingSMART international and its various national chapters, consulting firms like McKinsey (2017) or The Boston Consulting Group (2016), and others.

"[a]dapting to a sustainable built environment – one that supports the challenges of climate change and the need for a circular economy" (ibid.: 16). The main policy objectives are greater productivity, sector growth, faster production, better value for public money, and "an open, competitive and world-leading digital single market for construction" (ibid.: 2).

Often, these policies are championed by an industry-led initiative of larger planning and construction firms and software producers. Building-SMART, one of the largest international BIM standardization initiatives, is an alliance of companies, government bodies, and institutions, which promotes the use of open (not to be confused with non-proprietary), sharable building information based on the Industry Foundation Class (IFC) platform (Laakso/Kiviniemi 2012). IFC defines a standard for data exchange in the construction industry and thus a basis for interoperability between different BIM and computer-aided design (CAD) software. Software producer Autodesk has been a founder of buildingSMART and is now a member of its Strategic Advisory Council, together with software solutions providers Nemetschek Group and Trimble and other multinational corporations. On a global level, the Global BIM Network consisting of public- and private-sector representatives and multi-lateral organizations advances the knowledge and capacity of national policies and programs. Within the network, software provider Autodesk leads "a global team advancing policies to support Autodesk's business" (Friendly 2021).

As many governments have pushed to make BIM a standard, we view it as an obligatory passage point (Callon 1986), forcing all parties involved to adopt its rationalities, pushing and enabling particular ways of practicing design and construction, and foreclosing others.

BIM and urban design automation

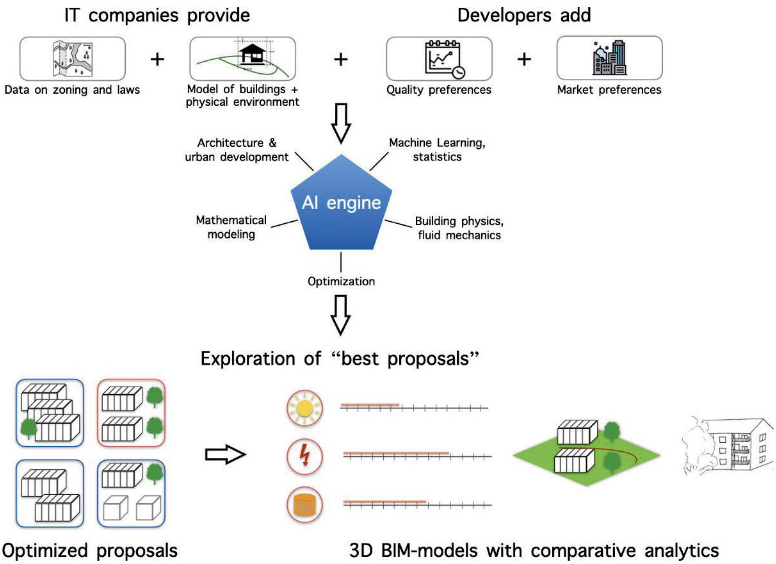
A key role in disseminating BIM and spreading the principles of digital capitalism has been assumed by Autodesk, especially with its BIM product Revit. Several companies and research laboratories have been involved in BIM development, but Autodesk and Revit significantly define its popularization and broader dissemination. Autodesk acquired Revit in 2002 and turned it into a $20 billion industry-standard today in BIM. Since then, it has held a dominant position in the global BIM market and increasingly defines digital formats, interfaces, and standards for 3D building models worldwide. Autodesk has made Revit the prime BIM platform and locked in most BIM users worldwide. Exact numbers are hard to obtain, but anecdotal evidence suggests that as much as 90 % of US and 80 % of UK firms working with BIM use Revit (Davis 2020). As an architect and structural engineer working for an international engineering office told us: "When people say BIM, three-quarters of them mean Revit." (2020, interview) With their Construction Cloud Connect, a combined cloud-application programming interface (API) solution, Autodesk further bridges companies, processes, and data. In 2020, it announced to push for a one-stop AEC cloud solution by investing in the development of the Revit API and Autodesk Forge, a cloud-based software development platform, as their primary future strategy (Davis 2020). The need for interoperability of data models for project partners to this standard decreases the chances for architects and developers to employ non-proprietary software applications. Even if they do, Revit remains an obligatory passage point, as a computational designer explained to us: "Yes, we are forced to use Autodesk products as well. However, we do not work with it. We work partly with it by creating interfaces. [...] And of course, we have written such interfaces to several software [applications]. So, also to Revit." (Computational Designer 2020, interview)

In sum, we see a set of techno-economic moves, strategies, and arrangements that show an inherent tendency towards concentration of economic power and a turn from technologies of access to technologies of data (Powell 2021: 5), through which Autodesk has gained a nearly monopolistic position in the world of BIM. Starting from offering software solutions for collaborative work in project design, management, and construction to integrated interfaces for digital object libraries where third-party manufacturers and subcontractors offer their services or building components for purchase, the software company has assumed functions of a marketplace in the construction industry. Their arrangements allow generating and gathering design, construction, and collaboration data via software logs and cloud connections that can be exploited for secondary use and turned into rent-generating assets[3]. BIM tool producers can also offer data analysis and evaluation that can be fed back into design and planning, thus facilitating design automation in general.

By now, Autodesk and Google have started expanding into the business of urban development. In November 2020, Autodesk acquired the Norwegian technology start-up Spacemaker for $240 million. Spacemaker is a cloud-based artificial intelligence-supported software for urban development that

3 For the concept of assets and assetization, see (Birch/Muniesa 2020).

Figure 1 Spacemaker and Co's promise of AI-based urban planning



(Kropp/Braun/Boeva on the account provided by Kyle 2021)

promises to deliver the 'best possible' urban planning solution for a site through quick iteration of design options along with specific input criteria (Baumgarten 2021; see Fig. 1). Autodesk proclaims on its website that it helps to "maximize developers' long-term property investments and realize the full potential of the site" (AP News 2020), to increase project value, and the ability to consider sustainability options. Shortly before, Sidewalk Labs launched Delve, a similar generative design tool powered by machine learning for urban development, and there are some others. The algorithms for these cloud-based AI platforms are fed and trained with data from existing BIM models in order to support urban planners, architects, and developers in their data-driven and thus seemingly evidence-based urban design decisions:

> "As architects create 3D models in their Autodesk program of choice, they can input their project data, parameters, and constraints into Spacemaker's criteria form. From there, the system will analyze the existing 3D model and written data to process alternate layouts and configurations. The best

possible site plans are then selected by A.I. and displayed in a sidebar in the user's Autodesk program of choice, along with additional statistics and tips." (Oriaku 2021)

Spacemaker and Co believe that the continued growth of cities is creating significant pressure to build faster, denser, and more sustainably. At the same time, urban planning is becoming increasingly complex, time-consuming, and burdened with regulations, but the resources of public urban planning authorities have been cut everywhere. Against this backdrop, the companies promise to reduce complexity and save "millions of dollars by using the software early in the development process" (Kyle 2021). Value creation will be generated by "the quick iteration of thousands of design operations" generated from the "synthesis of publicly available data sources such as physical, regulatory, environmental, and other forms of inputs used in the designing of large-scale real estate developments" (ibid.).

Since Spacemaker was founded in Norway, the company initially benefited from accessing a rich source of built environment data supported by Norwegian government agencies and focused on multifamily housing. These restrictions made it a challenge to extend its functions "universally across geographies" and to other building types, making "new forms of data and tweaks to the machine learning [..] necessary" – a challenge "not necessarily technical, and relatively easy to overcome" (ibid.). It comes as no surprise that automatically generated design options have been criticized as "urban design echo chambers", working with data from previous urban construction and development projects in a way that once available "layouts are endlessly reproduced, never challenged, questioned, or evolved" (ibid.). Since all the data originate from BIM projects, we can speculate that they typically fall into the segment of high-priced or serial construction projects (Sundermeier/Beidersandwisch 2019; Braun/Kropp 2021).

Platform urbanism, its echo chambers, and the challenges of responsible urban design

So far, design processes have unfolded as somewhat unpredictable, multilayered interactions between architects, developers, clients, sketches, models, calculations, materials, and technologies (Latour/Yaneva 2012), sometimes involving public participation. In the future, automated generation of design options could take over large parts on the assumption that this will optimize planning processes, reduce costs, and make spatial planning calculable and predictable. To the extent that the tools for design automation will be owned by platform companies such as Autodesk or Alphabet, the logic of platform capitalism is beginning to transform both cities and the AEC sector, with BIM acting as a data provider and obligatory passage point and government policies as gate-openers. The implications of the "emerging dynamics between the production of space and value, catalysed by the integration of digital platforms and urban environments [… happening] under the auspices of global tech companies" (Sadowski 2020b: 448) are not yet fully visible, but certainly, the relationship between technology, capital, and cities will once again change. While platform urbanism has so far been oriented to the movements and decisions of city dwellers as users, if only to achieve value with ever new and customized offerings, in the sociotechnical developments and corporate imaginaries presented here, the citizens' routines, desires, and actions may easily fall out of the sight. Cities may be optimized based on building data and machine learning along earlier decision-making of municipal governments, developers, and investors, legitimized by the argument that the best out of hundreds of – automatically generated and assessed – options has been selected.

The techno-economic moves and shifts bound up with this transformation will most likely affect who will gain and who will lose, with consequences for the building culture. In the realm of design software, this reconfiguration includes a further concentration of economic power with the tendency towards a near-monopoly by US-software provider Autodesk, further stabilized by securing control in the realm of cloud infrastructures and interoperability standards and a shift of focus and investment from architectural design to software solutions for urban construction and site development; all this will be benefitting primarily real estate owners, investors, developers, and construction companies. We can expect large construction firms to act as early adopters, securing themselves a comfortable starting position in a first-mover-takes-the-most game, and the encroachment of tech giants and domain outsiders such as Alphabet into architecture and construction, turning buildings and cities into machines for data extraction. At the same time, the hidden internal logic of BIM data generation, structuration, and processing may have its own "informational diagrammatic of control" (Marvin/Luque-Ayala 2017: 84). In various fields, it has already become apparent that the rule of algorithms is associated with a change in considering, classifying, and setting priorities (Coletta/Kitchin 2017; Gillespie 2014). These changes tend to benefit those who already dominate the given power constellations because their previous decisions are reflected in the available data. Accordingly, an impoverishment of perspectives and a focus on profit interests can be expected for the field of urban planning (Simpson/Brandlhuber/Grawert 2019).

IT companies and governments alike tend to present BIM as a panacea for all ills befalling the construction industry, from stagnating productivity via skilled labor shortage to its devastating environmental impact. Whether all these benefits will actually materialize in equal measure or whether the imperative of building ever more, cheaper, and faster will prevail over sustainability will be seen. So far, to the best of our knowledge, there is little systematic research on the actual impact of BIM mandates in terms of economic concentration processes, an environmentally sustainable building culture, or the delivery of livable and affordable housing. However, we see types of actors benefitting from the ongoing techno-economic shifts that are not precisely known for prioritizing environmental sustainability, affordable housing, or more livable cities over data extraction and their own economic profit. Without accounting for the logic of platform capitalism, BIM policies will most likely, even if unwillingly, facilitate platformization and assetization in architecture and construction and in the future also in urban planning. The grand challenges posed by the environmental crisis and the need to provide adequate and affordable housing are likely to rank second at best. It would be worthwhile to study the respective policy processes and see whether urban planning actors are problematizing the social and environmental risks and side effects of automated city design. Already today, there are city council members, state legislators, and community organizations that oppose the government's tendencies to satisfy Big Tech companies. At the same time, the less human and financial resources are available to develop suitable concepts, the more promising the use of artificial intelligence in urban planning appears. In any case, it is crucial to critically interrogate this digital transformation in light of the techno-economic dynamics and the reconfiguration of urban power relations it is enmeshed with.

Algorithmic rationalities and data-based operations tend to establish standardized ways of processing inputs and conducting operations. As a result, a city's complexity may be drastically simplified and limited in its ability to adapt to local *spacing* and synthesize the interplay between urban objects, structures, and actions (Löw 2018). As Marvin and Luque-Ayala explain, drawing on experiences with digital resource planning, it may turn out that

> "presumptions of the software package cannot be overridden; evaluation is restricted to a limited number of criteria; cognition processes rely on the identification and deployment of common elements across experiences; and finally, the black-boxed nature of the technology itself – the software – protects it from deliberate manipulation or transformation" (2017: 89).

Moreover, more wicked problems such as reconciling growth and sustainability are unlikely to be solvable with transmitted data and current AI: "A correlation between input and output is not enough. More important is the justification of choices, based on theory and policy accountability." (Komninos/Panori/Kakderi 2019: 4) Instead of thinking in terms of techno-managerial optimization and automation, there are important urban planning decisions to be made to respond to the major challenges of climate change, biodiversity loss, demographic change, and ongoing urbanization. The development of responsible city design is better advised not to rely on data about what already exists since what exists is neither socially just nor sustainable, but to look for a much more profound basis upon which to make decisions (Carmona 2009) and to develop entirely new ways of living and building in order to foster the required urban transformations (Hölscher/Frantzeskaki 2021).

Anyone who sees urban planning and construction as a purely managerial task for optimizing technical parameters runs the risk of seeking the solution only in faster, bigger, more, thus making the necessary transformation in urban design, architecture, and construction even more difficult. In current techno-utopias, the city is imagined as a hyper-optimized, efficient, and smoothly functioning place. However, this is not necessarily a sustainable and inclusive place that allows for a responsible and fair distribution of resources. As Arno Brandlhuber and Olaf Grawert point out in a conversation with Deane Simpson (2019), the current trend toward algorithmic (post)planning is leading to an increasing loss of decision-making authority in urban planning for architects and planners. While those should be guided by the democratic values of liberty, equality, and fraternity, the new defining power of smart city paradigms and their proponents seem to pursue more individual goals (ibid.). Thus, platform urbanism threatens to make urban planning and society disappear into algorithms and computational design capacities, ushering in a silent, unnegotiated revolution of guiding principles.

Lefebvre criticized industrial capitalism for boiling down the interactions of spatial practices, socio-political concepts, and utopian visions to a dualist antagonism between an abstractly conceived, organized space "defined by [..] echoes, repercussions, mirror effects" (1991: 39) and the lived, fluid spaces of everyday life, such that "lived experience is crushed, vanquished by what is 'conceived of'" (ibid.: 51). As a result, the dominant production of abstract space tends towards repetition and homogeneity. Lefebvre considered social class struggles as the only force capable of maintaining differences in face of the "homogenizing efforts of the state, political power, the world market, and the world of commodities". But how can these differences be mobilized when the production of abstract space takes place in the digital worlds of algorithms, data, and clouds? While in the 1970s, repetitious spaces were "the outcome of repetitive gestures (those of the workers) associated with instruments which are both duplicatable and designed to duplicate: machines, bulldozers, concrete-mixers, cranes, pneumatic drills, and so on" (ibid.: 75), nowadays, these effects are produced by *informational diagrammatics of control*. Yet, it is still capitalism, assetization, and the ideas of abstract government that rule urbanism for the benefit of value creation.

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