Editorial

Between Means and Ends – Sustainable and Smart Cities in Flux

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CITIES IN FLUX

The discourse on cities is in essence multidisciplinary and diverse; accordingly, the collection of articles in this special issue on *Smart Cities* presents an array of domains and methods, including critical perspectives on the tech industry, a theoretical-pragmatic essay and discussion, along with empirical research, case studies and reviews. Nevertheless, a solid body of knowledge is emerging, based on a shared perspective on the smartness of smart cities, i.e., *how* technology should be utilized in cities and for what purposes. Much has been said and analysed regarding the notion of "smartening up a city" as the new urban frontier. We believe that the dust is settling over strategic deliberations on technology per se, recognizing them as *means* to addressing critical urban issues. The design of information systems (IS) from multiple viewpoints and the integration of urban data is, therefore, a useful goal to pursue when trying to innovate in attempting to address urban problems. Smart Cities are – or at the very least should be – also *sustainable cities and fair cities*, and urban planning must account for the costs and benefits to society and the environment in a way that cares for the explicit as well as the implicit knowledge (as defined in Information Systems research), for the unobserved in addition to the observable and measurable (as constructed in psychological studies), and to the undocumented presence of people and entities that lack tags and data specifications (work immigrance, for example, as described in World Bank, 2020a; 2021).

In this special issue we invited urbanists and researchers to study these interfaces between smart, fair, sustainable and urban; in particular concerning climate change, sustainable development and urban inequality. The International Geosphere-Biosphere Programme (IGBP) analysis of development trends depicts a world in

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flux. The transitioning to the Anthropocene, a new geological epoch dominated by humans – coined the Great Acceleration – is demonstrated through four macro processes: technological development, environmental degradation, growing inequality, and population and urban growth. The city has become main stage for all four processes, which are constantly becoming more intense and incompatible.

With the advent of the 21st century, the Smart City model is gaining recognition as a preferred development framework (Matsumoto et al., 2019). Despite numerous broader definitions, the prevalent model is primarily technological, positioning city smartness as a goal instead of a vehicle for urban development. This approach is shared by governments and subsequently translated into budget allocation and policy guidelines. While technological innovation may be a leading driver for economic growth on the national level, it has not succeeded in overcoming social and environmental challenges on the local levels. On the contrary, economic disparity is growing, housing is less affordable, bio-capacity is deteriorating, and air pollution is increasing.

As the world's urban population multiplied, environmental resiliency decreased exponentially, CO2 in the atmosphere has surpassed several red lines, and key ecological systems are on the brink of collapse and extinction (United Nations, 2018; Ros et al., 2019). The new global development goals, adopted in 2015 (United Nations, 2017), reflect the emerging realization of the situation. Through the new development agenda, nations and global institutions are purporting sustainability as a comprehensive development framework, translated into 17 development goals for 2030.

The 2030 Agenda for Sustainable Development is a plan of action for people, planet and prosperity. All countries and stakeholders, acting in collaborative partnership, are starting to implement this plan. The 17 Sustainable Development Goals and 169 targets, which are integrated and indivisible, demonstrate the scale and ambition of this new universal agenda, which *balances* the three dimensions of sustainable development: economic, social and environmental.

Underneath the comprehensive framework of sustainable development, goal 11 specifically addresses the urban aspects, advocating for a *new* urban approach:

> …to forge a new model of urban development that integrates all facets of sustainable development, to promote equity, welfare and shared prosperity in an urbanizing world.

The new urban development agenda distinctly specifies the Smart Cities framework as a key mean to achieving the SDG goal for cities (United Nations, 2014, 4):

> We commit ourselves to adopting a smart-city approach that makes use of opportunities from digitalization, clean energy and technologies, as well as innovative transport technologies, thus providing options for inhabitants to make more environmentally friendly choices and boost sustainable economic growth and enabling cities to improve their service delivery. (United Nations, 2017, 19)

These broad commitments adopt a system-thinking, recognizing the complexity of the urban environment and aiming for systemic tools to organize it. Granted that today technology can be a key driver for urban development, the articles in this issue of GRF present a variety of perspectives and deliberations on the road to attain Smart City frameworks.

The dilemma of means and end resonated strongly as we, as guest editors, formed the organizing concept for the issue. We strongly believe that the interdisciplinary discussion of urban development and technology is highly relevant to 21st century realities, and to the immediate and critical challenges cities face today.

Our interests as scholars and practitioners of urban sustainability, climate change and technology come together through [on] the discourse of *means and ends* – between Smart Cities and Sustainable Cities, socially and environmentally. Three themes are explored in this context, across different scales and geographies, creating a wide perspective. The first theme relates to planning, responsive and adaptive systems; the second theme is about the interactions between sustainable development and smart development; and the third data-oriented theme revolves on questions of the value of information, data manipulation, rights and privacy in cities:

Planning, Responsive and Adaptive Systems – Adaptive to What?

1. Smart Urban Futures: Outlining the Smart City Planning Project: Jenni Partanen
2. Urban Growth Analyses of Rajkot City Applying Remote-Sensing and Demographic Data: Shaily Raju Gandhi
3. A Smart City Anomaly: The Near Becomes Far, The Far Becomes Near: Ronit Purian

Smart Drivers to Urban Sustainability and Resilience

4. Urban Heat, Vulnerability, and the Public Realm: Lessons from Tel Aviv-Yafo and Implications for COVID-19 Recovery: Johanna Lovecchio, Grga Basic and Thaddeus Pawlowski
5. Barriers to Empowering and Engaging Youth in Sustainable Urban Development Endeavours – Experience Gained from Korydallos Municipality, Greece: Nektaria Marava, Andreas Alexopoulos and Anastasia Stratigea
6. Smart Tourism Cities and Sustainability: Alon Gelbman
7. Municipal Innovation and Sustainability Readiness—Results from a Study of Mediterranean Cities: Avigdor Sharon and Orli Ronen

The Good and the Bad

8. Keystone Practices to Enable Smart Cities to Flourish: Theresa Dirndorfer Anderson
9. Big, Thick, Small and Short – The Flaws of Current Urban Big Data Trends: A Viewpoint: Rafi Rich

PLANNING, RESPONSIVE AND ADAPTIVE AYSTEMS – TO WHAT?

The notion of a holistic planning system has a long history. Suffice it to note the attempt to grasp various aspects of complexity and cognition in a self-regulated "general purpose support system" (GPSS), applying simulation in virtual reality techniques (Portugali, 2006), and more recently a search for sustainability and quality of life indicators in a decision support system (Grifoni et al., 2018). Yet they do not provide design principles for current urban landscapes.

In addition to a dynamic perspective that "explains how different agents change that physical form over time and how diverse processes are involved in this transformation", a perspective on city structure suggests "insights on prescription for the design of cities" (Oliveira, 2019, 529).

Alfasi and Portugali (2007) identified the weaknesses in current planning and building procedures, and proposed an "Urban Code" to create planning rules out of spatial relations, as well as a planning system that takes into account additional urban elements and the qualitative relationships between them. But what is a proper configuration of land and resources? How should the rules be responsive and adaptive, and to what? To make a clear statement, the aspiration for a city that is 'smart', sustainable and compassionate needs to be grounded in methodologies and tools. The three articles in this section connect the vision with pragmatic means.

Jenni Partanen outlines the Smart City Planning Project, and by that she provides a framework that usefully consolidates the deep theoretical knowledge-base of urban complexity with data sources and tools. As she proclaims, cities are constantly evolving complex systems, and the ongoing digitalization is making them even more complex.

Developing a toolkit for urban scientists is, therefore, an ambitious endeavour, especially as Partanen is determined to innovate on a multi-disciplinary scope, and to be pragmatic, at the same time. By actualizing dynamic urban theories and core urban domains, and coupling them with advanced computational methods, the paper builds modules to ultimately connect complexity and the observable and measurable realization of urban dynamics. Three domains – urban space, mobility, and urban economics – capture most actions and reactions in cities. The Smart City Planning Project is therefore organized around the three domains, coupling theoretical approaches to adaptive systems, urban morphology, urban economy and mobility systems – with the methodological foundations to spatial analyses and

functional patterns comprehension in the city. Data mining, and other methods and advanced tools are secondary to the solid rationale of intertwined built structure and urban activities. Mobility depends on cognitive and behavioural processes, human activities design the metabolic city, and self-organizing structures often enslave the agents. Urban activity (process, function) and urban form (pattern, structure) shape each other.

This is not just a general discussion about smart city projects, and yet, by bridging the many perspectives – big data and urban planning, cognition and metabolism – the paper can be meaningful for pedagogy, building interdisciplinary education programs; and insightful for urban research and data science, extending urban analytics to grasp urban theories.

By organizing socio-economic aspects as well as topological analyses, urban morphology etc., Partanen opens boundaries to a larger context of inquiry. She is not altering existing contexts but prevents silos in closely related domains and techniques. The following paper demonstrates such an integrative approach towards urban research, based on data from multiple sources. Together, the two papers illustrate how to assemble data from printed documents in municipal archives, satellite photos, cellular phones and travel cards in public transportation, questionnaires and knowledge of lifestyles in different parts of the city.

Shaily Raju Gandhi integrates remote-sensing and demographic data to analyse urban sprawl, a major issue in big cities worldwide. Urban growth analyses of Rajkot City, India, along the history provides a broad view on the socio-economic dynamics, geopolitical changes and the impact of technology on the urban area and its rural surroundings.

The conflict between urban progress and urban sustainability can be further investigated based on the methodologies provided in this study, from data provision (combining satellite photos data, collecting printed documents in municipal archives) to comprehensive indicators to monitor urban density.

Each city develops its own unique configuration, and so is the City of Rajkot. Interrelationships between structure and function can be tracked, e.g., whether the spatial configuration of growth is outwarded or into the inner-city. This study describes the related processes that may have shaped urban patterns.

Attempts to better understand the spatial configuration of growth, and the morphology that determines function (and vice versa, activities that change structure), refer to underlying processes, to relationships between the economy and social diversity, etc. Urban planning means shaping environments for human wellbeing and health, and this study presents an approach to scrutinize regional transformations.

The physical structure of cities and regions makes it possible to redefine the dichotomy between the so-called pragmatic perspective – the economic view that is too often narrowed to financial profit, and is long controlled by self-interests – and the ethical perspective that accounts for environment and society. The tension along this dichotomy is rising in recent years. The role and the responsibility of planning –

either urban planning or digital product design and development – is to understand the "physical structures within which people conduct their activities" (Farrell & McNamara, 2018), and by that to address their unspoken wishes.

While the discussion on inequality is complex, incomplete, and unresolved, the discussion can be better regarded in spatial terms, as proposed in the next paper. Ronit Purian shows how segregation and information flow affect each other to provide a theory of *smart* city form. City structure is changing in certain ways that invite us to explain urban dynamics today. To do that, Purian examines urban morphology through the technological progress and the economic and social influences over the years.

The first part of the paper: "The structure of cities: Increasing irregularity", reviews what led to the structure of the separated patches, as evident in big cities. Developing from homogeneous city quarters in the first urban models, a gradual decline in homogeneity appears in the radial pattern of concentric zones; the sectorial pattern of neighbourhoods alongside employment zone; and the pattern of multiple nuclei for different functions. The evolution of urban morphology since the days of concentric zones is presented to emphasize the continuous increase in heterogeneity. The transition outward to the suburbs and the decay of city core, and then the transition inward, back to inner city centres – constructs the Patchwork Metropolis (Florida & Adler, 2018) that suggests an order of separation – in economy, in society, and in urban morphology. Rather than relating, near things were separating and the resulting structure of the metropolis is not the ideal unifying bricolage of diverse communities, inclusive neighbourhoods, and buildings that manifest pluralistic values. On the contrary, while the global cities create a global network of "mega nodes" (Castells, 2010, 2743), the central core and the suburbs become farther apart. The patchwork city structure conveys the "homogeneous initial conditions" (Prigogine & Stengers, 1984, 183) as presented in the third part. The second part of the paper continues the morphological review to show how spatially distinctive are the differentiated spaces in cities, and to distinguish the spatial separation as opposed to integration measures. While network theories and urban morphology "usually focus solely on spatial integration patterns" (Omer & Goldblatt, 2012, 177), the spatial configuration of wealth and poverty in cities is better captured in levels of spatial separation or segmentation between areas. The spatial partitions, either open spaces (*discontinuity* in street network) or irregularity in street network (*discordance*), pertain to socio-economic differentiation, and Omer & Goldblatt (2012) innovated when they proposed to characterize spatial configuration in terms of spatial partitions between adjacent neighborhoods. Since 2012 the paper's assumption is that, in big cities, moderate variations between areas turn into sharp divide in closer proximity. Features of separation and segregation are assumed to imprint "uncoordinated" city spaces, diverse patterns of discontinuity and discordance in street networks and urban areas. However, spatial integration could bring people closer and increase residential integration. Why does socio-economic differentiation exceed the potential

for spatial integration? The spatial structure of the city is the *local* result of the same sociotechnical dynamics that connect the far *globally*.

The second part of the paper, "Gentrification patterns vs. displacement disorder", confronts displacement that transformed urban growth and urban renewal into sharp divide in close proximity. Financialization is at stake, in this case real estate investments that radicalize the nature and scale of spatial polarization and dissimilarity. High disparities in richer cities are expected, instead of organic growth and renewal by individuals who choose to live in affordable neighbourhoods. Qualities of emergence and rejuvenation characterize old communities. Pleasant urban environments are those least ordered.

The third part, "Elevations all the way up: Vertices isolated with technology and information", provides theoretical reasoning to address the transitions towards separation, and how inevitable is the form of segregation when using the technological aids that change behaviours and fragmentize groups in the society. Three views are presented: Hillier's ideas on innovation vs. stability – to explain global flows of people and money; Lynch on the time and distance for pedestrians and from different user perspectives – to clarify the dividing flows of technology; and Prigogine's analyses on scaling, speed and fluctuations – to specify the effects of local flows. Here Deneubourg's description anticipates how, in dense environments, clusters of condensed wealth rise in inflexible spaces and tighten up their boundaries to include a homogeneous population.

When each community and social group captures local-routines and worldwideties in its own separate condense information flow, the groups – that are interconnected within – become disconnected and isolated from each other. The impact of technology on the spatial behaviours is separation both physically (e.g., in navigation, to focus on estimated arrival time to destination, to neglect places we pass by) and digitally (e.g., collaborative filtering in recommender systems, much as ecochamber in social networks, creates social narratives to different groups). The separating elements are informational. Urbanism, in this sense, is an expression of the economic forces that dictate the direction, whether dividing or integrating. Spatial behaviour is the symptom and the antidote.

To grasp the isolating nature of the smart city, and the grand view on city structure, the urban processes can be envisioned as the effect of physical forces on bonding atoms, where populations experience attraction and repulsion, depending on their size and distance. The digital transmission of information has physical manifestations. The first is in smart city structure: The spatial structure of the smart city is fragmented in city centres, where extreme wealth and poverty levels appear in close proximity, and towards the periphery the gaps are moderated in lower socioeconomic levels and lower entropy. The second is in smart city function: Global connectivity is outward-interconnecting but inward-excluding. Recent reports identify wider income inequalities in dense urban areas, and lower social mobility in the longer term (World Bank, 2020a; 2020b; 2021). Current findings on the economic

implications of Covid-19 reveal the urban vulnerability in different countries and cities. In addition to the chronic rural poverty, the crisis confirmed that the "emerging global profile of the new poor" is urban.

SMART DRIVERS TO URBAN SUSTAINABILITY AND RESILIENCE

During the last two decades, major cities are indeed more vulnerable, they are exposed to recurring catastrophic disruptions; the attack on the Twin Towers in New York, impacts of Hurricane Katrina and Superstorm Sandy, floods in Bangkok, fires in Melbourne, heatwaves in Paris, and the onslaught of COVID-19 in heavily populated areas, to name just a few. The concentration of people and capital in cities renders them vulnerable (Mpanje, et. al., 2018). According to the UN World's Cities reports (2016, 2018), 59% of cities with at least 500,000 inhabitants were at risk of exposure to at least one of six types of natural disasters, (cyclones, floods, droughts, earthquakes, landslides and volcanic eruptions); 15% were vulnerable to two or more types of disasters. Floods were the most common potential natural disaster, followed by droughts and cyclones, all anticipated to increase in frequency and intensity due to climate change.

It is therefore not surprising that resilience has become prerequisite for a successful city; urban wellbeing as defined by the SDG framework is *Resilient*, Sustainable and Equitable (SDG11). The concept of resilience evolved from the ecological and environmental sciences. Walker defines it as "the capacity of a system to absorb disturbance and reorganize while undergoing change" (Walker et al. 2004, 2). In the context of sustainable development, emphasis is given to the ability of a system to reorganize to an *improved*, more sustainable state.

The idea has been copiously adopted to the urban sphere. ICLEI – Local Governments for Sustainability, one of the leading urban sustainability networks, and one of the first to make this linkage, put forward the following definition for urban resilience:

> A resilient city is prepared to absorb and recover from any shock or stress while maintaining its essential functions, structures, and identity as well as adapting and thriving in the face of continual change. Building resilience requires identifying and assessing hazard risks, reducing vulnerability and exposure, and lastly, increasing resistance, adaptive capacity, and emergency preparedness. (ICLEI, 2019, 5).

The New Urban Agenda (United Nations, 2016), a derivative of the SDG framework, transposes these objectives into comprehensive policy guidelines:

> City systems must be transformed to encourage healthy, sustainable life and enable the development of communities that can adapt to and prepare for existing/ potential shocks and stresses. [...] Effective management for urban environmental sustainability and resilience potentially provides multiple benefits including economic development, more attractive and liveable urban

> landscapes, and increased human well-being. These are elements to a thriving urban subsystem" (United Nations, 2016, 11-12).

Urban challenges and urban opportunities intertwine to produce sustainability for the community and its individuals. The strong emphasis on resilience, together with urban vulnerability, convey a new sense of urgency in urban policy, especially concerning the expected impacts of climate change.

The Second Assessment Report of the Urban Climate Change Research Network (Rosenzweig et al., 2018) explores the implications of changing climatic conditions on critical urban physical and social infrastructure sectors and inter-sectional concerns. The report assesses the main concerns and impacts of climate change, pointing to a number of climatic phenomena that will directly affect cities:

- Temperatures are rising in cities due to both climate change and the urban heat island effect.
- Mean annual precipitation is projected to change by -7 to +10% by the 2020s.
- Sea level is projected to rise by 4 to 19 cm by the 2020s.

These findings clearly demonstrate the pressing need for cities to adopt strategic measures to address climate challenges meaningfully. However, while the need is evident, actions are still mostly incremental, fragmented and siloed. The New Urban Agenda (NUA) identifies technology and Smart City models as potential drivers for improving city resilience and sustainability:

> …[A]dopting a Smart-City approach that makes use of opportunities from digitalization, clean energy and technologies, as well as innovative transport technologies, thus providing options for inhabitants to make more environmentally friendly choices and boost sustainable economic growth and enabling cities to improve their service delivery (United Nations, 2017, 19). […] We underscore the need for enhanced cooperation and knowledge exchange on science, technology and innovation to benefit sustainable urban development… (United Nations, 2017, 37)

The smart city model is clearly identified here as *means* to an end, utilized to strengthen local efforts aimed at producing strategic climate responses. It remains to be seen whether it can supply the necessary impetus to produce the more transformative strategies required to trigger a fundamental change towards sustainable and climate-resilient urban development pathways (Rosenzweig, et. al., 2019).

Strategic urban planning for resilience is not the widespread choice of local government, as Jabareen (2013) indicates in proposing the Resilient City Planning Framework, a 4-tiered comprehensive model: vulnerability analysis, planning in uncertainty, urban governance and prevention. The four concepts frame key questions on measures to attain resiliency, which in turn, can define tools and pathways, including spatial planning, technological systems and community engagement and support.

The question of sustainability, resiliency and the Smart City model is addressed in this issue by four contributions from different – yet congruent – perspectives, simi-

lar to Jabareen's delineation: spatial planning and the urban heat island, community-technology sustainability and tourism, and finally, governance and sustainability.

All articles in this section are concerned with the Mediterranean region, identified, as one of the world's hotspots for climate change (Kim, et. al., 2019). The region frequently experiences extreme climate and weather events, especially heat waves and droughts. Despite these trends, Mediterranean cities are lagging behind North European cities in addressing climate change challenges and mainstreaming sustainability. Sharon and Ronen (in this special issue) maintain that the emerging convergence of sustainability with innovation may offer a stronger incentive for Mediterranean cities to promote expansive environmental actions and policies. Findings from a study of 34 Mediterranean cities indicate that there was much interest in adopting innovative solutions, but less experience of actually doing so. Only one fifth of the participating authorities were already working to develop innovative and large-scale environmental initiatives, predominantly the larger municipalities.

Readiness to adopt sustainable development is also the main theme of the article by Marava, Alexopoulos & Stratigea: "Barriers to Empowering and Engaging Youth in Sustainable Urban Development Endeavours". The problem of mainstreaming sustainability, especially in including youth in decision and policy making, has become more challenging with the advent of the digital generation. Bridging intergenerational gaps, as the article elucidates, needs to overcome barriers in communication, digital gaps, and building trust, skills and avenues for non-trivial input and involvement in solutions for a sustainable and just future. The study deliberates the adoption of ICT-enabled interaction patterns for the establishment of steady communication bridges and information channels with youth, taking advantage of prevailing youth interaction patterns to introduce them into the socio-political discourse. Alternative options are available nowadays, such as online campaigns, clicktivism and slacktivism, hacking and Distributed Denial of Service (DDoS) attacks, crowdsourcing and liquid democracy (EC-CE, 2015).

The issue of barriers to innovation and sustainability is augmented by deepening the understanding of practices of the digital generation, the lack of attractive communication bridges between youth and local administration and the deficient strategic use of available digital means (e.g., Facebook, Twitter) for establishing linkages, spreading information and engaging youth in local affairs. The researchers introduce new insights regarding face-to-face participatory tools used in the DemoCU and Gr-RAC initiatives, and the focus on youth's creativity as powerful tools for unfolding their thoughts, skills and perceptions.

In the context of sustainability, the deliberation on the benefits of technology, mostly centered on the transition from the "Petropolis" to the "Ecopolis", two opposing urban models coined by Girardet (Girardet, 2017), exemplifies the current controversy. The contribution of Lovecchio, Basic and Pawlowski on "Urban Heat, Vulnerability, and the Public Realm", presents a tangible case study of working with aspects of the two models in addressing climate change in a Mediterranean city. The

article explores how innovative thermal spatial analysis exposes interconnected risks, to inform new paradigms of planning and design that seek not only climate adaptation but also social equity at the community level, integrating social sensitivity indicators compound with heat exposure. In this case, socio-political, economic, and environmental stresses converge: from displacement caused by rising unaffordability of housing and disproportionate exposure to heat.

Cascading consequences of heat suggest the interconnected nature of risk: Small businesses with months of lost foot traffic reduce revenue and jeopardize business sustainability, livelihoods, and important community resources for residents. This analysis assumes that vulnerability is defined by the combination of exposure and sensitivity indicators, derived through data analysis and data-based extrapolations, reverberating the discussion of means and end. This process, also known as the "multi-criteria decision analysis," intended to help prioritize where planning efforts may be directed. This innovative tool introduced through the case study exemplified as a Climate Smart framework, demonstrating the use of data in determining climate action.

The implications of both sustainability and smartness on the region's leading industry – tourism, are brought in by Alon Gelbman in a review article that examines the characteristics of smart tourism cities as a tool for the effective management of environmental systems and urban society. The major tourism cities of the Mediterranean, such as Barcelona, Venice and Athens, are suffering dramatically from the impact of over-tourism on residential life and local infrastructures.

Technology, ICT applications and better monitoring can help to meet these challenges and possibly create new frontiers even in COVID19 times. Maximizing the use of smart technologies such as robots at airports and other public places will provide better management of visitor movement, reduce crowding and enhance medical and security control. Gelbman also notes the need to address the unique characteristics of the younger generations in this context, born into a digital environment and for whom this is a part of their life style. They expect smartness, they prefer travel tech and are more aware of the environment. Sustainable management of services and experience are becoming accepted standards.

One can argue that smart urban tourism is transforming from a futuristic vision to a real and abiding need. This includes sustainable tourism management, which creates a balance between the use of environmental and social resources, and the movement of tourist visitors in a city. In this way, online digital experiences in contemporary urban tourism can provide responses to the problems of tourism overcrowding in the 21st century. Gelbman contends that the smart city concept incorporates improved sustainability through the greater efficiency provided by the use of new technologies and higher volumes of information for management, ultimately within new governance.

In congruence, Sharon and Ronen, conclude the section and present the policy aspect of integrating innovation and sustainability on the local level, in "Municipal

Innovation and sustainability Readiness". They argue that urban climate resilience depends largely on the municipality's' readiness to embrace innovation and mainstream climate and sustainability comprehensively within municipalities; this is the second wave of municipal innovation adoption. The pioneers have already shown the value of transitioning to a climate ready reality, now the more peripheral cities can reap the benefits through collaboration with the first cohort of cities. Most cities do not have integrated institutionalized mechanisms for innovation, and even when they do, these are not associated with sustainability or climate issues. Apparently, innovation is not perceived, nor implemented, as a catalyst for climate action. In view of the growing impact of climate change, this state is concerning in relation to municipal policies, in general and in the Mediterranean region in particular.

Mediterranean cities are contending with the rising environmental and climate challenges. The contributions in this special issue delineate an emerging reality where innovation and technology are becoming advantages and means to pursuing climate and environmental resilience.

THE GOOD AND THE BAD

Smart cities are cities of data science, encompassing the urban data life cycle. Urban decision making, in a smart city model, is a product of business intelligence (BI), technology and information systems (IS) management, and scientific research, based on data that creates one of the most basic pillars of the smart city. In the first days of Obama's administration, dashboards and mashups were the state of the art. Since then, smart cities replaced the concepts of e-government, e-democracy and e-participation, and the web-based dashboard applications are deeply assimilated in the new giant platforms termed 'digital twin'. At the recent Smart Cities Conference in Barcelona, technology vendors presented what may be called *super-platforms* and cities presented use cases. Among the companies presented were Huawei, ESRI, Deloitte, Bentley, Siemens, and more. What are the possible appropriations of digital tools and technologies?

The two closing papers frame the purpose of data, datafication and the operation of smart cities. Theresa Dirndorfer Anderson's essay presents keystone practices to enable smart cities to flourish, spanning the theoretical and the pragmatic perspectives, and Rafi Rich follows with a critical viewpoint on the tech industry. Anderson encourages to see the good and Rich concludes – beware of the bad. The promise of the smart city is also its worst enemy, as municipalities are more likely to adopt bandwagon behaviours. Rich describes the flaws of current urban big data trends, how industry leaders set the rules, and why the big fails to observe the smart conclusions gained in thick and small data studies.

Anderson shares her thoughts on lessons learnt as a consequence of the massive bushfires of the summer. She builds on the notion of creative urban ecologies as

a way to characterize a thriving 'smart' city, both in terms of technology, data in use, and of the city's capacity to learn and adapt. Anderson introduces four claims underpinning her approach: Data is never complete, information is never certain, but action is still required; indecision in light of the indeterminacy of information is a threat to the resilience of an urban ecology; building trust and mitigating risk is critical to resilience; and emphasizing the context of design *with* the city rather than *for* the city. Then, using the concept of "urban ecology", the paper develops keystone practices of community, mutual respect, consistent communication and connection to place, nurturing intuitive understanding; and appreciating leadership and professionalism as listening and commitment.

To initiate inclusive social and climate actions, data provision and integration is necessary, consolidating the many systems and service providers into a principal-agent problem of collective action (Purian et al., 2019). However, the overall aim of a profit-driven industry is not necessarily to further develop the systems and the societal practices that encourage healthier and more sustainable behaviours.

In this respect, the critical commentary by Rafi Rich clearly states: beware of the flaws, avoid bandwagon behaviours, nurture your own thick and small data and insights. More than industry standards, the smart city is about intimate connections to the people and to the places. Efficiency is necessary, but not sufficient. To break down – and resolve – urban problems we must connect the institutional perspective of organizations in different sectors and the individual perspective in communities and social groups.

The design of data and services, specifying what information to collect, store or deliver forward, is therefore an ethical design of social relationships, actualizing rules of conduct and shaping norms and responsibilities. The smart reality that spans multi-stakeholder initiatives, through services and platforms that facilitate processes, must be effective from a business perspective as well. While doing that, the envisioned mechanisms will produce and absorb streams of collective vast big data, anonymised and privacy-protecting. This big data pillar must be specific and selective, and challenged constantly by gatekeepers to address a simple question: do we collect data not for surveillance but for providence, not to police but to protect, not anonymously monitoring but attentively listening and taking care?

To conclude: perhaps, the good and the bad Smart delineate the axis of the Smart and Sustainable cities discourse, and conversely, the questions presented in this special are fused, outlining the complexity of cities today. Today, in the age of technological acceleration and global cities, there is a need for a new perspective that integrates the emerging ecosystems of systems and agents – both socially and environmentally. The following articles explore these assumptions, delving into the intricate fabric of city building, managing and developing at the opening of a new century.

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