Special Issue Future of Smart Cities

FUORI LUOGO

Rivista di Sociologia
del Territorio, Turismo, Tecnologia

Guest Editors
Monica Bernardi
Luca Bottini

Direttore Fabio Corbisiero
Caporedattore Carmine Urciuoli

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INCONTRO FUORI LUOGO

Senzio Sergio D'Agata[1]

Smart Cities, Green Urban Growth and Sustainable Development: a Socio-Cybernetic Reading in conversation with Mark Deakin

Mark Deakin is a professor at the School of Computing, Engineering and the Built Environment, Edinburgh Napier University, UK. He is a leading scholar in the field of smart cities and sustainable development and his longstanding research activity has contributed to the development of an understanding of smart cities able to grapple with the complexity of the issue. Moreover, Mark Deakin has directed several research projects dealing with Smart Cities and the Sustainable Development of Urban Environments for the European Commission, Economic and Social Research Council, and Engineering and Physical Sciences Research Council in the UK.
In this interview, the professor gives us a general understanding of the smart cities agenda, highlighting the potential of a socio-cybernetic approach in which humans stand as protagonists with the assistance of technologies brought to the fore by research and innovation strategies.

Question 1 - As I write, Southern Europe is hit by one of the worst heat waves ever recorded, with severe consequences for many urban contexts. While our cities' development path needs to change, we struggle to find a convincing alternative. The concept of the smart city often goes together with the sustainability one, presented as a powerful and promising way to achieve the goals of sustainable development. However, scholars all around the world, spreading from critical theorists to neoliberal intellectuals, continue to debate the true meaning of sustainability struggling to find a common ground. In this broad and different scenario, what are the main contributions that a smart city transition theory can offer?
Answer - As the United Nations' (UN) 2015 Sustainable Development Goals (SDGs) and 2016 HABITAT III Urban Agenda (UA) make clear, the challenge cities around the world now face is no longer solely humanitarian but also social. No longer solely humanitarian, but also social in the sense the SDGs of the UA stand as attempts to explore the relationship between the humanity of wealth creation and the prosperity of society. This is something they achieve by exposing the adverse effect any division between them (human wealth creation and social prosperity) has on the health and well-being of cities around the world.
The onset of global warming and climate change no doubt offers the strongest example of where divisions between the humanity of wealth creation and prosperity of society adversely affect the health and well-being of cities. No doubt because the exploitation of nature, depletion of resources and emission of carbon into the atmosphere, causes global warming to reach that level which cities no longer consider safe. Cities no longer consider safe but on the contrary so insecure for the UN and HABITAT III to begin questioning whether the urban growth model available for humanity to create wealth and society to prosper is still fit for purpose. Is still fit for purpose, not because urban growth fails on humanitarian grounds alone but for the reason wealth creation also falls short as the social basis of prosperity. Fails and falls short on these grounds and this basis, due to the model of urban growth cities around the world stand by for humanity to create wealth and society to prosper being neither environmentally just nor fair. Neither environmentally just nor fair in terms of that human wealth creation, social prosperity, health and well-being which cities around the world either stand tall against or fall on. Either stand tall against or fall on as the human wealth creation, social prosperity, health and well-being of that quality-of-life which cities provide access to all around the world and both the UN and HABITAT III expect regions to sustain the development of.
The challenge of humanity creating the wealth needed and society prospering from that urban growth which is able to close any gap between them, vis-à-vis be environmentally just and fair in creating wealth and prospering from the health and well-being this generates is now given

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to smart cities. These cities are charged with the responsibility of turning the injustices and unfairness of the current situation around by getting smart about urban growth. Getting smart about urban growth by turning humanitarian failures into successes and social shortfalls into longstanding fulfilments. Into successes and longstanding fulfilments able to turn the fortunes of cities all over the world around. Turn the fortunes of cities all over the world around by virtue of modelling the humanitarian grounds and social basis of urban growth as environmentally just and fair. Environmentally just and fair in the sense the humanitarian grounds for and social basis of the wealth creation, prosperity, health and well-being smart cities safeguard is drawn from that process of climate change adaptation which secures the potential the so-called fourth industrial revolution possesses to stabilize that global warming which otherwise has an adverse effect on the quality of life.

The inter-governmental and trans-national consensus coalescing around cities getting smart serves to concentrate attention on the structural dynamics of urban growth. This is considered vital if research and innovation are going to be successful in pivoting the scientific and technological trajectories of legacy systems inherited from the previous industrial era in a direction able to meet the SDGs of that UA which are set out by the UN and HABITAT III. The idea here is that cities, as the sites and powerhouses of urban growth, wealth creation, prosperity, health and well-being, need to be smart in terms of the research and innovation systems which they champion under the fourth industrial revolution to drive that science and technology which allows the process of climate change adaptation regions assemble to be resilient in sustaining development. To be resilient and sustain development by keeping global warming within the 1.5 ^{0}C of the pre-industrial era and at that level which is currently considered safe by the International Panel on Climate Change.

The regime change associated with securing this transition away from legacy systems and towards the structural drivers of smart cities goes under various names. As a trajectory of urban growth in the new industrial era, it is common to see smart cities referred to as a study of the research and innovation relating to the evolution of human intelligence and as either socio-technical or cyber-physical systems (Komninos, 2014, 2020; Batty et al. 2013; Batty, 2019). Irrespective of the names these intelligent systems are given, what they share is the conviction the research and innovation leading this transition to smart cities are human-centric, socially networked and cybernetic, inter-disciplinary in nature, grounded in codes of communication found in (computer) science and based on the (digital) technology of the ecosystems 21st century urban growth relates to.

The AI, IoT and machine learning of the fourth industrial revolution are the current symbols of this intelligent and systems-driven model of an environmentally just and fair urban growth. The virtuous nature of this urban growth model is as that of an ecosystem which is sufficiently bio-diverse to be dematerialised and subjected to a process of decarbonisation. Dematerialised and subjected to that process of decarbonisation which is clean and waste-free. Clean and waste-free in greening that urban growth which is environmentally just in creating wealth and fair in providing access to a share of the prosperity, health and well-being found in the quality-of-life cities around the world offer. Cities around the world offer to sustain that development which regions assemble the resilience of as the climate neutral change and net zero adaptations of nation-states.

Question 2 - You argue that a sociotechnical approach is the best suited to develop a theory around smart cities. Following the Multi-Level Perspective, exogenous factors from the macro-level of the sociotechnical landscape and endogenous factors from the micro-level innovation niches reflect in the meso-level of the sociotechnical system, shaping in fundamental terms the trajectory of development of smart cities. Can you explain specifically how public local governments contribute to shaping a smart city? Moreover, what changes do the public sector need concerning smart cities?

Answer - The intrinsic intellectual value of this human-centric, socially networked and cybernetic model of smart cities, lies in the interdisciplinary milieu it currently sits. That is, with the value the intelligence which the research into this newly emerging field of innovation offers for models of urban growth to avoid the naturalism, social, scientific and technological over-determination of the legacy system and environmental reductionism they otherwise encode into the injustices and unfairness of the previous industrial era. Codes that literally need to be rewritten and cast afresh as the intelligent systems of the fourth industrial era so the structural dynamics of this regime change can be environmentally just and fair as trajectories which green the urban growth, human wealth creation, social prosperity, health and well-being of cities around the world. Green the urban growth, human wealth creation, social prosperity, health and well-being of cities around the world that regions in turn assemble the resilience of as the climate neutral change and net zero adaptations of nation-states which can sustain development.

Not being limited to the structural dynamics of the intelligence grounded in either national or transnational research and innovation systems, nor based on either mode 1 or 2 trajectories of science and technology, this greening of urban growth is written as codes of communication. Those founded in science and based on technologies evolving into the next order logic of the triple helix. The triple helix of smart cities that evolve into the ecosystems of regional assemblages and which take on the status of a sensory system. That sensory system which assembles the collective intelligence needed for the institutions of knowledge production situated across nation-states, to safeguard research into and secure innovations from the science and technology of that fourth industrial revolution which commands the transnational status of being environmentally just and fair.

That fourth industrial revolution which commands the transnational status of being environmentally just and fair, precisely because it can green urban growth. Can green urban growth by securing that science and technology which bears down on the global footprint and overshoot in the consumption of resources. That overshoot in the consumption of resources which is environmentally unjust and unfair and the wrongs this causes, vis-a-vis rising atmospheric temperatures, excessive heat, drought, crop failures and food insecurity, is what this new industrial era aims to put right. Aims to put right by safeguarding research and innovation from institutions of knowledge production across nation states into the collective intelligence of that sensory system which evolves into a smart city. Evolves into a smart city by staging that model of urban growth which is environmentally just and fair in closing the gap between human wealth creation and social prosperity. Closing the gap between them by virtue of the green credentials this urban growth model offers to dematerialise resource consumption by subjecting it to process of decarbonisation. By subjecting it to that process of decarbonisation which is clean, waste-free and human in creating wealth from that environment which is just. From that environment which is just in allowing society to prosper from access to that fair share of the health and well-being found in the quality-of-life which cities around the world offer to sustain that development regions assemble the resilience of.

The role the public sector plays in this regime is that of an institutional body underwriting the structural dynamics of this greening and supporting the narrative on urban growth it is charged with the task of making sense of. Making sense of as that institution of knowledge production which governs the trajectory of research and innovation into the science and technology of the fourth industrial revolution so it can be safeguarded and made secure across nation-states. So, it can be safeguarded and made secure across nation-states and in terms of how the structural dynamics of such a regime stabilises this greening of urban growth. Stabilises this greening of urban growth so the fourth industrial revolution can be environmentally just and fair as an ecosystem closing the gap between the humanity of wealth creation and social prosperity. Closing the gap between them so the balance struck is no longer destructive (warming the temperature of the atmosphere to unsafe levels) but on the contrary constructively aligned (as a process of climate change adaptation). No longer destructive but instead constructively aligned as that hu-

man society which is able to create wealth that is environmentally just in providing cities around the world access to a fair share of that prosperity, health and well-being which the UNs SDGs and UA of HABITAT III deem necessary.
As an institution of knowledge production, the public sector also leads on the research and innovation required for the trajectory of this science and technology to secure the structural dynamics of that regime change which stabilise the fourth industrial revolution. This regime change requires any such discursive incursion into the greening of urban growth to both monitor the environmental justice of closing the gap between the humanity of wealth creation and social prosperity and evaluate the fairness of the balance it strikes. The fairness of the balance it strikes in gaining access to the prosperity, health and well-being, vis-à-vis quality-of-life this offers cities around the world to sustain that development which regions assemble. Sustain that development which regions assemble the resilience of as the climate neutral change and net zero adaptations of nation-states and transnational arrangements they enter.
This is the agenda of what for all intents and purposes is the new public realm. That public realm which is known as the Smart and Sustainable Specialisation Strategy (the so-called S4 movement) and policy of that next order logic which not only greens urban growth but is also environmentally just as that human wealth creation which is fair in providing society access to a share of that prosperity, health and well-being which stand in as a measure of the life chances found in cities all around the world (McCann and Soete, 2020).
This is also the so-called 4-all agenda of the new public realm advanced by the UN and HABITAT III, in the sense which the balance it strikes between wealth creation and prosperity is both humanitarian and social, closing the gap that otherwise exists between them (human wealth creation and social prosperity) by getting smart about the greening of urban growth. Getting smart about the greening of urban growth as an environmentally just creation of wealth and fair sharing of that prosperity, health and well-being which is fit for purpose by virtue of them standing in as a just and fair measure of the life chances cities all around the world offer humanity and everyone in society wants access to.

Question 3 - The project of "smarting" the city requires the utilization of Information and Communication Technologies (ICT) at large. Indeed, even if scholars continue to discuss this issue, at least in the Western context, and at least in big cities, an ICT-driven approach seems to be a milestone. As many scholars have pointed out (e.g., Eskridge, 2019; Zhuravleva et al., 2019; Martinez-Balleste, Perez-Martinez & Solanas, 2013) this poses a new problem, which is the property of a large amount of data that stays at the edge between personal and public. Moreover, we have seen in other contexts that private companies do not always comply with legal requirements when it comes to managing these data (the most famous example being, maybe, Facebook). In a context where the development of cities is devolved almost entirely to private actors, which kinds of opportunities and threats represent the enlargement of private owners of personal data?
Answer - Yes, this is a concern about the rise of smart cities that emerged early in debates on the trajectory which they follow. They refer to the rise of smart cities as corporate organisations with agendas dominated mostly by the experiments of large tech companies rather than the democracy of that rule-of-law which otherwise governs the public realm. The critique they offer tend to be of the self-declaratory claims which the high-tech companies championing smart cities offer as neo-liberal models of 20th Century industrialisation and by extension the natural, social and technologically over-determined visons of how to manage the urban growth of cities around the world.
While valid research questions, focussing attention on the so-called civics of smart cities, rather than the socio-cybernetic research-driven and innovation-centric rendering of them offered here, means the criticisms are not so much scientific or technological but cultural, concerning those wider divisions they may open within society. Those wider divisions that may open up in the event the environmental injustices of the wealth creation and unfair share of prosperity,

health and well-being which they currently offer access to, continue to be the humanitarian grounds and social basis of that urban growth agenda which cities around the world adopt as climate change adaptations able to sustain development.
As this brief rendering of the smart city agenda has sought to communicate, the division such critiques draw between the sociology and cybernetics of the physical and social sciences do not cut so deep. Do not cut so deep as to open divisions of such a magnitude it is unable to bridge. For on the contrary, there is growing evidence the institutions of knowledge production across nation-states are conducting interdisciplinary research and innovation into that science and technology which can bridge them as transnational arrangements. Can bridge them by studying smart cities as the science of that intelligence which is embedded in the transnational arrangements of either sociotechnical or cyber-physical systems.
This in turn suggests the inertia in the emerging socio-cybernetic discourse on smart cities can be broken. Can be broken by those intelligence-driven models able to get beneath the veneer. Able to get beneath the veneer and delve deep into the structural dynamics of the research and innovation brought forward as the science and technology of the cybernetics found in the social networks and physical arrangement of that ecosystem which cities around the world collect data on. Which cities around the world collect data on, process information about and now render as intelligence relating to the environmental justice of wealth creation and fairness of sharing the prosperity, health and well-being that is smart in greening urban growth. That is smart in greening urban growth as a dematerialisation which decarbonises resource consumption, so it is not only clean, but also waste free. That decarbonisation of resource consumption which is the clean and waste free revolution of the fourth industrial era. That fourth industrial era which stands apart from the grey shadow of the business-as-usual model legacy systems otherwise cast, by virtue of the clean and waste-free status the climate neutral change and net zero adaptation this greening of urban growth champions.
Unlike the legacy systems, the fourth industrial era stands apart as a resource consumption that is dematerialised, and which is subject to a process of decarbonisation commanding that clean and waste-free status which is revolutionary in nature. Which is revolutionary in the sense the clean and waste-free status of this ecosystem can bear down on the global footprint. Can bear down on the global footprint and overshoot in the consumption of resources otherwise associated with the warming of the earth's atmosphere. Bear down on the overshoot otherwise associated with global warming by striking a balance between them on the grounds the humanity of wealth creation is the social basis of prosperity.
That is on the grounds and basis of a wealth creation which is humanitarian and society prospers from for the reason the balance struck between them is environmentally just. Is environmentally just in closing the gap which otherwise exists between them and because the wealth this creates is also fair in providing access to a share of that prosperity, health and well-being which the clean and waste-free status of this climate neutral change and net-zero adaptation to global warming offers. Which such a climate neutral and net-zero adaptation to global warming offers cities around the world access to as that quality-of-life which smart cities stage and regions assemble the resilience of to sustain the development of nation-states and transnational arrangements they enter.

Question 4 - The implementation of ICT devices and infrastructure has become so pervasive that in some literature streams 'smart city' and 'ubiquitous city' are considered equivalent since the rate of interconnection between infrastructures has become almost all-encompassing and everyone is connected to them. Considering the continuous technological advancements (machines never stop) and the massive deployment of highly sophisticated techno-robotic devices in many smart cities, in your opinion, why do climatic events remain a scourge, particularly in European cities? In this regard, we would appreciate your insights focusing on geographically limited areas, including your perspective on Italy. Additionally, could you provide at least one example of a virtu-

ous city that has effectively mitigated the impact of climatic events thanks to ICT infrastructures and another example of a city that has struggled in this aspect?

Answer - The experience of climate change in Europe's Mediterranean region is of summer heat waves, forest fires across Portugal, Spain and Greece, followed by torrential downpours and flooding. These outbreaks might be best understood as symptoms of global warming and pressure the ecosystem has not so far been able to absorb with respect to the devastation this unleashes.

These humanitarian disasters do not happen due to the absence of metrological models able to predict such events, but on the contrary, the failure of society to adapt to the climate change they signal the existence of by either absorbing the pressure urban growth loads onto the ecosystem or mitigating the adverse effects such extreme weather events have on cities. As man-made disasters, caused by the over-exploitation of natural resources and destruction of ecosystems, the containment of such catastrophises is proving to challenge public authorities and calls for a smarter real-time strategic management of cities.

The challenge the new public realm in cities face is to co-ordinate a multitude of communication platforms, capturing real-time data on these extreme events and processing information that feeds into hubs for strategically managing the otherwise devastating impact which they have. The absence of these hubs as platforms for emergency planning, also serves to expose the limitations of such databases and information systems. The fact they are only informational, processing data and circulating information to the agencies that are responsible for the strategic management of such events and warning the public about them.

What this information does not offer cities is the intelligence needed to appropriate a scientific knowledge and technological understanding of the extra capacity ecosystems must have to carry the additional weight of any such environmental loading, or the climate change adaptations required for any ongoing greening of urban growth to absorb the adverse impacts of such events in terms of the damage they otherwise cause. Meeting this strategic management challenge means appropriating knowledge of extreme weather events that moves beyond the informational and which progresses research and innovation towards an understanding of them in scientific and technological terms. This in turn means demonstrating how platforms of remote sensing, AI and the IoT, can work as self-reflective learning machines. Self-reflective learning machines automating in real-time the strategic management of climate change adaptation programmes with the wherewithal to strike that balance between wealth creation and prosperity that is environmentally just and fair.

That balance which justly safeguards the environment from the damage extreme weather events otherwise cause, by virtue of this being fair in securing access to that share of the prosperity, health and well-being which cities around the world are now beginning to stabilise as climate neutral and net zero adaptations. As climate neutral and net zero adaptations that manage extreme weather events by bearing down of the global footprint and any overshoot in the consumption of resources and which allow this greening of urban growth to dematerialise resource consumption. To dematerialise resource consumption as the decarbonised, clean and waste free era of that fourth industrial revolution which smart cities around the world are now beginning to stage. Smart cities around the world are now beginning to stage and regions assemble the resilience of to sustain the development of nation-states and those transnational arrangements which they also enter.

Cities that are smart in mobilising the intelligent systems which are needed to green urban growth and as the climate change adaptation regions assemble the resilience of, include Sonderborg, the Hague and London (Brem and Radziwon, 2017; Werker et al, 2017). These climate change adaptations are found in the nation-states of Denmark, Holland and the United Kingdom and transnational arrangements they in turn have with Europe.

As intelligent systems drawn from the triple helices of university, industry and (local) government, the municipalities of these cities have been smart in undertaking research and conducting

innovation into the science and technology of renewable energies as nature-based solutions. Nature-based solutions that dematerialise the consumption of resources as renewables and which capitalise on the decarbonisation opportunities physical science and engineering technologies offer for the clean and waste-free design and construction of built environments to drive these adaptations towards the climate neutrality of net zero.
In London the research and innovation relate to the science and technology of IoT based, AI supported and machine learning-driven platforms. Those found in the instillation of smart micro-grids and as a stage for the storage and distribution of energy generated from solar power and wind farms. In Sonderborg and the Hague, the research and innovation relates to the science and technology of hydropower as a climate change adaptation. That adaptation which also dematerialises resource consumption by leading on that decarbonisation of energy as renewables which offer a clean and waste free greening of urban growth that is environmentally just and which is fair.

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