Paths to Action, Smart Cities Discussion Session at Actionable Science for Urban Sustainability (AScUS) – 3-5 June 2020

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The "Smart Cities, Urban Infrastructure Transitions, and Sustainability" discussion session was divided into two parts. This document concerns the first part, which focused on the alignment between the smart cities concept and urban sustainability. This part was designed as an open brainstorming session about what the smart city concept means across disciplines, and how to view the smart city as a part of an urban sustainability transition. The purpose of this format was to highlight key research questions that can help bridge the divide between the smart city literature and urban sustainability literature. These research questions are the output of this session, and help define a path to action in the research community that aims to couple more closely the ideas of a smart city and a sustainable city.

The main research questions identified are below in Part A. Following these questions, there is a summary of the overall discussion in Part B, which provides the logic and insight into how the research questions (RQs) were identified.

A. Research questions:

RQ 1: How do smart cities (or cities with smart city strategies) treat the concept of equity in their business models? – A call for a deeper understanding of *who owns* (government or citizens versus private companies, especially with respect to data), *who buys* (technology, data, rights to use data), and *who benefits* (government, private companies, or citizens) in the smart city.

RQ 2: How can we reconcile Sustainable Development Goals (SDGs) and their targets, especially SDG 11 on "Make cities and human settlements inclusive, safe, resilient, and sustainable", with the smart city?

RQ 3: What are the synergies and trade-offs between the urban circular economy model and the smart city concept? ; How can the smart city concept be made more circular?

RQ 4: How are smart city policies improving sustainability outcomes? – An in-depth policy evaluation study.

Note: It is especially of interest to evaluate this in terms of urban metabolism outcomes. For example, do smart city policies improve the urban metabolism of a city?

RQ 5: How can real time data enabled through smart city solutions be used to provide inputs for evidence-based policy-making that supports sustainability?

RQ 6: What are the downstream effects of smart city consumption – especially with respect to the materials making the city "smart" (e.g. materials used for technological applications)?

RQ 7: What are the long-term effects of smart city technologies used in projects, from manufacturing phase to end of life (including a life cycle assessment (LCA) to assess them)?

RQ 8: How can blockchain technology generate more ethical and secure use of private citizen data in the smart city (Different models, e.g. Person-to-Person, etc.)?

B. Summary of Discussion Session:

The first question of the discussion session opened the conversation by asking **"how can we define the smart city"?** The purpose of this question was to see the different understandings of the smart city concept, notably coming from participants of diverse backgrounds.

A summary of common responses was that a smart city aims to improve environmental, economic, and social aspects of urban life through technological solutions. The key words "sustainability" and "resilience" were also mentioned, indicating that the smart city concept may include underlying support to urban transitions more broadly.

It is also worth noting that participants believed the smart city concept <u>did not include</u> the dimension of equity. Inclusive of this discussion were the ethical issues of data privacy. This topic surfaced multiple times throughout the conversation, and is present in both the first RQ as well as subsequent RQs.

RQ 1: How do smart cities (or cities with smart city strategies) treat the concept of equity in their business models? – A call for a deeper understanding of *who owns* (government or citizens versus private companies, especially with respect to data), *who buys* (technology, data, rights to use data), and *who benefits* (government, private companies, or citizens) in the smart city.

Another salient point brought up during the discussion of how we define the smart city was that the smart city, despite some ambitious to support sustainability, does not equate to a sustainable city. Although this point has previously been brought up in the literature, this calls for a deeper understanding between the two concepts, and moreover how the smart city can align itself (via policies, projects, partnerships, etc.) toward the Sustainable Development Goals and urban sustainability transitions.

RQ 2: How can we reconcile SDGs and their targets, especially SDG 11 on "*Make cities and human settlements inclusive, safe, resilient, and sustainable*", with the smart city?

RQ 3: What are the synergies and trade-offs between the urban circular economy model and the smart city concept? ; How can the smart city concept be made more circular?

RQ 4: How are smart city policies improving sustainability outcomes? – An in-depth policy evaluation study.

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The second question discussed during this session concerned the **advantages/benefits and disadvantages/pitfalls of the smart city concept**. Benefits identified include ability to use real time data to solve urban problems and control the urban metabolism. A more general benefit is the idea that technology, when properly used, can support sustainability objectives.

RQ 5: How can real time data enabled through smart city solutions be used to provide inputs for evidence-based policy-making that supports sustainability?

In addition to sustainability considerations, a noted benefit was that smart cities can support building resilient communities with a data driven decision making approach.

The discussion surrounding disadvantages identified numerous points. First, smart cities consume many resources, without mentioning the environmental costs to this consumption. The renewable aspect of these materials is important, but largely neglected in smart city strategies and projects. This applies to both the effects of resources used within the boundaries of the local area (the city and its hinterlands), and the downstream supply effects. It is extremely taxing on the (local) environment(s) to mine and process resources. Consumption effects must be accounted for at local levels and along the supply chain.

RQ 6: What are the downstream effects of smart city consumption – especially with respect to the materials making the city "smart" (e.g. materials used for technological applications)?

RQ 7: What are the long-term effects of smart city technologies used in projects, from manufacturing phase to end of life (including a life cycle assessment (LCA) to assess them)?

A second disadvantage that is re-highlighted from above concerns equity and access to the smart city. One way to address the issue of equity is through universally applied steps for implementing a smart city. For example, the first step could be universal Wi-Fi. This would enable all citizens (at least those with a smart phone, there is unequal access still between those who have smart phones and those who do not) to have basic Internet connections. This enables access to smart city applications or projects (e.g. e-government, phone apps using open data for supporting city life, etc.), which can follow the Wi-Fi implementation step. Moreover, it was suggested that smart city projects should have more than one avenue granting access to services. For example, if a service is given via smart phones, it should equally have an option to access it through more traditional means. This enables all citizens to have equal access to services.

Privacy concerns were also mentioned as a disadvantage. These concerns echo the ethical issues about who can view or control private data (see RQ 1). One suggestion to manage this was the use of blockchain technology in the smart city.

RQ 8: How can blockchain technology generate more ethical and secure use of private citizen data in the smart city? (Different models, e.g. Person-to-Person, etc.)

In closing the discussion session, participants talked about if **smart cities can lead to sustainability**. Generally speaking, the majority of participants believed this to be the case, but with some caveats. Smart cities, or technology more generally speaking, can only be part of the solution to urban sustainability. For example, one major element that does not involve technology is behavioural change. This leads us to the conclusion that technology solutions may support an urban area in their sustainability transition, but broader societal change is required to achieve sustainability.