Chapter 2
Towards Integration of Smart and Sustainable Cities

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Abstract In the current academic discourse, there seems to be a dichotomy between smart and sustainable in the built environment. It is treated as separate research fields incidentally connected and the question is how to these worlds could be brought together. In this introductory chapter the proposition is to link smart and sustainable through design, people and data. After reviewing current literature, a Smart Urban Model is presented in which the four components of a smart and sustainable city are an equal part: smart, sustainable, spatial and human. In six examples, one from Sydney, Australia and five from the province of Groningen, the Netherlands, the new model is illustrated. This chapter must be seen as a first start of the discussion only and does not pretend to present the final version of the magical trick to integrate smart and sustainable. It requires further conversations, exploratory research and user-led design processes to experiment with real projects and cities in order to make school and identify what successful smart and sustainable cities can be.

Keywords Smart city · Smart urbanism · Sustainable urban development · Resilient city · Participative planning · Data

2.1 Introduction

By the year 2050 an estimated 2.6 billion people will have moved to or have been born in urban environments. Of these billions of residents, two-thirds will live in Asia or Africa. Many of these cities, should we not act, will emerge out of or swallow-up squatter settlements (New York Times and Shell Oil 2014). Amenities,

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such as water, sewer, transportation, electricity, telecommunications, housing, health care or education, have not yet been integrated during the growth of these cities hence will have to be built from the ground up. The discourse around Smart Cities, in contrast, largely focuses on the immediate future and seems to focus its interests on places that are already known and up and functioning. Therefore, to balance the attention between existing, known urban areas and the unknown, novel ones, the focus of Smart City research should shift towards the processes of urban transformation on the longer term in novel urban places, because current smart city explorations will only marginally inform understanding of the real cities of tomorrow. The pace of change is forecast to be so swift that research needs to go beyond current and locally 'sold' technologies. Instead, an intelligent discussion starts with the question which cities we want in the future and whether and how smart urban technologies, and urban design and urbanism, are likely to provide them (Glasmeier and Christopherson 2015). The premise is that Smart + Sustainable + User led design will lead to a more resilient city.

In this chapter after a review of the current smart urbanism discourse, a 'Smart Urban Model' is presented, followed by several prospective examples of this model. The chapter ends with recommendations and conclusions.

2.2 Smart Urbanism

The abundance of distributed sensors, chips with which the infrastructure, streets and buildings are fitted, as well as in the numerous electronic devices of its inhabitants make of the city an intelligent being. The smart city is activated at millions of points, thanks to information and communications technology. This intelligence is profoundly spatial, since it follows the topography of the networks of streets and buildings and the movement of vehicles and its inhabitants, hence is able to produce a map of urban activity in real time (Picot 2015). However, the critique about the inadequacy of the mechanical technological approach to smart cities is heard from different sides (Greenfield 2013; Sennett 2012; Koolhaas 2014). The idea that you put sensors out, measure everything, and on that basis make decisions, is biased because all data is crafted (Van Timmeren et al. 2015). The tech-driven adagio 'give us your data and we'll give you a techno utopia', is impossible to make true. Besides the technology-driven paradigm, a human-driven approach (Kummitha and Crutzen 2017) is equally important. Next to Cyborg City, in which everything is managed, the spontaneous collaborative city, in which 'nothing' is managed exists. Both require design, creativity and spontaneity as well as coordinative power (Picot 2015). Sim City (Terzano and Morckel 2016) should not only be seen as a managed calculation, but even so as a creative process of city design.

The Smart City should emerge as an integrated, sustainable and efficient city with a high ‘Quality of Life’ for its residents that aims to address urban challenges by (Mosannenzadeh and Vettorato 2014):

1. Application of ICT in its infrastructure and services,
2. Collaboration between its key stakeholders, and
3. Integration of its main domains and investment in social capital.

The underlying promise is that more information will improve the experience of urban social life and lead to the creation of many useful and efficient services (Rabari and Storper 2015). Urban systems in themselves have been complex in terms of their operation, management, assessment, and to plan for in line with the vision of sustainability. Here comes the role of ICT into play, given its foundation on the application of complexity sciences to urban systems and problems (Batty et al. 2012a; Bibri and Krogstie 2016). The development of the Smart City with its various faces has come to the fore in recent years as a promising response to the same challenge of linking smart and sustainable (e.g. Al Nuaimi et al. 2015; Batty et al. 2012b; Neirotti et al. 2014). Smart solutions have been developed for sustainability, optimizing efficiency in urban systems, and enhancing the quality of life of citizens. The fundamental question is, whether that promise is one that is made to everyone. Is the conception of the ‘smart city’ inclusive or excludes it important groups in society, by the very nature of the data it relies upon?

The interlinked development of sustainability awareness, urban growth, and technological development have recently converged under what is labelled ‘smart sustainable cities’ (Höjer and Wangel 2015). A ‘smart sustainable city’, although not always explicitly discussed, is used to denote a city that is supported by a pervasive presence and massive use of advanced ICT, which, in connection with intricately interrelated urban domains and systems, enables cities to become more sustainable. In more detail, it can be described as ‘a social fabric made of a complex set of networks of relations between various synergistic clusters of urban entities that, in taking a holistic and systemic approach converge on a common approach into using and applying smart technologies that enable to create, disseminate, and to mainstream solutions and methods that help provide a fertile environment conducive to improving the contribution to the goals of sustainable development’ (Bibri and Krogstie 2017). Smart sustainable cities entail thinking about and conceiving of urban environments as constellations across spatial and temporal scales that are networked in multiple ways to provide continuous data coming from urban domains, employing pervasive sensing, processing, and networking technologies, in order to monitor, understand, and analyse how cities function and can be managed so as to guide and direct their development towards sustainability (Bibri and Krogstie 2017).

However, smart urbanism introducing the spatial design perspective, goes beyond the mechanical. Urbanism aims to deliver a city which provides all its basic functions (shelter, welfare, prosperity, social exchange) and shape (i.e. design) it in a way its citizens are serviced and enjoy or consume a convenient life in a sustainable way. It is 'a powerful integrative and action-oriented body of thought on cities that emphasises their particular histories, the social composition of cities, analyses the resources it takes to 'run' a city, provides insights into the intricate ways in which design, politics and business interrelate, and helps to think of the institutional formats and practices that can help deliver on the transition needed. The future calls for smart urbanism rather than smart cities.' (Hajer and Dassen 2014).

The convenient city (Roggema 2019) provides good houses, a clean, healthy and safe environment, access to resources of clean water, renewable energy and healthy food, social interaction, healthy interactive environments, resiliency/low vulnerability for climate impacts, (intelligent) mobility that guides traffic, mode shifts to new tech and innovative transport (autonomous and air vehicles) and arranges collaboration between the constituencies that shape the city. Smart Urbanism integrates technology, knowledge, governance, citizens, and business hence represent a multidisciplinary field, constantly shaped by advancements in technology and urban development (Angelidou 2015). The key smart applications enabled by big data analytics and context–aware computing include smart transport, smart energy, smart environment, smart planning, smart design, smart grid, smart traffic, smart education, smart healthcare, and smart safety (Bibri and Krogstie 2016). Big data analytics and context–aware computing and what these entail in terms of digital sensing technologies, cloud computing infrastructures, middleware architectures, and wireless communication networks, will be the dominant mode of monitoring, understanding, analysing, assessing, operating, organizing, and planning smart (and) sustainable cities to improve their contribution to the goals of sustainable development (Bibri and Krogstie 2017).

The big difference for urban planners is they suddenly have access to real time data, which may alternate and differ over time. City makers and urbanists suddenly have to deal with the option of emerging events (Dosse 2010) and spontaneous developments rather than a determined program or future. This requires in strategic design of temporary uses being it events, temporary urbanism (Bishop and Williams 2012) and including voids and redundancy in the urban fabric (Roggema 2018). The way energy generation and storage can be balanced with real time demand and usage in Smart Grids (Obinna et al. 2017), or how the Living PlanIT in Portugal (Carvalho et al. 2014) and ReGen Villages in the Netherlands (Ehrlich et al. 2015) are monitoring, adapting and closing environmental flow cycles are early examples of these urban design applications of combinations of the virtual and physical city.

No matter what digital input cities undergo, in its essence the city remains the same. The design of the city may be inspired by the fluctuating insights data deliver, and new gadgets and shared bike systems may flock the city, meanwhile the urban form has basically not changed, its physical components and purpose remain. New cities such as Songdo, Masdar or existing cities such as Rio de Janeiro or Barcelona, all dubbed smart cities, do not look any different than the cities before the digital revolution. One may speak about the rise of a new planning paradigm of the intelligent city, other than virtual spaces (Ishida and Isbister 2000) and digital ecosystems enhancing innovation (Komninos 2015) are not distinguished, leaving current physical urban structures intact. The breadth of street widths, the suite of urban block sizes, these have not changed because of digitisation. The city still consists of a street and a façade, no matter whether these are private, public or when a virtual space over cities is created.

There is one fundamental new opportunity for urban life. The way the city can be 3D-mapped (Picot 2015) is new and allows us to access data and info in real time about mobility services, entertainment, food/restaurants, the environmental quality and leisure of places that are near us but not physically visible. This provides us with a convenience tool that makes our urban life potentially of a better quality. We can be informed and make better decisions on where what is available in real time, but even this doesn't fundamentally change the physical appearance of the city.

Therefore, smart urbanism could re-emphasise urban planning principles (Hajer and Dassen 2014):

1. To not limit growth of wealth yet at the same time minimise the use of resources in a socially just and safe way;
2. To present a strong persuasive story, 'beyond the smart gadget', for the use of smart technologies, supporting positive social reform and bringing about urban resilience;
3. To use urban metabolism as the central urban planning framework on which to base urban performance decisions on, and focus on the potential transformations, by increasing urban redundancy by including spatial voids in the city to use whenever suitable (Roggema 2018);
4. To develop urban infrastructure that provides shelter, water, energy and contact in a way that is (hyper)localised, small-scale and off grid;
5. To establish a symbiosis of smart technologies, social innovation, and business models through design;
6. To create the technological environment enhancing open politics of continuous learning, using the intelligence of the 'energetic citizen' (Hajer 2011) as part of the search for solutions. Establish a digital democracy and participatory urban planning using urban living labs (Steen and van Bueren 2017);
7. To practice the urbanism of transplantation, searching for the suitable conditionalities to adapt, correct, adopt and create add-ons to the city and transplant solutions in matching contexts.

The urban consumer turns into a smart citizen, 'prosuming' in an intelligent, agonistic and creative way (McLean and Roggema 2019) while making use of interoperable and open data sources (Van Timmeren et al. 2015). Smart urbanism in practice could work in a quadruple helix model in which:

- innovative companies, investing in developing new concepts and products,
- academia, participating with the brightest minds,
- the government, allowing the novelty to emerge and be tested in the city, and
- the urban prosumer, being the primary user and tests the prototypes come together in an urban ecosystem of exchange, creativily finding new ways of co-design and co-development.

2.3 Smart Urban Model

The traditional model of the city, which is founded on the idea of the city as being a stable or constant structure, is rapidly changing, so too are the associated planning approaches in response to the emerging shifts brought by computing and ICT. These are under-pinned by their foundation on complexity- and data-sciences: from focusing on physical and spatial development to including broader principles (e.g. sustainability) and relying on big data analytics, context information processing, intelligence functions, and simulation models, and what these entail in terms of sensing, computing, data processing, and wireless networking technologies (Bibri and Krogstie 2017).

An integrated smart urban model works toward the following assets (Angelidou 2015):

– Advancement of human capital: citizen empowerment (informed, educated, and participatory citizens), intellectual capital and knowledge creation (Aurigi 2006; Komninos 2009; Liugailaité -Radzvickiené and Jucevicˇius 2012; Neves 2009; Ratti and Townsend 2011).
– Advancement of social capital: social sustainability and digital inclusion (Batty et al. 2012b; Caragliu et al. 2009; Hodgkinson 2011; Liugailaité -Radzvickiené and Jucevicˇius 2012).
– Behavioural change – sense of agency and meaning (i.e. the feeling that we are all owners and equally responsible for our city) (Frenchman et al. 2011; Townsend et al. 2010).
– Humane approach: Technology responsive to needs, skills and interests of users, respecting their diversity and individuality (Bria 2012; Lind 2012; Roche et al. 2012; Streitz 2011).

In the smart cities discourse, the conviction that collecting historical data sets will provide the insights for planning and design is often believed in (see e.g. Rathore et al. 2016). However, this is risky as even when big data is collected, for instance through abundant placement of sensors and IoT practice, all relevant data can never be collected and is always subject to (biased) interpretation and choice-making. Especially subjective data such as emotions, values and moods of people are difficult to collect and may change considerably over time. Also, the data of the past does not give any certainty about the future. Especially factors such as climate change, migration and economic change will influence the sort of city that is required in the future. Moreover, the use of data is generally sectoral which might make it useful, but urbanism is integrative for reasons that in the city all different factors are present in conjunction with each other at every given time meanwhile influenced by human beings. For instance, a sectoral approach could solve the traffic problem, while as a result, other problems, such as the loss of biodiversity or water quantities might increase. Finally, design is science with creativity build into its approaches. Creativity implies emergence of unexpected combinations, integration of problems, and the employment of novel propositions.

Paraphrasing Jane Jacobs (Jacobs 1961) social ideas (and laws) shape private investments, which shapes cities, today's planning and procurement practices do not explicitly recognize the value of the smart city vision, and therefore are not shaping the financial instruments to deliver it (Robinson undated). Urban life should come first, then urban place, before thinking technology.

As is often the case with technological change, the producers of the technologies cannot dream users into existence, but instead uptake requires learning by doing through collaboration and risk sharing. The degree of know-how and collateral resources required to use smart city interventions, assuming that everyone owns a smart phone and knows how to operate it at maximum performance, is often taken for granted, but technology audits are necessary to reveal just how flexible, usable and accessible these technology designs are (Offenhuber 2015). Beyond making cities more liveable because their inner political workings are more accessible, local organisations are building tools to make 'sensibility' real, using devices such as Carlo Ratti's City Lab's algorithm, which integrates crowd sourced data from cell phone users who, for instance, are seeking to track night life hot spots. But how much of the smart city research is being directed toward questions of groups in society unlikely to be consulted or enabled to use the sophisticated facets of a cell phone? What of the elderly, the disabled, the economically and socially isolated (Glasmeier and Christopherson 2015)? If the goal is to produce morally balanced and socially aware smart city strategies, then stakeholder engagement is crucial. Stakeholder engagement, or better: user-led design processes, can provide valuable insights about sustainability assets and needs of the city, increase public acceptance of the smart city venture and elevate the 'smartness' of the city to a whole new level, leveraging human capital and collective intelligence (Angelidou 2014). Therefore, the role of technologies in smart cities should lie in enabling sustainable development of cities (Bifulco et al. 2016), not in the new technology as an end in itself (Marsal-Llacuna and Segal 2016). Ultimately, a city that is not sustainable is not really "smart" (Ahvenniemi et al. 2017). Although smart city technology investments are mainly comprised of upgrades rather than true innovations, they potentially offer access to information on local conditions. They can afford communities and interest groups the opportunity to identify negative conditions and the potential to improve the urban experience (Glasmeier and Christopherson 2015). Citizen movements have demonstrated the ability to successfully adopt and adapt the core of smart city technologies to engage in public debate and to advocate for urban improvements (Glasmeier and Christopherson 2015).

The Smart Urban Model comprises of four perspectives that need to be all in the mix and in balance with each other: smart, sustainable, spatial and human (Fig. 2.1). Only then an inclusive city can be developed that is sustainable and supported by technology, is evident. The urban planning process, from abstract-larger scale, to implementation-smaller scale, should therefore be linked with information attributers of smart cities: prosumers (both providers of data and products, even so being end-users), services, infrastructure and data (Anthopoulos and Vakali 2012).

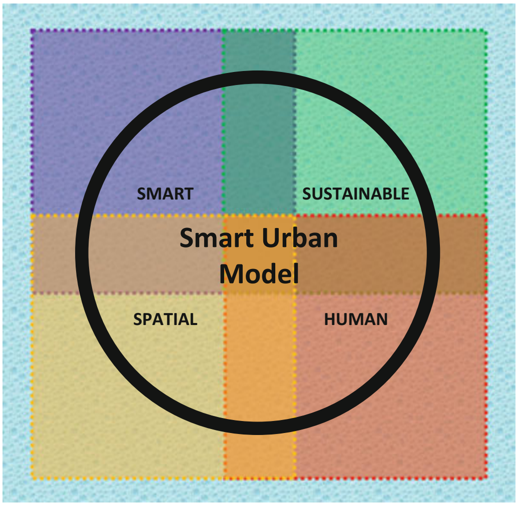

Fig. 2.1 The smart urban model

2.4 Imagine

In this paragraph several examples will be presented that have been developed or are being developed that illustrate working according the principles of the New Smart Urban Model. These examples all show, though in different settings and configuration the four principles of the model. They are:

1. Smart. These plans make use of advanced ways of monitoring, data-collection and feedback, using real time sensing, which makes instant feedback and assessment possible and technologies are supporting the systems in the plan;
2. Sustainable. In all these examples optimized solutions for the Food-Energy-Water Nexus are presented, in which no waste is produced, rather new resources are being delivered, minimal resource is used, or the plans show regenerative principles (Cole 2012; Cole et al. 2012; Du Plessis 2012; Gabel undated; Girardet 2013; Mang and Reed 2012; Robinson and Cole 2015) in which they produce and deliver more clean and usable output to the environment than is used and processed, both in a quantitative and qualitative way;
3. Engage. In these projects, engagement is not seen as a necessary box to tick, but as a meaningful process to increase sustainability and resident's satisfaction. Hereto the local citizens are seen as co-producers of information, visions, plans, products and expertise hence are partnering from the early stages of a project as directors of their own future. End-users are one quarter of the quadruple helix together with industries and business, government and academia. The way this type of process can be ideally facilitated is through design-led process;
4. Design. In all these projects design is used as an enabling process in which the strengths of design can be fully flashed out. It is able to illustrate and visualise ideas, unrealised worlds and bring these alive, it is also a tool to facilitate

communication about how different groups, within the community think about the future and, last but not least, as a mean to create an environment beautiful.

2.4.1 M-NEX Western Sydney

The desire to create a green healthy city that is sustainable, even under sometimes harsh climate conditions is at the basis of the Western City Parkland development. Planned around and in the vicinity of the new airport of Badgerys Creek, in the aerotropolis (Kasarda and Lindsey 2012), approximately one million new inhabitants will live, an abundance of jobs is expected, and an extensive agricultural cluster is foreseen (Commonwealth of Australia 2018). In the midst of this, the Sydney Science Park will be developed, a sustainable new precinct for residential, education and science, commercial and ecology, with a special attention to the infrastructure systems of water, energy and waste. Within the Masterplan a primer test-site is designed to test out the integration of the food, energy and water systems. Together with the local stakeholders, such as academia, research institute, developer, and government (residents do not yet exist), a data driven adaptive design is conceived in which the sensored data will give insights in the performance of local recycling, reuse, and regeneration of these infrastructural systems, while continuously operating as an experimental site for education projects, student research and citizen involvement. The idea is to create an autonomous food producing and water cleaning landscape (Fig. 2.2) on a slight slope towards the creek, driven by locally generated renewable energy sources, cleaning waste-, rain-, and stormwater in subsequent productive landscapes: orchard and vineyard, fishponds, greenhouses and crops and herbs will step-by-step clean the water and produce a range of crops, such as fruit, bees and honey in the orchard, fish in the ponds, tomatoes, pepperoni, in the greenhouses and lettuce, legumes, lettuce, cale and herbs on the field. Out of the monitoring the planting and systems can be immediately understood, and if desirable replicated on site or elsewhere in the Science Park, or at scale of the entire Western Sydney Parkland. As a first step the entire system is foreseen to be flipped 90° and scaled up on the N-S slope along the creek.

2.4.2 Foodscape Groningen

The recent analysis published in the Lancet on the implications of our global food system and the ways food need to be produced to stay within the planetary boundaries (Willett et al. 2019) has shown that in different continents different changes to the diets are required. The new diet for the Netherlands has been derived for the regional context (Fig. 2.3). In the project Foodscape Groningen, a design investigation will be undertaken on the crops that need to be grown in the Dutch northern province context to be able to cook this diet, what the nutritional values are and what

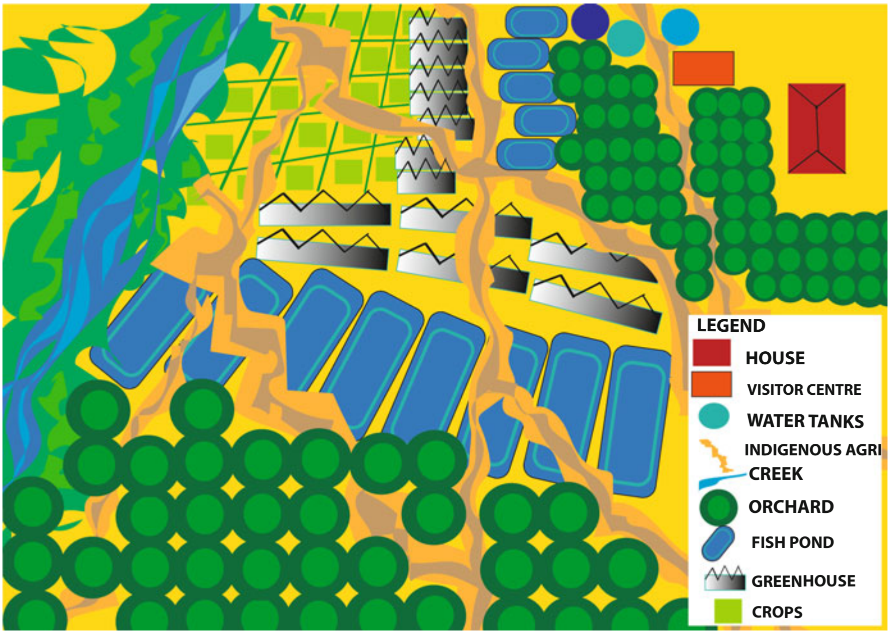

Fig. 2.2 Integrated food-energy-water nexus in western Sydney

kind of dishes can be created. During the growth of the crops the amount and types of crops will be monitored in relation to the soil quality, climate change and weather changes. The plan will be co-designed in a collaboration between local chefs, who will design the new menu and dishes, local growers, who will grow the crops, and academics who will sense the metabolism and a government body which will analyse the nutrient values, qualities and uptake. The crops will be used to cook and eat a dinner with it together.

2.4.3 Aquaponic Wall

One of the technologies to increase productivity of food production in confined urban environments is aquaponics (Somerville et al. 2014; Pollard et al. 2017). Within the Hanze University of Applied Sciences Groningen an Aquaponic Wall (Fig. 2.4) will be built in a co-designed project with the Hanze University-Facility Management, industries, such as design offices and builders/constructors, and the student community. This wall will produce food, clean water, harvest fish, and will be sensored for measuring the growth of the produce in quality and size, the quality of the water in the system and its environment (temperature, humidity, light, air quality). This will give insights about the an aquaponic system in these conditions and the factors determining the output.

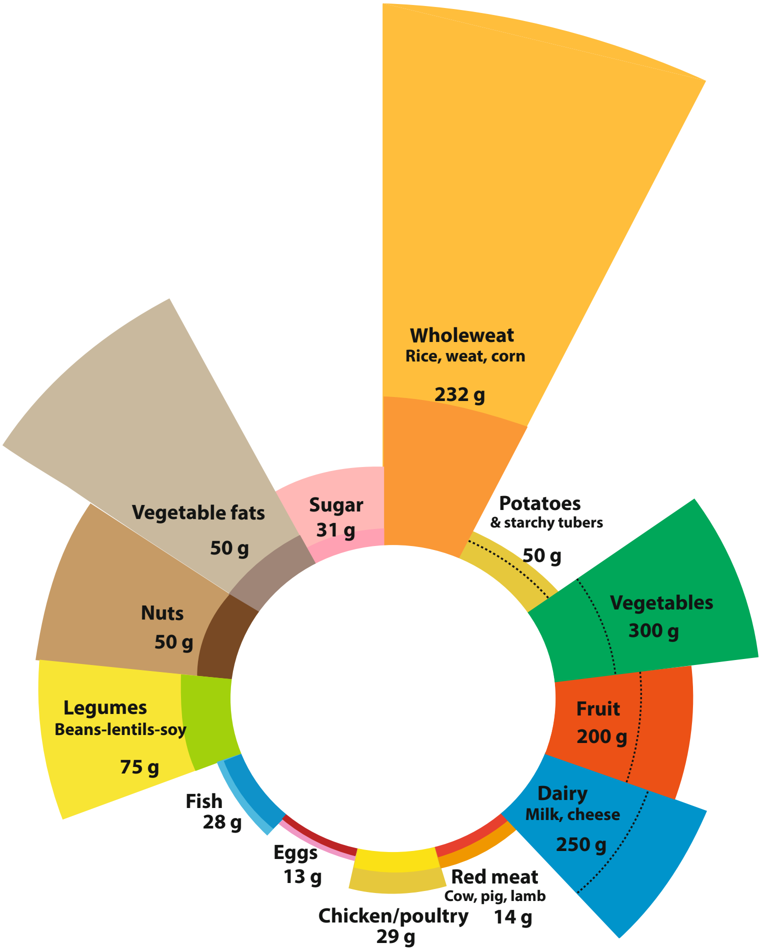

Fig. 2.3 Dutch new diet, based on the global assessment (after: De Volkskrant, 17 January 2019)

2.4.4 Climate Neighbourhood

Many projects related to climate adaptation have been developed in many cities around the globe. Most of these relate to water, have been instigated by councils and were set up with a technological eye. In Europapark Groningen a climate neighbourhood is about to be developed, which is thrived by the local community. The residents started an initiative for greening their urban environment and succeeded in attracting support from the local government and academia. The project is designing a system of green and water throughout the area, mutually connected and operating as a living system. Aspects of the spatial vision were brainstormed

Fig. 2.4 The aquaponic wall in the Hanze University (image: Alex van Spyk)

under guidance of the local residents (Fig. 2.5), and bound together in an overall plan with four pillars:

(a) Ground: breaking concrete reduces street- and garden pavements and redesign these as green spaces and gardens;
(b) Façade: greening, and hanging gardens, such as food-walls, or aquaponics;
(c) Roof: gardens, FoodRoofs (Roggema 2017), eventually with aquaponics;
(d) Climate-gardens: based on the local bureau of meteorology-scenarios (KNMI 2014) four climate gardens represent a scenario each to test out future possible climates. In these gardens the climate is simulated and planted accordingly, fully monitored in their growth, success-plants, and required adjustments. This way the climate neighborhood can prepare for any future climate and is an experimental example which findings can be used throughout the Netherlands.

2.4.5 Positive Energy Districts

In the Making City project so-called Positive Energy Districts will be designed, constructed and monitored. Together with the local community appropriate measures and investments are discussed and implemented, after which the new system

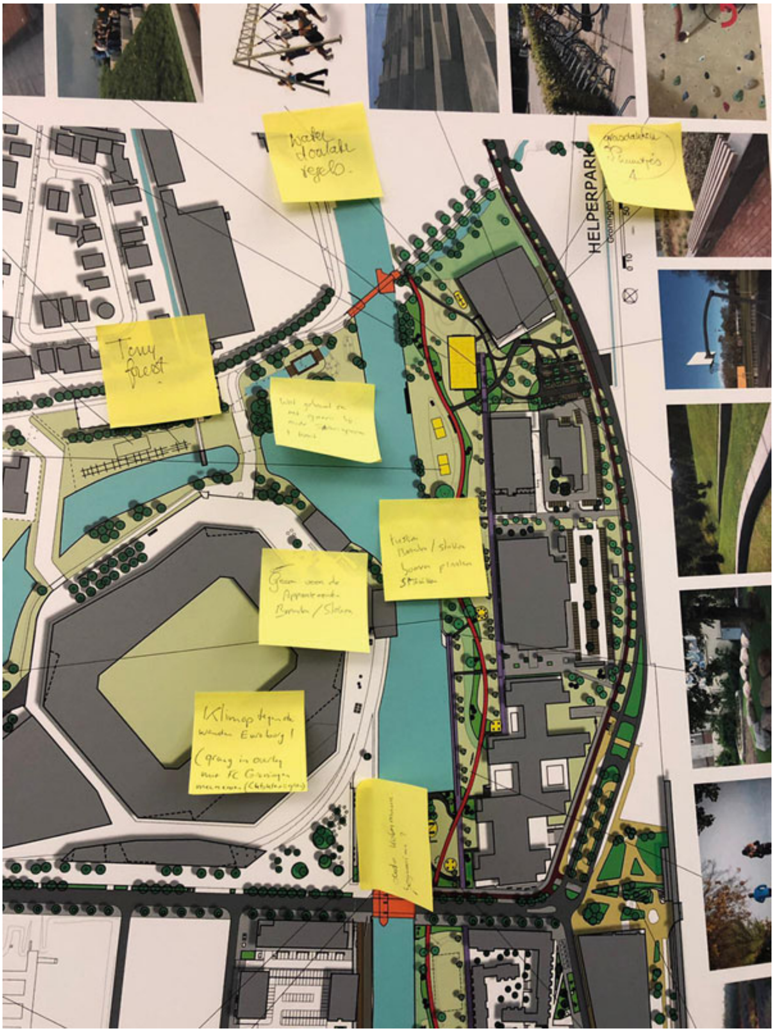

Fig. 2.5 Planning with residents: Climate neighbourhood Europapark Groningen

will be sensored. The amount of electricity will be measured to ensure the district is energy-positive, but also to guarantee the residents they will receive the financial benefits of their in- and around-house generation of energy and how energy can be exchanged between several uses within the neighbourhood to be most efficient. This H2020 project is a collaboration between resident groups, government, academia and industries.

2.4.6 Beyond Circularity Loskade

The old industrial site of the sugar factory in the western part of the city of Groningen, the Netherlands is subject to postponed urban design and development due to the GFC (Meissner 2017). This meant the expectation was that this site would not be developed before 2030. The implications of this decision are large and reach well into the future. The municipality of Groningen decided to create a regulation-low zone, which meant for instance that residential development would be possible, but people could only inhabit houses for periods shorter than 6 months. Developer Van Wijnen jumped in this opportunity to create a small neighbourhood ‘De Loskade’ (Van Wijnen 2017) where could be experimented with circularity of technical solutions in the houses and apartments as well as circular principles in the public space (Fig. 2.6). Because inhabitants will move in and out quite

Fig. 2.6 The loading loskade just after realisation in August 2019

frequently, additions and adjustments of the houses themselves and the local urban environment can have a fast lead time as well, exquisitely suitable to investigate how circular the area really is and increase circularity over the 10 years of operation. A network of sensors will provide the intelligence to constantly adjust the built form in relation to customer satisfaction and daily use and sustainability against the background of the flux of weather change and long-term climate change.

2.5 Conclusion

A smart city is nothing new. Civilisations have always used the appropriate and available technologies to shape their cities. However, due to the IoT and sensing technology the possibility of an integrative collaboration and continuous testing and improving the quality of the urban environments is novel. The density of data allows to think laterally and use information in real time, and hence influencing, managing and directing daily uses in the city, such as crowd control, traffic management or water systems manipulation has come within reach. As illustrated in the exemplary projects, this can make the city both more convenient to use, but also healthier and more resilient.

A smart city is first and foremost a city, while smartness, gained by cyber-physical intelligence and services, is 'just' another urban asset, which either improves/automates typical functions (transportation, waste management, etc.) or generates jobs and increases citizen satisfaction (from traffic awareness, energy efficiency, etc.) (Anthopoulos 2017). On the one hand side the role of smart technologies is to make our lives more convenient, while on the other hand it provides the tools to become more resilient.

There are several uncertainties whether this will be effectuated and successful. It is most likely and easy to believe the Homo Ludens (Huizinga 1938) will take up novel smart applications that will make his life easier and more joyful. Most probably, the market for smart gadgets will continue to emerge. More uncertain is whether the smart city movement will be able to enforce the implementation of the urban infrastructure needed for the new urban population for a fraction of the costs of current infrastructure. Secondly, the question is if the smart city will it be able to deliver on the promise to create the smart technology for the eco-efficiency needed for cities to really become resilient?

Apart from these uncertainties but directly related to the development and the promise of smart cities, some big questions should also be addressed. Not the least because these questions are an inevitable part of good urbanism, so smart urbanism should, as a self-evident given, contribute to finding solutions for these big questions:

- Will smart cities help to control climate change and keep the earth below a reasonable rise in temperature?
- Can smart city technologies play a role in moderating rapid population growth at global level?

- Is smart urbanism capable of preventing large scale migration, of which a large amount is caused by climate impacts?
- Will the smart city promise contribute also to social justice and equity at world scale?
- Could the smart city provide sufficient healthy food for everyone?
- Could it bring corruption-free democracy everywhere?

Urbanism, not even smart urbanism will instantly pull the switch and aim to solve these and other big issues. But at the same time, it would be a matter of negligence if smart thinking, with the availability of all algorithms, big data and the Internet of Things would not try to make big changes in these fields. This way a smart city should be a humanitarian effort, bringing a better quality of life for the all its citizens, rich, poor, displaced or newly arrived.

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