

Chapter 2

Who Is the Assumed User in the Smart City?

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every city wants to be a smart city nowadays.

March and Ribera-Fumaz [14], p. 1.

Much hyped and funded to the tune of billions of dollars annually, smart city projects claim to solve a range of contemporary urban problems including “air pollution, traffic congestion and assisted living for the elderly” [20], thus providing cleaner, safer, more energy-efficient cities of the future. Local and national governments, technical companies and researchers are keen to emphasise how the integration of various kinds of technologies (for example, big data analysis, Internet of Things, wireless sensors and cloud computing) are key to tackling the challenges posed by an ever-increasing urban population. The mission statement from the recently created Institute of Electrical and Electronics Engineers (IEEE) Smart Cities Initiative, for example, reads:

we see an opportunity for IEEE to assist municipalities in managing this transition to urbanization. This would include raising awareness of the benefits and downsides of technology and help guide the appropriate uses of technology [23].

However, at the same time, smart cities have also been criticised for not taking into account the needs/customs of local inhabitants or for increasing social divides. This latter critique has been directed particularly at brand-new smart cities. Laveesh Bhandari, for example, talking about the push to create more smart cities in India such as the currently-under-construction Gujarat International Financial Tec-City (GIFT), argues that such cities will potentially create “special enclaves” where only the economically secure will be “enjoying the privileges of such great infrastructure” (quoted in [18]). Much of the current debate about smart cities in both popular media and the social sciences thus centres round the role of the inhabitant. To what

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extent are existing inhabitants being enrolled in the process of “smartification” or what kinds of future inhabitants are envisaged occupying future cities such as GIFT? In the hype about technological advances, is the diversity of human needs and behaviours at risk of being reduced to that which smart city designers think is efficient/sustainable/“smart”? Or, more precisely, to what extent are these cities designed with the technology (rather than the citizens) at the forefront of the designers’ minds? To what extent is the diversity of potential citizens’ and their needs considered? These are important questions because smart cities *are* being hyped, *are* being funded and *are* being built at an increasing rate. The WHO predicts that 70 % of the world’s population will live in cities by 2050 and this means that the cities where future generations will live are likely to be “smart” to some extent, and the design of these cities has a very real impact on what kinds of lives can be lived in them.

This chapter thus contributes to the existing scholarship that takes a more critical perspective on smart cities, particularly in relation to considering current or future inhabitants. Much of this book focuses on the technological developments that have made the smart city possible. Instead, in this chapter the focus is primarily on the everyday user of these technologies, both the future user as the designers imagine her/him to be and the existing users who are already living in and interacting with smart cities. The overall aim is not to discard the idea of the smart city, but rather to encourage greater thoughtfulness as to how smart technological solutions might be developed which can take into account a range of different lived experiences by city dwellers. This approach is often called the “bottom-up” approach, and usually refers to projects that try to ground themselves in users’ everyday experiences and which will be widely adopted by the urban population. The recently launched Google Sidewalk Labs initiative, for example, plans to assemble “small teams of experts to brainstorm ideas and launch experimental projects that have the potential to catch on virally with large numbers of city dwellers” [22]. Commenting on this initiative, Carlo Ratti of MIT praised this people-centric approach:

This kind of “bottom-up” approach has the potential to bring rapid change at low cost (...) in contrast to the more centralised, “top-down” tech projects that cities have used in the past to reduce costs or improve services [22].

The “bottom-up” approach appears to offer not only a more equitable model for urban development that recognises a diverse range of users, but also contains the promise of widespread adoption by the local residents. Taking careful account of the diversity of human needs has the benefit of improving chances of new technologies being adopted by the whole community because it starts from the users’ experiences rather than from the technologies. As Madeleine Akrich notes: “the success or failure of innovations frequently depends on their ability to cope with dissimilar users possessing widely differing skills and aspirations” [1]. This is not to say that existing solutions have ignored the user. Rather, that the existing technology-centric paradigm concerns itself primarily with opportunities and challenges connected to smart city technologies, instead of reflecting on how these technologies may assume certain users behaving in certain ways—at the expense of

other users or behaviours. Existing solutions assume certain users, but this assumption may be somewhat limited.

Starting from the user experience prompts an important and different set of questions about smart city technologies. This chapter starts with the premise that the design and development of a smart city “artefact” (a term which is here used to refer to a system or tool or technological object) is a process that assumes certain users and usages [1]. The assumed user of an artefact shapes the affordances and limitations of the artefact; designers and developers strive to create an artefact that balances their understanding of the needs of the assumed user and the limitations/affordances of the technology itself. Starting from this point, this chapter asks: what is an assumed user? Who is the assumed user in the contemporary smart city? And, why might reframing smart city technologies as “artefacts” help us to think more critically about the balance between people and technology in urban environments? These questions will occupy the first half of the chapter.

In the second half of this chapter, we will turn our attention to some examples from contemporary smart cities projects. Here we will explore characteristics of the assumed user in particular cases and subsequently ask how limitations in the understanding of the assumed user may lead to the needs of some groups being overlooked during design and development—precisely because they do not “fit” the profile of the assumed user. This half of the chapter therefore poses the question: which citizens’ needs are not adequately addressed because they do not constitute the assumed user(s)? and what does this mean for the success or failure of smart cities initiatives?

I conclude with some questions for my readers, who I assume are from more technical disciplines, about how to develop an approach that balances both technical affordances and human requirements.

2.1 Assumed User(s) and Artefacts

This chapter on is based on the premise that what counts as valuable knowledge in one scientific discipline may be different from what counts in another, and that you and I (as author and reader) may have quite different ideas about this. So, to get us on the same page.... A researcher or a student of a technical discipline might be more accustomed to thinking about smart cities from, for example, the perspective of creating “dependable, reliable, and secure networks of heterogeneous smart objects” [29]. What counts as valuable knowledge here is the affordances and limitations of the technology itself. This might include considering how efficiently or securely a technology functions, or whether it can be easily implemented in a particular environment. In contrast, social science researchers use their critical perspectives to “unpack, contextualise and make theoretical sense of smart city rhetoric and initiatives” [10] and are thus more interested in when, where, how and

what kind of activities city inhabitants take part in, and whether these are accurately reflected/responded to in any smart city initiatives proposed for implementation. In particular, within the social sciences, there is a well-established tradition of taking context into account; understanding the broader socio-historical context is essential in order to understand the development, use and understanding of any technology. This promotes a lively questioning of the “common sense” or “naturalness” of an artefact.

As a researcher from the social sciences, specifically science and technology studies, I am going to use the term “artefact” a lot in the following chapter. I use “artefact” to refer to material objects, facts or ideas. It is a word which can be applied to a wide range of “things” but which fundamentally understands them all as socially constructed, not as “natural” or neutral [17]. When we look at “facts”, for example, it is tempting to think that we are seeing something objective, which was discovered as part of a linear process of experimentation, and which is possible to present in a transparent way. Or, as Rob Kitchin puts it:

Smart city advocates imagine themselves as creating technologies, techniques and visions that are scientific, objective, commonsensical and apolitical [10].

The term “artefact” can be used to bring our attention to “facts” as the results of complex negotiations between different interest groups (this could include—but is not limited to—competing scientific paradigms, political agendas or budgetary constraints). In this chapter, I am using the term “artefacts” when referring to smart city technologies in order to emphasise that the objects and ideas being created and implemented by smart city designers, developers and engineers emerge within particular contexts that affect the artefacts themselves. This emphasis on context can, for example, help to reveal the particular political decisions that shaped which technologies were (or were not) funded. Other examples of important contextual information might include organisational infrastructures that determined what information was considered “important” to capture in a database and which could be discarded [8], or the terminology used to describe the artefact that implicitly suggests it as a tool for a particular person [3].

Artefacts (be they material objects like bicycles or less tangible objects like facts) take a particular shape, thanks to the questions we pose, the limitations/affordances of the tools we use, and the ways in which results are interpreted. In other words, human beings and our personal, professional and social contexts shape the artefacts, including how we understand the “smart city” itself, the technologies that are needed and the inhabitants who populate it. The creation of any artefact thus takes place within a particular context by particular people, and it contains within it particular ideas about how it will be used and by whom, and these may be more or less clearly articulated. In a commercial setting, for example, when a new product or service is developed this process involves trying to imagine who might want to buy it. In so doing, a picture of this potential customer is built—either through explicit techniques (such as marketing surveys or consumer testing) or

through implicit techniques (such as the designer's personal experience or from looking at the existing users for similar products) (see [1, pp. 169–175] for a more detailed outline of explicit and implicit techniques). Similarly, the development of any smart city artefact (whether intended for sale or not) contains a number of explicit and implicit ideas about how it will be used and by whom. This is what can be called the “assumed user”. In the case of smart cities, the “assumed user” could be a list compiled by the developers of the different kinds of people who might want to use the night buses in a town, or the municipal organisations who would like to know more about air pollution at particular intersections.

However, if the idea of the assumed user does not accurately match the end user there is a risk that the project will not address a community's needs, will increase social divides by only serving some groups in the community and will not be adopted long-term. Thus, reflecting on assumptions about the users when developing a smart city technology can significantly improve the everyday lives of users and the process of implementation. In short, I identify two aspects of the current, technology-centric approach to smart cities where incorporating critical, citizen-centric perspectives can make a big difference:

1. To stop assuming that technologies are objective or apolitical, and
2. To get a better understanding of the diversity of user needs/behaviours.

The call to think more critically about smart city technologies is clear in both research and policy recommendations. For example, the recent report by innovations charity, Nesta, titled “Rethinking Smart Cities from The Ground Up” draws attention to this:

‘Smart cities’ offer sensors, ‘big data’ and advanced computing as answers to these challenges, but they have often faced criticism for being too concerned with hardware rather than with people.

Advocating greater use of collaborative technologies, one of the reports’ policy recommendations is to “take human behaviour as seriously as technology” (Nesta policy recommendations for smart cities, [15]). Meanwhile, Rob Kitchin, in his recent research article titled “Making sense of smart cities” draws attention to how:

Left untouched are issues such as panoptic surveillance, technocratic and corporate forms of governance, technological lock-ins, profiling and social sorting, anticipatory governance, control creep, the hollowing out of state provided services, widening inequalities and dispossession of land and livelihoods [10].

With this in mind, how can we engage with emerging smart city technologies to address the concerns being raised by researchers and policy makers? In this chapter I suggest that one entry point involves paying closer attention to who the assumed user is when designing or implementing smart city artefacts. In the following section, I suggest some ways to try and identify the “assumed users”, and problems that might occur for those who do not “fit” the profile of the assumed user.

2.2 The Assumed User in the Contemporary Smart City

Early ideas about smart cities tended to stress the technological innovation that would characterise these environments [10] or the financial competitiveness that would be the result of these fast-paced, well-managed urban spaces [13]. These early imaginings of smart cities presented a visually stimulating, almost science fictional image of the buzzing, technology-dominated city where success was to be measured in terms of economic success and technological advancement. At best, this vision assumed technologically savvy citizens who were active producers and consumers, financially contributing to society. Absent from this picture are concepts such as “wellbeing” or “work–life balance” or “sustainable living”. Also absent are discussions of how these technologies might serve members of the population who do not “fit” the idea of the assumed user; for example children, the elderly, those with disabilities, non-native speakers or those less comfortable using certain technologies.

Visions such as this did not die out with the 1980s, big hair and shoulderpads though. The Center for Innovation, Testing and Evaluation (CITE) is a contemporary billion-dollar experiment in building an unpopulated, test city where new technologies such as smart devices can be trialled while “sidestepping those pesky humans” [4], see also [5]. The managing director of the company leading this project went so far as to say: “It will be a true laboratory without the complication and safety issues associated with residents” (as quoted in [4]). Experiments such as CITE show that for many the thrill of developing innovative technologies remains the most interesting aspect of smart cities. Smart cities where the emphasis has been on using technologies to maximise efficiency have also been criticised for their ambience (or lack of it), as in the case of Brasilia (see Fig. 2.1).

Inevitably, when we design something, our own perspective and experience plays an important role in shaping how we imagine the technology might be used. It is much harder to imagine the different challenges or potentials experienced by another person using the same tool. And yet, focusing primarily on the technologies or not taking the diversity of human experience into account can result in low levels of adoption or even complete failure of a project. The world of Information and Communications Technologies for Development (ICT4D), for example, provides some striking examples of technologies designed and built in the Global North for the Global South that failed because the designers had not understood the local perspective. In his book *Smart Cities: Big Data, Civic Hackers and the Quest for a New Utopia*, Anthony M. Townsend recounts the example of the Lincos project (designed by MIT engineers 1999–2001) which aimed to pack into a single shipping container everything necessary to connect a rural community to the Net [24]. This container would then be airdropped into local communities in the Dominican Republic and Costa Rica. The project failed spectacularly in the Dominican Republic because “(g)overnment officials apparently found the container design, so revolutionary for the MIT engineers, a symbol of poverty. Dominicans wouldn’t be caught dead walking into one” [21]. The Lincos example shows what happens



Fig. 2.1 Brasília. Completed in 1960, it was heralded by boosters as the first jet-age city. But critics later mocked its sterile architecture and desolate streets

when the assumed user does not match the real user; in the Lincos case a lack of accurate real user knowledge based on understanding of the specific use context for the technology significantly contributed to failure of the project. While the Lincos project exemplifies transnational challenges, it is worth remembering that these gaps in understanding can also occur closer to home. Differences in physical abilities, age, gender, ethnicity or educational background, for example, affect how comfortable a person is when moving through urban space or engaging with technologies—both of which may affect adoption of smart city services.

Both commentaries about smart cities and the types of smart technologies show an evolution of the idea of the “smart city” that incorporates increasing awareness of social divides and sustainability issues. However, an overwhelming focus on technology and a need for more “local” knowledge remains prevalent and much of the hype around smart cities continues to be connected to innovative technologies. The assumed user of a smart city therefore often remains less well defined than the technologies being proposed for their use.

the smart growth agenda may have progressive potential, it is also in danger of being used as a means to discipline cities and their populations, reducing sustainability and the urban question to a technical discourse [7].

This problem is not specific to “smartification” and has been noted in other aspects of urban planning. There is a well-established body of research, for example, showing how the layout of urban spaces may affect the freedom of

movement of women (poorly lit streets or limited-use thoroughfares may cause women to fear being attacked in these spaces and thus limit their movement through urban space particularly after dark, see for example [11]). The lessons learnt from urban planning are also applicable to the integration of technologies into cities with the aim of making them “smarter”. The ways in which we design smart cities have an effect on how people live their lives; where and how citizens can move, and who feels welcomed or excluded in particular spaces become questions of what the technologies permit or prevent.

In order to respond to a wide range of citizens’ needs it is necessary to reflect on the assumed user who lies behind design and development of smart cities, and to ask whose needs are not currently being addressed. Current wisdom advocates the “bottom-up” approach as the best way to achieve this. Usman Haque of Connected Environments gave a nice example of this in 2012 in a specially authored piece for *Wired* magazine:

A citizen-led air quality monitoring system would see measurements taken at a much higher resolution in places (e.g. at the height of a children’s stroller) that the official network just doesn’t reach. Children could learn which side of the park to play on. People could decide to walk different routes to work. They could measure the specific impact of their own cars [9].

Haque’s argument makes a connection between empowered citizens and technologies. It requires data being shared with citizens in a user-friendly way that allows them to make everyday decisions that affect their quality of life and reflect on how their own behaviour might be contributing to pollution levels. It also includes children and those who do not use transport (public or private) for their daily commute. These may be the less obvious behaviours, which do not contribute directly to the economic success of an urban environment, but which form part of a vibrant, diverse community. However, it also assumes users who are sufficiently tech-savvy to be comfortable interacting with an air quality monitoring interface (however rudimentary), and able-bodied citizens who are able to go to the park or walk to work. The above example of a citizen-led air quality monitoring system thus starts to model a balance between technology and citizen, and attempts to broaden the range of human experiences of the assumed user, when compared to the early imaginings of the smart city and its assumed user.

Smart city artefacts are designed within particular contexts with a set of assumptions about who is going to use them and in what ways. Some of these assumptions may be made explicit, for example the need for long-range communication between devices. Some of these assumptions may be ideas that developers have about users without really realising them. In the following sections, I illustrate this with examples of two smart cities, one new venture in which smart technologies are being embedded into the infrastructure of the city from its inception, and the other an example of the “smartification” of a well-established city. In each case, I am focusing on the assumed users of the smart city artefacts.

2.3 The Case of Palava

Palava claims to be the first smart city in India and, as such, has been dubbed “The Future City” by the company developing it. It is scheduled to be complete by 2025, but thousands of housing units have already been sold and built. Located in the Mumbai region, one of its main selling points is its proximity to established transport and business hubs. Palava is a commercial venture, developed as a partnership between Lodha (a real estate group) and a number of international companies, including IBM. It is also one of a wave of smart cities currently being built in India, supported by the government.

Palava is an interesting case study because it is a brand-new city, envisaged from the start as a smart city and owned by a commercial firm, rather than a municipality. A significant amount of the city has already been constructed, and a well-developed media and marketing strategy is in place outlining key selling points to attract businesses and residents. This means that a number of promotional and informational materials are available online about the city. From these online materials, which include films on YouTube, the Palava website and various press releases, we can learn a lot about the assumed users of this city and how developers understand the concept of a “smart city”. A number of themes can be identified in these materials. In the following, I examine two of these materials: the “Palava Megacity” short promotional film from Lodha (available on YouTube) and the Palava website [26]. The promotional film is 6 min 35 s in length and dwells on different aspects of the city, illustrating these with photorealistic images, plans for the city and maps, accompanied by a soaring soundtrack and polished voiceover in English. It gives a flavour of the city, rather than providing many specific details. The website provides more detailed information, including housing prices, city transport, energy and water supplies, information about Lodha and the Palava City Management Association. Of the many aspects of Palava sold on the website and in the film, there are two themes that dominate: innovation and economic success.

The promotional film for Palava uses “vision” as an overarching theme [25]. This term is used repeatedly in the voiceover and is connected to the idea of it being a futuristic, aspirational city. The promotional film uses expressions such as “largest ever private, planned self-sustained city”, “technologically advanced and futuristic”, “to wash away the old” and “the city of the future”. These expressions are accompanied by aspirational imagery of breaking waves and soaring skyscrapers, a sweeping soundtrack and concluding with the tagline “Palava—The Future City”. As such, Palava positions itself as being a radical evolution from existing cities in India, one characterised by: (i) the latest technologies and (ii) the scale of the development.

The theme of innovation is developed on the website through a combination of both aspirational text such as “Palava isn’t just a new place to live, it’s a new way to live” [27] and details of the telecommunications and transport infrastructure built into the city. Smart cities in other countries are mentioned as inspiration or models for aspects of Palava. However, it is worth noting that Palava positions itself as a

leader within India, comparing its offering both explicitly and implicitly with other Indian cities, and focusing particularly on technological artefacts not widely available within India such as smart cards, surveillance, solar panelling and rain-water capture. Palava is framed as offering “innovation” within a specific national and cultural context. To many in an international audience familiar with such amenities, 24/7 electricity may be less innovative and more expected.

One of the other main selling points of Palava concerns its location and resources for businesses. This takes the form of Special Economic Zones, IT Park, offices and a central business district, all of which are featured in the promotional film. The website provides more information about this in various sections, including the “City Advantages” section of the site. Here there are details of the low operating costs offered by Palava, accompanied by graphics, which claim to show annual cost reductions for business over a number of metrics such as lower utility bills, walk-to-work benefits and communications infrastructure. In a neighbouring section, the different groups of customers (businesses, citizens and tourists) envisaged as the basis for Palava as a high-growth market are detailed, and once again accompanied by graphics. Here plain text, specific figures and use of tables and graphs work to support Palava’s claim to be a “City of Opportunity”.

Financial success as a characteristic of Palava is conveyed not only through its framing as a location for businesses, but also as “a destination for the rich and famous”. Detailing the different types of housing, the word “luxury” is repeatedly used, together with glossy images of house interiors and pictures from the sales events. In each case, the voiceover informs us how many “units” were sold within the initial sales period, framing this as a commercial real estate success. Palava is thus simultaneously framed as offering good opportunities for businesses due to its lower cost options, and as a location for luxury housing. Its ideal users are thus skilled workers/business people or those who are already wealthy.

Palava appears to be a city that draws on many aspects of European cities as an aspirational model. As such, it sets up a power dynamic in which local culture, skills and techniques are designated second best. The contact details at the top of the home page give numbers for the Indian, US, UK and UAE offices, suggesting that Lodha see many of their potential customers as an international group, possibly drawing on the economically successful Indian diaspora. The film does not use the term “smart city” although it refers to environmental and traffic management technologies commonly associated with smart cities. The website however, calls Palava “India’s First Smart City” and in its consistent focus on technological innovation, sustainability and financial growth is in line with much of the prevailing rhetoric on smart cities.

By fitting itself with the dominant model of a smart city in which technology is used to facilitate economic growth and efficiency, Palava to some extent fails to take into consideration its citizens. The city is primarily defined by buildings and facilities, rather than by people; in the promotional film there are many images of buildings, roads and transport that are often taken from overhead, so the people are reduced to scuttling ants. On the few occasions when people are shown in close-up in the film, it is worth noting that they are often light-skinned, able-bodied adults

expensively dressed in outfits of the Global North. As such, they epitomise the active producers/consumers imagined as the users of early smart cities.

The only evidence of citizen engagement in the city appears in the section of the website that describes the Palava City Management Association, a body comprised of “citizens of Palava, expert city administrators and urban planners” which will be responsible for the running of the city [28]. The involvement of citizens therefore takes place after the city has been constructed, rather than during its design and planning stages. Overall, Palava is promoted as a private city, only available to those who can afford to live there or who wish to subscribe to the particular luxury lifestyle on offer. Indeed, some commentators have suggested that cities such as Palava will be “more fortresses than places of heterogeneous humanity, because they are meant only for specific classes of people” (Pramod Nayar quoted in [18]. This may contribute to a growing divide between haves and have-nots as these private enclaves draw natural resources from the region with the blessing of the municipal government and under the guise of boosting the economy. Something of this can be seen in the use of surveillance and security technologies in Palava such as the “intelligent security and monitoring system that includes everything from electronic access systems and fire alarms to CCTV surveillance and street-level panic buttons” as well as smart identity cards for every citizen. Use of systems such as this to create and police the boundary between haves and have-nots was noted by academic and author Pramod Nayar who wrote that:

Smart cities will be heavily policed spaces (...) where only eligible people—economically productive consumers (shoppers) and producers (employees)—will be allowed freedom of walking and travel, while ambient and ubiquitous surveillance will be tracked so as to anticipate the ‘anti-socials’ (as it appears in [18].

2.4 The Case of Barcelona

Since the early 2000s, Barcelona has been working to reinvent itself. The most recent manifestation of this was the announcement in 2012 by the newly appointed mayor of his intention to transform Barcelona into a global model for the smart city. This included a number of projects, some of which have been realised, and some of which are ongoing. One of the most discussed is the project to transform a large run-down area of the city, Sant Marti, into a new knowledge hub, now known as 22@Barcelona. Aims of the project included regeneration of the area to bring together industry, university and technology transfer companies, as well as boosting employment (a large percentage of which was envisaged to be an international workforce). The project also incorporated housing and social amenities. Located in an area near the centre of this well-established and bustling city, 22@Barcelona was thus quite a different proposition to Palava. The existing infrastructure and population meant that this was more a project of “smartification” of an existing urban space, rather than being able to build something entirely new. In common with

Palava, however, was the goal to develop simultaneously multiple aspects of the space to create a work-live environment: “the execution of a strategy that integrates, economic, physical and social regeneration with investment in economic and social programmes as much as in property development” [12].

It is widely acknowledged that the 22@Barcelona project had ambitious goals, and even the most positive commentaries on the smartification of Barcelona acknowledge (albeit briefly) that the smart city initiatives which took place in Barcelona faced a variety of challenges and that there have been problems with adoption. The reason for this is often suggested to be a lack of awareness of the broader context by designers and planners. This takes several forms, including the broader economic context, the labour market, and organisational cooperation. In their study of Barcelona, Bakici et al. suggest that “Barcelona faced certain challenges such as providing exact and appropriate infrastructure, deployment and management of wireless networks, creation of triple helix, networks, clusters and collaborations” [2] and tentatively admit that “local engagement and collaboration across departments could be challenging sometimes” [2].

Leon goes further in his analysis, identifying five major challenges that this project faced, most of which centre around the lack of suitable labour and industry in the 22@Barcelona area, namely “The human capital was originally not aligned with the needs of industry clusters” and “The incipient level of local entrepreneurship was very low”, as well as a lack of early stage venture capital funding and the absence of large firms with headquarters in the region [12].

This lack of attention to the existing context could also be seen when, shortly after the 2012 announcement about the latest phase of regeneration, two of the sites identified for development were discovered to be unavailable for use due in one case to being occupied by squatters (who then needed to be relocated), and in the other case to having been turned into a food bank by the local population. Lack of awareness of local populations and their needs here highlight a gap between idealistic smart city planning and lived realities. These, it has been suggested, may have contributed to difficulties in adoption of the smart city initiatives:

...flagships of the new urban model in Barcelona, have already encountered the opposition of neighbourhood associations, and new urban infrastructures are far from being examples of democratic participation [14, p. 10].

Both Bakici et al., and March and Ribera-Fumaz draw attention to the particular economic challenges faced by Barcelona, and emphasise that this aspect cannot be underestimated by planners of future smart city initiatives:

As new urban smart interventions are being designed and applied, little has been explored about how they are inserted into a wider political economy and ecology of urban transformation [14, p. 8].

This can be seen in other critiques of the transformations effected in Barcelona in order to transform it into a smart city, most particularly the lack of engagement with private citizens. Like Palava, the transformation of Barcelona was driven by a clear vision. In this case, the vision of chief architect, Vicente Gualart, who re-envisioned

the city on the same model as the Internet, a flat network of connected hubs. At the heart of this vision was the use of ICTs and technologies to improve environmental efficiency. Guallart did stress that such technologies were only of use if they improved people's lives. However, as the above examples suggest, this vision of smart technologies that improved people's lives failed to be realised in a way that took into account local conditions, and which ultimately was technology-centric rather than people-centric.

2.5 Conclusion

In truth, competing visions of the smart city are proxies for competing visions of society, and in particular about who holds power in society [16].

In this chapter, I have used the concepts of the “artefact” and the “assumed user” to suggest how assumptions and biases may be unwittingly included in the design and implementation of smart city initiatives. In line with recent calls to make such initiatives more people-centric or “bottom up”, I argue that a critical reflection on assumed users is a useful way to avoid thinking of these technologies as unproblematically “scientific, objective, commonsensical and apolitical” [10]. Rather, we need to recognise that smart city technologies are “artefacts”, constructed in a particular socio-historical context and thus shaped by politics, budgets and local culture as much as by the material limitations or affordances of the technology itself (such as processing power, bandwidth, etc.). Understanding smart city technologies as “artefacts” highlights the human aspect of design and use, something that may be lacking in “top-down” approaches. I have illustrated this with two examples—one from a brand-new smart city, and one from an established city in the process of smartification. Both cases support March and Ribera-Fumaz's critique that: “the Smart City is a rather empty and ambiguous concept that is being deployed more on an imaginary and discursive level, rather than materially” [14].

Examining promotional materials for Palava helps us to identify the financially successful producer/consumer who is the assumed user for this particular smart city, and consequently reveals those members of society who are missing from this glossy picture of urban living—an absence that commentators suggest will lead to long-term problems within Indian society. Reading accounts of the smartification initiatives in Barcelona reveals how a mismatch between the developers' assumptions about the users and the actual users of a space contributed to poor adoption of the processes. Palava and Barcelona are examples of the different ways in which smart city technologies and visions are being currently implemented. They have important differences (for example, commercial vs. municipal leadership, and smart-from-inception vs. smartification) but both show a primary concern with technologically led change rather than citizen-led change. Furthermore, in both cases it is possible to see how these initiatives may aggravate existing social divides as segments of the population are erased from the vision of the city.

As the above discussion suggests, it is clear that it is essential to think critically about the assumed user both at the planning stage and during use for reasons of both equality of opportunity and successful adoption of smart city initiatives:

...it is of special importance to find ways of ensuring that certain user representations—which would otherwise not be considered by the innovators and the entrepreneurs—are taken into account. (...) In addition, public authorities should identify, create and/or use a number of mediators between innovators and end-users to redefine the demand and thus allow new user representations to be considered [1].

How then to do this? How can designers, developers and engineers enhance their existing practices and pay closer attention to the kinds of assumed users implicit in their technologies?

One way forward might be to have more interdisciplinary development teams that include those whose interest is primarily with the users and citizens, who have expertise in human behaviours. For example, in a recent article in *The Guardian* newspaper about the Future Cities summit, the writer highlights the following solution put forward by one of the summit delegates:

One sceptical observer of many presentations at the Future Cities Summit, Jonathan Rez of the University of New South Wales, suggests that “a smarter way” to build cities “might be for architects and urban planners to have psychologists and ethnographers on the team.” That would certainly be one way to acquire a better understanding of what technologists call the “end user”—in this case, the citizen. After all, as one of the tribunes asks the crowd in Shakespeare’s *Coriolanus*: “What is the city but the people?” [16].

Indeed, interdisciplinary collaboration between technical and social sciences seems key to developing smarter “smart cities”. By integrating these two distinct perspectives, a more complex understanding of the citizen–technology relationships in contemporary and future smart cities might be reached, one that guarantees access and inclusion for all, and a better chance of adoption by the citizens themselves. This kind of collaboration might seek to engage with the following kinds of questions:

How can you include a wider range of user experiences, needs and behaviours into the technical design and development process? How might including more experiences into the technical development stage make the solution more robust and more likely to have a smooth adoption process by citizens? To what extent do technical developers and designers have a responsibility to consider diversity and equality in their work in smart cities?

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