

Smart citizens for smart cities: Participating in the future

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Abstract

This paper discusses smart cities and raises critical questions about the faith being placed in technology to reduce carbon emissions. Given increasingly challenging carbon reduction targets the role of ICT and the digital economy are increasingly championed as offering potential to contribute to carbon reduction targets within cities and buildings. This paper questions the faith being placed in smart or intelligent solutions through asking, what role then for the ordinary citizen? The smart approach often appears to have a narrow view of how technology and user-engagement can sit together, viewing the behaviour of users as a hurdle to overcome, rather than a resource to be utilized. This paper suggests lessons can be learnt from other disciplines and wider sustainable development policy that champions the role of citizens and user-engagement to harness the co-creation of knowledge, collaboration and empowerment. Specifically, empirical findings and observations are presented from a case study of citizen engagement around an Energy from Waste infrastructure development. Recommendations are provided for engineers, planners and decision makers in order to help plan more effective engagement strategies for citizens, building users and stakeholders.

*Sic. What is the city but the people?
Citizens. True, the people are the city.*

Coriolanus Act III. Scene I. William Shakespeare

1 Introduction

A significant cultural shift occurred recently with the majority of the world's population now living in cities and contributing over two thirds of global carbon emissions (UNEP, 2015). If countries like the UK are to meet their challenging carbon reduction targets, 80% by 2050 for the UK, then how our

cities are governed and managed to maximize energy efficiency is of vital importance. Faith is increasingly being placed in what are commonly referred to as 'smart cities' to meet these targets. Most visions of these smart cities though revolve around increased ICT efficiency through what has become known as the 'digital economy.' Smart cities seemingly offer a utopian vision of urban integration, efficiency and [subsequent] carbon reductions. But is 'smart' purely seeking maximum technical efficiencies or does *smart* need to incorporate citizens as well? Cities, we argue (in borrowing a well cited phrase from Katy Janda (2011), like any building development or infrastructure, don't use energy, people do.

This paper first explores definitions of smart cities, before presenting a case study of citizen engagement around planning for sustainable waste management infrastructure that provides insight into how citizens can be engaged in smart city initiatives. We argue that lessons learnt from this case are highly relevant for engaging citizens in infrastructure and engineering developments such as smart cities. Partnership working is not easy though, and in conclusion this paper offers reflections and practical recommendations for engaging citizens in cities more effectively.

2 Smart Cities – a review of definitions and concepts

According to the Smart 2020 Report 'Enabling the low carbon economy in the information age' this new digital economy could deliver approximately 7.8 GtCO₂e of emissions savings by 2020 as a result of smart logistics, grids and buildings (SMART2020, 2008). With regards to buildings for example the report proclaims, 'better building design, management and automation could save 15% of North America's building emissions' (2008: page 9). In buildings these automated systems vary in capability, but they afford energy managers the opportunity to control everything from the heating, ventilation and air conditioning systems to lighting controls and security systems without the ordinary building user having to do anything. Depending on the scale and complexity of the local controls building users no longer having to worry about opening windows if it is too hot, switching on a light if it is too dark; the centrally controlled building energy management system (BEMS) takes care of everything. The question remains though whether this a vision shared by those using these buildings or living in these new smart cities?

A smart or 'intelligent' approach to buildings, or transport and cities can appear to imply or suggest the behaviour of the people is a hurdle to be overcome rather than a resource to be utilized. However, a wider literature review, for example of the risk communication literature, shows that expert-led, top-down techno-centric solutions rarely deliver on their promises (Fioriono, 1990; Renn 1992; Leach, Scoones et al., 2010). Staying with buildings for a moment, user-experience and the literature tells us that around 30% of energy in buildings is wasted through the behaviour of the building-users (Brown, Bull et al., 2012). Such waste is in part due to the technical limitations and flaws inherent within building energy management system (BEMS) such as the reliability of sensors, the quality of algorithms alongside human error.

The phrase 'smart city' has emerged during the last decade and has been used, since then, by different companies but notably the IT sector and companies such as IBM, Cisco and Siemens. However, according to Harrison and Donnelly (2011), this concept is not new; its origins go back to the Smart Growth Movement in the late 1990's. Definitions of smart cities vary according to the sector in which they are used and it is immediately evident from the range of definitions that there is little consensus. In the next section the views of industry and policy makers are briefly reviewed before looking at an example of smart participation.

2.1 Industry definitions

Many companies, mainly from the IT industry, are providing their visions and interpretations of the concept of Smart City. Businesses like IBM, Schneider Electric, CISCO and Siemens are using this concept to market their vision for the cities of tomorrow through the 'application of complex information systems to integrate the operation of urban infrastructure and services such as buildings, transportation, electrical and water distribution, and public safety' (Paroutis et al., 2013, p.2). Therefore, these companies appear more focused on using information systems to solve the problems facing the cities. Table 1 below highlights some of the key features and differences of these organisations vision of smart cities.

Table 1 Overview of organisation's vision of smart cities

| Company | Vision | Key features |
|--------------------|---|--|
| IBM | Cities can capitalize on new technologies and insights to transform their systems, operations and service delivery. Being smarter can change the way their cities work and help deliver on their potential as never before. | <ul style="list-style-type: none"> - Big data and analytics for deeper insights - The 'cloud' for collaboration among disparate agencies, mobile to gather data and address problems directly at the source, social technologies for better engagement with citizens. |
| Schneider Electric | Cities need to become smarter, more efficient, sustainable and livable. This can be done through collaboration with different entities (municipality, council, etc.) to deliver urban efficiency. | <ul style="list-style-type: none"> - Smart Energy: Energy management System to make end users, renewable energy sources and electric vehicles efficient and smartly connected to the grid. - Smart Water: use of management systems to detect water leaks in the network, to optimize the energy used for supplying water, and to provide solutions to face storms and floods. - Smart Building: use of Building Management Systems to monitor the energy use. - Smart Mobility: Traffic and transit management systems that deliver real-time visibility across the entire transportation network, electric vehicles and efficient and safe recharging infrastructure via tolling and congestion charging solutions. - Smart Public Services: solutions ranging from street lighting to the public safety with a focus on data collection for better management. - Smart Integration: linking different management systems available in the city to increase the efficiency of each one of them and the overall efficiency of the city. |
| Siemens | Smart Cities should find ways to optimize its infrastructure through intelligent infrastructure solutions – such as smart grids, building automation, security solutions and traffic control systems. | <ul style="list-style-type: none"> - The use of sensors, communications, computational ability and control in some form to enhance the overall functionality of the electric power delivery system |
| Cisco | Smart cities should include an integrated urban information and communication technology (ICT) that can overlay on a city that can support delivery of connected urban services and allow for efficient management of those services on a global scale. | <ul style="list-style-type: none"> - Leveraging the Internet of Everything, cities can integrate people, processes, data and things to create safe and vital places to live, work, learn and play. |

They highlight the efficiencies to be gained through greater technical integration of public services – energy, transport, street lighting and so on. These integrations and efficiencies are of course to be welcomed but yet offer a one-dimensional view of the smart city.

2.2 Policy makers

Smart cities have become a major policy initiative of the European Union. In their Strategic Implementation Plan for ‘Smart Cities and Communities’ (2013) they define smart cities as

. . . systems of people interacting with and using flows of energy, materials, services and financing to catalyse sustainable economic development, resilience, and high quality of life; these flows and interactions become smart through making strategic use of information and communication infrastructure and services in a process of transparent urban planning and management that is responsive to the social and economic needs of society.

In this document they describe areas of focus around sustainable urban mobility, energy efficient buildings and integrated Infrastructures and processes across energy, ICT and transport. Space is given to the need for increased citizen engagement and the benefits that brings. The areas of focus are (1) developing a common European framework for cities, (2) removing barriers from experimental initiatives that innovate and increase knowledge, and support co-creation, and (3) establishing local citizens committees to work with local public authorities, SMEs and larger industry in order to set the targets for developments.

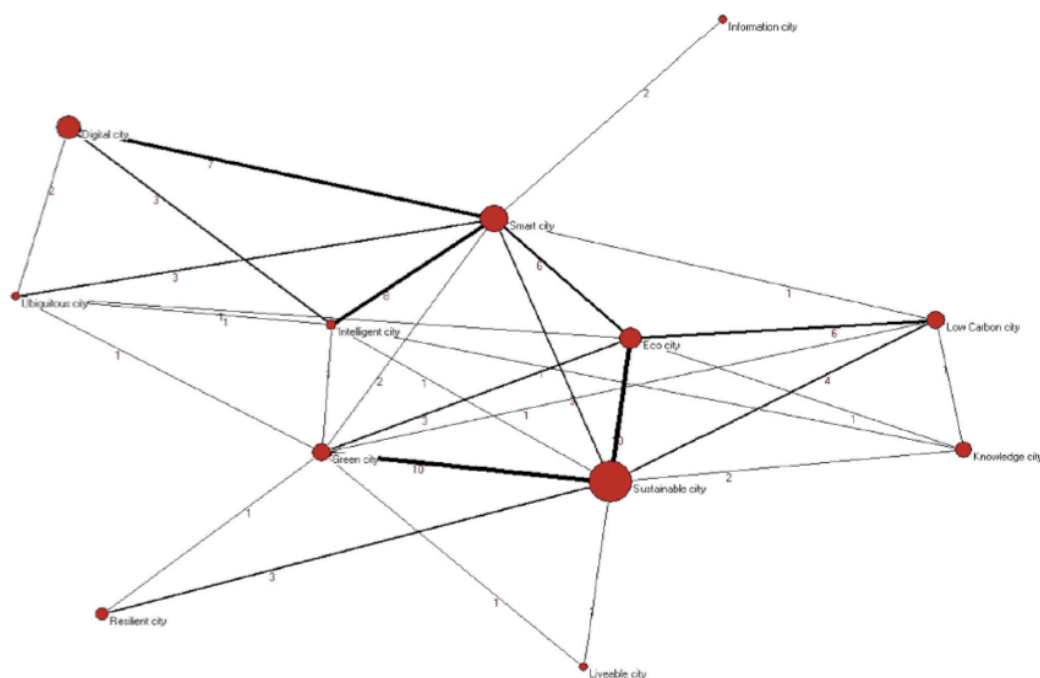
Here in the UK the Department for Business, Innovation, & Skills (BIS) has defined the process by which cities turn into smart ones rather than trying to define the concept. It refers to the process as one in which cities become more ‘liveable and resilient’. For BIS a smart city should enable every citizen to engage with all the services on offer, public as well as private, in a way best suited to his or her needs and incorporates ‘hard infrastructure, social capital including local skills and community institutions, and (digital) technologies to fuel sustainable economic development and provide an attractive environment for all (BIS 2013, p.7).

So whilst companies may be adopting a more techno-centric view of smart cities, policy makers are hoping to see the citizen as an essential stakeholder.

2.3 Reflections

This lack of clarity is reflected in the wider academic literature on smart cities. A recent study (De Jong et al., 2015) highlighted twelve different categories of cities in the literature for the period running from 1996 to 2013: 'sustainable city', 'eco city', 'low carbon city', 'liveable city', 'green city', 'smart city', 'digital city', ubiquitous city', intelligent city', 'information city', 'knowledge city', and 'resilient city'. They found 'sustainable city' had the highest number of occurrences followed by 'smart city'. However, the importance of this study resides in defining the links between these different types depending on their number of occurrences in the selected range of academic literature:

Figure 1: Links between the twelve different types of cities (Jong et al 2015, p.30)



It can be seen from figure 1 that 'smart city' is linked more to 'digital city', 'intelligent city', 'eco city' and 'low carbon city'. 'Low-carbon city' is viewed as a sub-set of sustainable city whereas smart city is viewed as a new concept with particular connotations around integrated building and technological fixes. Huber and Mayer (2015) agree that there is no clear definition or conceptual content of smart

cities unlike the low carbon and eco cities, and that it is still a fuzzy concept; but there exists many interpretations. They conceptualise this through three perspectives:

1. Instrumental perspective: this consists of using ICT to gather high quality data from different sources of information in shorter times to help improve the work of institutions, like the municipalities, through the processing of these data in order to produce meaningful information which can help in building the right strategies and making decisions.
2. Administrative perspective: the goal of a smart city is to unify the work of institutions through the establishment of a smart policy. In other words, it is fundamental for all structures/departments belonging to the same municipality, as an example, to interact and unify their efforts to develop a vision to the city; a vision that has as a starting point defining the needs of the citizens and as an endpoint meeting these needs.
3. Governance perspective: citizens should have a great role in defining how their cities should look like, this is why it is essential to overcome the traditional top down governance and transit to a new governance style; a style which enables integration of all stakeholders in the decision making.

This governance perspective gets to the core issue of how citizens are engaged in decision making, be it for the design of a new building, infrastructure project or city-level planning such as a new transport policy or carbon management strategy. What does it mean to actually engage the citizens of a particular area or city? Before presenting a concrete example the theoretical framework around public participation is briefly discussed

3 Smart citizens?

The principles of public participation methods have been tried and tested in the siting of controversial facilities such as waste facilities (Bull et al., 2008) and transport planning (Bickerstaff and Walker 2005). Sovocool (2014) notes three benefits of engaging 'non-experts,' first, democracy is increased as all citizens have a right to participate and be represented in environmental decision making, second, non-experts are often more attune to the ethical issues of a situation, and third, greater acceptance can often be achieved by involving those affected by the situation. Most relevant to this subject is the strong and emerging links between public engagement and learning, increased

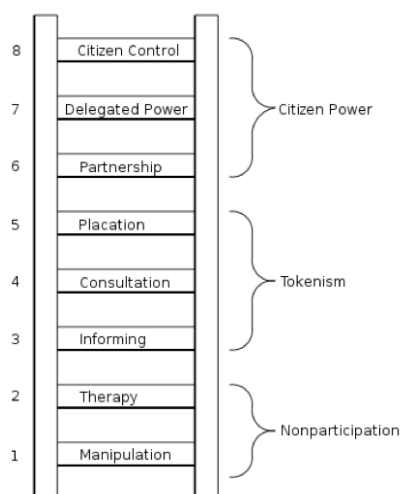
environmental citizenship and behaviour change (Bull et al., 2008). As Webler et al (1995) discovered in their research into this field:

When citizens become involved in working out a mutually acceptable solution to a project or problem that affects their community and their personal lives, they mature into responsible democratic citizens and reaffirm democracy

Tom Webler et al (1995: 444)

Back in 1969 Arnstein's (1969) 'ladder of participation' (see figure 2) defined steps to better engagement. At the bottom was information provision a predominantly one-way form of communication, moving up the steps, consultation is usually conceived as a relatively passive process asking for people's opinions but not necessarily engaging them in debate. Participation is normally used to refer to processes, which allow people to participate in a decision by putting forward their views verbally whereas engagement goes further, suggesting an innovative and interactive, two-way process of discussion and dialogue (i.e. deliberation) to ensure that people's views inform a decision, alongside those of the expert and/or decision-maker. This is still one-step removed, however, from Arnstein's top step of her ladder that defines empowerment as people taking control of decisions and their implementation.

Figure 2: Arnstein's Ladder of Participation



The theoretical underpinnings find their roots in Habermas' theory of communicative competence which was successfully mined in the early 1990s by Thomas Weblar (1995). Weblar (1995) explored how language functions to form key foundational principles for the management of deliberative practices within the school of risk communication. Working from the premise that participation is 'interaction among individuals through the medium of language' (Weblar 1995, 40), Habermas (1979) argues that any communication between two individuals would fail without cooperation. An individual's ability to use language to create understanding and consensus is referred to as 'communicative competence'. Habermas (1979) outlined a set of ideal conditions in which communicative competence would be best served, known as his 'ideal speech situation'. Weblar (1995) applied these principles of communication to the formulation of a set of criteria and rules that would transform democratic ideals of deliberative democracy into practice

In short, people can be a valuable source of knowledge and wisdom and, if given the opportunity, capable of handling complex information and resolving complex problems. Yet, these principles are still under-researched with regards to engaging citizens in smart cities contexts and questions remain as to how applicable they are. These questions are to be explored, but first, the case study is introduced.

4 An example of Smart Citizen engagement

So what does this actually look like in practice, and what relevance has this for smart cities? As outlined earlier, the EU Smart Cities and Communities agenda is seeking exemplars of citizen engagement yet often the concepts are lacking focus or application. This example from the 1990's provides a clear example of what is possible. In the early 1990s Hampshire was facing a waste crisis. Landfill capacity was rapidly decreasing (limited by the permeable geology of the county), higher regulatory standards were too demanding for the five existing incinerators and increasing waste quantities were placing an excessive burden on the existing infrastructure (Petts, 1994). In 1992, under contract to Hampshire County Council (HCC), the waste contractor failed in submitting a planning application for a 400,000 tonne per annum Energy from Waste (EfW) plant to handle municipal waste. The County went back to the drawing board to try and decided to try a different approach. Decisions were made to engage the public in a discussion of an appropriate waste strategy

to manage household waste in Hampshire. A highly innovative engagement process based on deliberative ideals was designed with three community advisory fora (CAFs) across the County at the centre of the communication strategy. The CAFs were facilitated and administered by a team of engagement consultants knowledgeable in waste management, and were independently chaired.

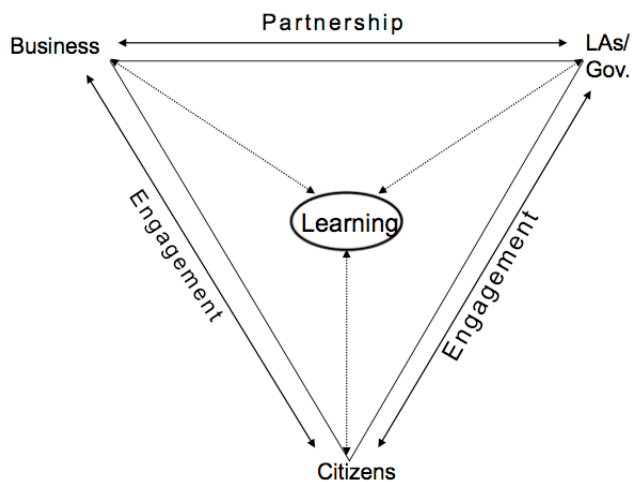
Composed of 16-20 people from diverse backgrounds with broad interests their purpose was to receive and debate information about Hampshire's waste problem, to discuss the available options and to submit a report to the County detailing their preferred option. Each CAF met six times on a monthly basis, beginning with an explanation of the process and the background to the waste strategy the meetings progressed to considering available options for dealing with the waste crisis. Views were sought on how to implement the waste hierarchy (reduce, reuse, recycle, dispose) in the context of Hampshire. The process encouraged debate and opportunities to challenge and validate claims through small group and plenary discussions.

The outcome was an agreed waste strategy which was put out to tender. Onyx (now Veolia Environmental Services) won the contract and formed a novel partnership with the County (operating as Hampshire Waste Services under the title Project Integra) to deliver three new, small (under 200,000 tonnes per annum) EfWs. Part of their contract required them to engage with each local community prior to submitting the planning applications. To that end three contact groups were convened by Hampshire Waste Services (HWS) to discuss the developing applications and associated Environmental Impact Assessments (EIAs). They recruited people on a similar basis to that used for the CAFs, but this time from the directly potentially affected communities. For HWS using this 'contact group' process was a key milestone. Two of the three facilities were granted planning permission without having to go to public inquiry with evidence of political confidence to take a local decision.

Figure 3 is developed from analysis of the structures that exist to manage waste in Hampshire and provide us with the model for engagement for smart cities. Local authorities, business and individual citizens all worked together in different ways to confront the problem of sustainable waste

management. With the goal of learning in the centre, a framework is presented to illustrate the context, influences, and relationships necessary for learning.

Figure 3: A relational framework for learning



Learning is at the centre of the framework in Figure 3. This is not to imply that learning occurs abstractly, separate from the actors or the processes. Rather learning is located centrally to illustrate the external influences upon the process. The arrows suggest these influences, but also stress the two-way responsive effects of the learning process. The case studies clearly show that not only did the actors influence the learning process but the process also influenced them. Crucially, removing any side of the triangle will negatively affect the potential for learning. The findings of this research suggest that optimal (social and organisational) learning and effective public engagement are both interlinked and dependent on effective relationships between all three of the actors involved in the waste management cycle.

To conceptualise this learning several established models have been utilised. Jack Mezirow's transformative learning theories (1994; 2003) helped understanding of the beyond process learning of the CAF members in Hampshire. Like many theories around learning through engagement or discourse, Mezirow focuses on the conditions within the learning environment essential to understanding how to design and manage engagement processes to best enhance learning. Mezirow

(2003) speaks of actively managing the process to maximise learning and other empirical evidence has identified the components of management required (Petts, 2006).

Partnership was central to the waste management sector and crucial if cities are to become truly smart. Davoudi and Evans (2005) have drawn attention to the effects of the restructuring of society and the role of the state in mediating power through devolving responsibilities to regional agencies and partnerships. Frederickson (2007) contrasts partnership with a technocratic client-contractor approach, characterised by long-term contracts with one service provider operating large, centralised facilities. Long-term private-finance-initiative (PFI) types of contracts are typically associated with this approach. Project Integra was a PFI-type contract within which the role of the private waste contractor, HWS, was central. Frederickson (2007) highlights three ingredients of successful partnerships: emotional commitment, agreed shared vision and common objectives. In Project Integra these have been exhibited and promoted particularly by the key individual champions but also by the participation and support of all thirteen districts in the development of the household waste strategy and then its implementation.

Through these connections the successful implementation of the waste strategy becomes the responsibility of everyone. In a partnership such as Project Integra, business and local authorities are mutually dependent on one another. In this way, partnership denotes a shared emotional commitment to work together, steered and managed by people with vision.

Discussion

Frederickson (2007) argued that partnership working is capable of achievements that would not be feasible if individual partners worked in isolation. He is referring to the technical benefits of partnership working between local authorities, for example, greater economies of scale concerning recycling collection initiatives and securing contracts for recyclables. This was the case in Hampshire where partnership working with all of the local authorities enabled greater efficiencies and sharing of best practice.

Partnerships between business and local authorities provided mutual learning benefits. However, such partnerships have a sphere of influence beyond themselves. Project Integra provided clear, united governance, de-politicising the issue of waste, that is, the public viewed no single party as responsible. Instead, a neutral organisation was created. The partnership appeared to create a culture of trust, which enabled the public engagement to function more effectively and increased the opportunity for learning. This is significant given that so often the interests of business, under the influence of market forces, and local authorities implementing policy, are viewed as competing with one another (Forester 1985) and particularly important given the often contentious nature of infrastructure developments

In Hampshire, the framework of Project Integra, and the consultation process that preceded the formation of the partnership, provided HWS with a confidence to develop the contact group process around the proposed sites for EfW. A household waste strategy informed by the CAF process meant that the broader issues surrounding waste management were dealt with and had achieved a consensus. HWS were now relatively free to engage with the specific issues and concerns surrounding EfW. As such the contact group process was reasonably successful - attendance was strong and the debates mainly lively and constructive. In one of the contact groups, interviewees reported not only a good experience, but also significant impact upon the route of the waste lorries (to and from the facility) as well as the design of the facility (Bull et al., 2008; 2010).

The influence of the CAFs upon the learning of the individuals involved, and as a pre-cursor to effective facilitation of the contact group process, cannot be overstated. The decision by HCC to use these groups and to involve the private sector in running and facilitating them was instrumental. It provided a degree of independence and importantly it brought highly professional and knowledgeable (in terms of waste management) facilitators into the process. The contact group process has the opportunity to bridge the missing link in the governance of waste between citizens and business. Veolia did not just stop their public engagement once a planning application has been submitted either. All of the three facilities in Hampshire have liaison groups that meet quarterly throughout the year. These operate on a similar basis to the contact group process, being made up of local people, some of whom were involved in the original process. They are independently chaired and exist to

provide an ongoing interface between Veolia and the local community. For example, the Marchwood liaison group had been able to hold HWS to account on the agreed traffic routes, discuss screening arrangements and generally review the ongoing running and performance of the relatively new facility. Utilizing deliberative processes through the contact group model has the potential to benefit everyone, providing the vital link in the chain between business, local authorities, and citizens.

6 Conclusion and recommendations

So what has this all to do with planning and developing smart city technologies, engineering and infrastructure? Firstly, it is important to be clear what is being talked about with regards to smart cities, what is promised with regards to these developments and who is defining the terms of engagement for smart cities. Participatory processes like those outlined here provide a clear and tangible model of engagement for industry and local authorities for engaging citizens beyond the statutory public consultations that rarely go beyond 'information provision'. Crucially though it also shows the benefits of engagement and should inspire decision makers to cease viewing stakeholder engagement as a 'box-ticking' exercise but rather a strategic decision to improve business process and quality of life for all.

Engagement then is more than providing information and feedback; genuine participation accesses the knowledge and skills of all the actors and stakeholders to provide greater legitimacy and improved processes.

Within this case study then can be found five key recommendations for organisations, individuals and decision makers wishing to develop engagement processes to develop 'smarter citizens':

1. Decide on an appropriate engagement strategy that is fit for purpose and clearly distinguishes between consultation and engagement (i.e. climbing higher up Arnstein's ladder – figure 2) with a view to allowing all those affected by the decision to have a say in the outcome rather than be passive recipients of information.
2. Identify suitable well-trained individuals to lead the process. Public engagement requires particular skills, notably around empathy, excellent communication skills and diplomacy. Better not to undertake it at all than to do it badly.

3. Allow sufficient time for the process. But time invested up front will pay dividends (depending on the intervention), in terms of more motivated staff, engaged citizens and genuine sharing of knowledge between all parties involved.
4. Clearly communicate the impacts of the engagement on the decision-making process, being transparent and open throughout the whole process.
5. Finally, do not underestimate the benefits of 'unplanned' and informal social times for interactions. Allow time for informal activities, invest in good quality refreshments and ensure everyone gets time to meet all those involved.

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