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'SMART CITIES' – DYNAMIC SUSTAINABILITY ISSUES AND CHALLENGES FOR 'OLD WORLD' ECONOMIES: A CASE FROM THE UNITED KINGDOM

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Abstract

The rapid and dynamic rate of urbanization, particularly in emerging world economies, has resulted in a need to find sustainable ways of dealing with the excessive strains and pressures that come to bear on existing infrastructures and relationships. Increasingly during the twenty-first century policy makers have turned to technological solutions to deal with this challenge and the dynamics inherent within it. This move towards the utilization of technology to underpin infrastructure has led to the emergence of the term 'Smart City'. Smart cities incorporate technology based solutions in their planning development and operation. This paper explores the organizational issues and challenges facing a post-industrial agglomeration in the North West of England as it attempted to become a 'Smart City'. In particular the paper identifies and discusses the factors that posed significant challenges for the dynamic relationships residents, policymakers and public and private sector organizations and as a result aims to use these micro-level issues to inform the macro-debate and context of wider Smart City discussions. In order to achieve this, the paper develops a range of recommendations that are designed to inform Smart City design, planning and implementation strategies.

Keywords: *Smart cities, urbanization, technology, innovation and transition*

1. INTRODUCTION

Urbanization, in tandem with industrialization, has been a process experienced in Europe over last few centuries. Indeed the United Nations estimates that between 1950 and 2014 the world's urban population increased from 746 million to 3.9 billion and it is estimated that the percentage of the world's population living in urban areas will increase form 54% in 2014 to 66 per cent by 2050 (UNPD, 2014). In addition, and strikingly, the past fifty years have seen economic revolutions in the developing world that have evidenced economies undertaking rapid transition from agrarian to industrial, and then quickly onwards to information-based models of economy. In recent years, especially in Asia, and parts of Europe, and the United States of America, the drive towards industrialization and urbanization has brought about the emergence of so-termed 'Smart Cities'. These have raised something of a messianic vision of a Utopian future where an embedded infrastructure of information and communications technologies (ICT) provides citizens with wide-ranging real-time information with which to make informed choices within their lives. However, conversely, Smart Cities have also fuelled dystopian fears about one unequal power structure and set of dynamics merely being replaced by another controlled by technocrats and public-private partnership organizational arrangements. This paper explores an attempt, and the related issues, to develop a smart city.

2. THE PHENOMENON OF THE CITY AND THE ASCENT OF SMART CITIES

The role of the city is more important now than at any other period in human history. The percentage of the European population living in urban areas is at its highest historical level and set to grow higher (Caragliu, Del Bo & Nijkamp, 2011). Moreover, as cities grow they will start to merge to become 'mega cities'. By 2023 there will be 20 mega cities globally, with 55 percent in the developing economies of India, China, Russia and Latin America (Amarnath, 2011). In addition, further important examples exist in the more developed in the North American, Scandinavian and Israeli contexts.

This rapid and dynamic growth, particularly in the emerging world economies has put significant pressures on existing infrastructures and urban modelling has shown that this strain will simply increase. In order to understand this strain, and to find ways to mitigate it, policy makers and the private sector have increasingly turned to technological solutions and it is this growth in a technological underpinning of infrastructure that has led to the label Smart City.

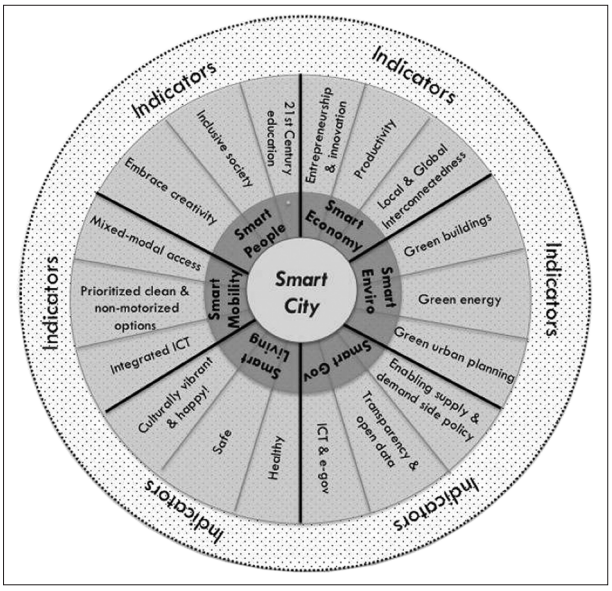
The term 'Smart City' is not new (see Bollier, 1998; Caldwell, 2002; Siemens, 2004; Cisco, 2005; Dirks, 2009). Harrison & Donnelly (2011: 8) suggest that the phrase has *'evolved to mean almost any form of technology-based innovation in the planning, development, and operation of cities'*. Caragaliu & Niikamp (2012) draw on the works of, Cohen & Levinthal, (1990), Coe, Paquet & Roy (2001), Glaeser, (2005), Poelhekke, (2006), Abreu, Kitson, Savona & Grinevich, (2008) and Hollands (2008) to develop a more detailed definition that identifies six facets of a Smart City:

1. The utilization of networked infrastructure to improve economic and political efficiency and enable social, cultural, and urban development;
2. An underlying emphasis on business-led urban development;
3. A strong focus on the aim of achieving the social inclusion of various urban residents in public services;
4. A stress on the crucial role of high-tech and creative industries in long-run urban growth;
5. Profound attention to the role of social and relational capital in urban development;
6. Social and environmental sustainability as a major strategic component.

Displaying some or all of these facets a number of cities have identified themselves as 'Smart'. Diez & Posada (2013) provide a number of examples. They observe that Barcelona has developed the Smart Citizen Kit – an electronic board and shield based on open hardware that can capture environmental data and share it through the internet; Amsterdam Smart City has involved the establishment of a private and public sector partnership to pursue a project portfolio focused on energy saving in the form of Sustainable-Work, Living, Mobility, and Public Spaces; the City of Edinburgh has developed a Smart City Vision project that focuses on *'e-government infrastructure to improve the performance and delivery of public services while supporting access and participation'*; and Manchester has developed *'a landscape of connected monitoring devices supporting impact mapping and program design across social, environmental, and economic domains'*. A host of project ideas are involved in Smart Cities, including: Integrated Databases for the Smart City; Sensing, Networking and the Impact of New Social Media; Modelling Network Performance, Mobility and Travel Behavior; Modelling Urban Land Use; Transport and Economic Interactions; Modelling Urban Transactional Activities in Labor and Housing Markets; Decision Support as Urban Intelligence; Participatory Governance and Planning Structures for the Smart City (Batty et al., 2012). Thus, recent technological advances now allow cities to be 'instrumented', facilitating the collection of more data points than ever before, which enables cities to measure and influence more aspects of their operations. Cities are increasingly 'interconnected' allowing the free flow of information from one discrete system to another, which increases the efficiency of the overall infrastructure to meet these challenges and provide sustainable prosperity for citizens and businesses, cities must become 'smarter' and use new technologies to transform their systems to optimize the use of finite resources. Much has been written on how such infrastructures can "work smarter, not harder." (see Mitchell, 1995, 2001, 2003; Graham & Marvin, 2001, 2002; Castells, 2011) Indeed, the creation of a Smart

Cities program within the MIT Media Lab provided groundbreaking examples of the ways in which innovation could be seen as the provider of sustainable solutions to urban problems. Cohen (2012) provides a holistic model that integrates and summarizes many of these elements.

Figure 1: The Smart Cities Wheel



Cohen, B. (2012). What exactly is a SMART City? Retrieved from http://www.fastcoexist.com/1680538/what-exactly-is-a-smart-city on 31st November, 2014.

The preceding diagram illustrates the complex system of interfaces, interdependencies and dynamic relationships that exist in modern cities. From an environmental standpoint this parallels well the naturally-occurring dynamism of ecosystems which develop balance out of the interplay between the forces of nature. We do not mean to say that any modern or 'smart' city is a complete ecosystem unto itself as there will always be external forces exerting themselves on the system by influencing the "indicators" in the image above, but that one aim of Smart Cities might be to enhance the relationship between individuals and their environment in ways that provide some kind of *balance* to the system, be it justice, social equity, or other kinds of equilibria. These kinds of targets map very well onto the goals set by the planners of NOW's Smart City bid for European funding. In producing such balance, the private sector has been and remains key to Smart City development. IBM for example has led not only a high-profile campaign to promote Smart Cities but has supported its staff to present papers in academic conferences and seminars demonstrating their development (Dirks, Gurdgiev, & Keeling, 2010).

The critical factor in any successful community, enterprise, organization or venture is its people and how they interact. Hollands (2008) suggests that this is because the most important thing about information technology is not its capacity to create Smart Cities, but the possibility it offers for them to empower and educate their citizens so that they can become members of society capable of engaging in a debate about their own environment. Furthermore he suggests that technology should:

> *'…create a real shift in the balance of power between the use of information technology by business, government, communities, and ordinary people who live in cities, as well as seek to balance economic growth with sustainability…In a word, the "real" smart city might use IT to enhance democratic debates about the kind of city it wants to be and what kind of city people want to live in.'*
>
> (Hollands, 2008: 312)

To achieve this, cities that really want to be 'smarter' will have to *"take much greater risks with technology, devolve power, tackle inequalities, and redefine what they mean by 'smart' itself, if they want to retain such a lofty title"* (Hollands, 2008: 316). These views are radical in a discourse dominated by the language of 'progress', 'innovation', and 'entrepreneurship'. They pose a serious and considered insight into the powerful drive behind the development of technological solutions to societal problems, and recently they have been taken further by the concept of 'smartmentality' proposed by Vanolo (2014). He argues that while on the one hand Smart City policies support new ways of imagining, organizing, and managing the city, on the other they might be seen to create a new moral order for the city by introducing specific technical parameters in order to distinguish between 'good' and 'bad' elements of the city. In Vanolo's critical perspective the Smart City discourse may therefore be a powerful tool for the *'production of docile subjects and mechanisms of political legitimization.'* (Vanolo, 2014: 890).

Through an analysis of policy documentation and funding frameworks Vanolo argues that the

concept of the Smart City has been most prominent in Europe because it has received significant support from European Commission structural funding. Moreover the language of the Smart City has been dominated by *'a powerful rhetoric including salvation visions of technology and the image of clean, livable, technologically advanced cities far removed from the economic crisis.'* (Vanolo, 2014: 894). He argues that far from empowering citizens to play a greater role in their society such cities inevitably create a new geometry of power dynamics which shifts towards technocrats and public-private partnerships – a process he calls 'smartmentalisation'. For Vanolo there are two dangers inherent in such a process. First the wide support for *a priori* concepts inherent in notions of 'smart', 'progress', 'technological', 'innovation', etc. means that critical perspectives of Smart Cities may be lost and have no voice. This in turn will mean that those individuals not included in the new systems (the elderly or the homeless, for example) could become increasingly excluded from Smart Cities. Second, by imagining social problems as essentially technological ones the notion of the Smart City – in its all-pervading current form – limits creative solutions which are based on understanding human actions and interactions rather than leveraging the capabilities of ICT.

Vanolo's point is not that Smart Cities are inherently bad. Rather he makes the point that Smart Cities and the technology that support them are assumed by the modern *zeitgeist* to be so positive means that there is a need:

> *'…for studies and considerations regarding: the politics engendered by smart city projects; the geometries of power triggered by strategies; the relationships between the city and technology; the role played by different fields of knowledge in shaping the city of the future; and, finally, the need to bring the smart city into the political arena in order to spark a serious debate about the kind of smart city we want to live in.'*
>
> (Vanolo, 2014: 895)

Thus Vanolo urges us to question the justifications for our beliefs that technology will solve, or is even capable of solving, serious problems in human society. It is now time to turn towards the specific instance of Smart Cities in Old World contexts.

3. 'OLD WORLD' SMART CITY TRANSITIONS

While much of the literature and comment has focused on the relatively historically recent settings of emergent of New World emergent market economic contexts (for example South America, India, China), there is less discussion that explores the challenges facing 'Old-World' post-industrial economies (for example, Europe including the United Kingdom) and the challenging transitional processes that they have undertaken in order to move from old industries and infrastructures towards aspirational Smart City status (Shelton, Zook & Wiig, 2015).

'Old World' economies are those economies which formed part of the earliest Industrial Revolutions (spanning the period 1750-1920). They are situated predominantly in the Western hemisphere and, more precisely, mainly although not exclusively in a relatively small European area. Over the stated period, the North of England exhibited intense industrial activity across a number of sectors, including, initially, shipping and textiles, and later shifted into railways, chemicals, and energy. This industrial infrastructure was based on traditional industries such as coal extraction (centered in Yorkshire), steel production (the city of Sheffield), textiles (Manchester), chemicals (Runcorn), and shipbuilding combined with seaports and intercontinental trading (Liverpool). The twentieth century witnessed the terminal decline of many of these industries and consequently extensive structural unemployment and industrial decay. As a consequence these 'Old World' cities possess an extensive range of post-industrial derelict "brownfield" sites containing obsolete and unused factories, warehouses and storage buildings.

These aging urban and industrial environments are often burdened with structural industrial and labor market transitional issues which are compounded by a range of socio-cultural problems and, as such, present a particular range of challenges in relation to their move towards becoming a Smart City. Consequently, the purpose of this article is to examine attempts by, and challenges for, cities and conurbations in 'Old World' settings to move towards, and manage, more dynamic 'Smart City' status and environments. Large segments of developed economies are forced to confront these issues. This

article presents, discusses, and analyzes a case drawn from the North of England.

Transitions from old (first-generation) industrialization and urbanization environments present a range of challenges for a variety of stakeholders and their dynamic relationships. The term 'stakeholders' presumes a potentially rich collection of individuals and includes, by way of example: city inhabitants of various socio-economic and cultural backgrounds, business owners and directors, local government authorities and councilors, local institutions such as schools, and professional advisors and consultants. Such a variety of stakeholders may of course also be common to Smart Cities in 'New World' and emerging economy contexts, however, 'Old World' economies exhibit relationships, mind-sets and legacies that are a product of particular combinations of embedded historic industrial and post-imperial relations and social structures.

As alluded to above, technology has always played an integral role in industrialization and its associated urbanization. It has also been central to the ascendency of Smart Cities however it is the relatively recently arrival of the internet and its accompanying social media that provide the core of the technology of Smart Cities. In developing the overall commentary on Smart Cities, it is possible to discern three phases of the interaction of technology and Smart Cities and these can also be broadly aligned, in principle, to certain historic phases in the conception, and the evolution, of the Smart City phenomenon. These phases, and particularly Phase III, have particular implications for 'Old World' Smart City transformations in general and the subsequent case study in particular. Table 1 provides a description of each phase.

Phase I thinking suggests that with the instigation of various technologies in recent decades Smart City transformation should be able to take contextual account of 'Old World' city economies and that it might be possible to determine a variegated set of challenges and potential responses.

The progression from Phase I type development (whereby the solutions to human problems are seen as mere technological issues, and that the resolution of ICT shortcomings will lead directly to a reduction of social problems) to Phases II and III – where a more comprehensive understanding of the interface of social, political and economic factors

Table 1: Typology of Interactions with Information Technology by Smart Cities

Phase I *Technology viewed as providing categorical solutions to urban issues and challenges.*	This represents an *early phase* in the application of technology to social and economic issues and is a nascent element of the emergence of Smart City phenomenon. It was driven very much by the North American military-industrial complex through influential entities such as IBM and MIT. This approach could be termed the "technological deterministic approach," whereby technology is the motor that drives and shapes human life.
Phase II *Technology not necessarily or automatically viewed as a solution to the challenges of urbanization and living in dense urban spaces such as cities.*	This represents a more questioning approach to technology. Rather than viewing technology as the automatic solution to a range of concerns, technology is seen merely as a means to an end. It uses technology to inform citizens so that they may act differently and, indeed, perhaps the value-judgment or subjective implication is, act 'better'. In broad terms, this Phase may be suggested as occurring before and around the turn of the millennium but often continues in many 'New World' Smart City settings.
Phase III *This is a heightened cautionary approach to the use of technology as a means of enhancing urban life and experience.*	This may be seen very much as the vision guiding a range of Smart City developments. This is particularly an aspirational position and approach in 'Old World' contexts which need to take account of many longstanding structures and stakeholders. Within Phase III, there is a concern over seeking uniquely technological solutions to what are, in essence, human problems. This phase and the perspectives that underlie it tend to favor local- and district-developed responses rather than the mantle being always picked up by 'big business' and (or) 'big government'. This overall approach aims to adopt a more humanistic social and critical perspective approach rather than a technological deterministic approach of Phase I.

comes into play – is an ideal or aspirational progression. This is especially exemplified in the case of transitions to Smart Cities in 'Old World' economy contexts, because it inevitably invokes particular power dynamics brought about by the motives and actions of traditional and longstanding stakeholders. Consequently, there is always a risk and concern that some stakeholders may be left behind. This is a problem that many advocates of Smart Cities seek to avoid and could be seen as the purpose of engaging in Smart City design in the first place: to include all citizen in the life and vigor of their city. In this regard, while there is no doubt that the private sector is instrumental in progressing the Smart City agenda there is also recognition that it must work together with the public sector in order to ensure it connects with the widest appropriate body of stakeholders. It is in the 'local' and 'district' level responses that circumscribed and targeted private initiatives can be anticipated to be most active. Moreover, undertaking these actions within the spirit of Phase Three might be viewed as the broad overall aspiration.

To restate the focus of the present discussion, the development of 'Old World' economies is the underexplored aspect of the Smart Cities agenda we wish to examine in this paper. In particular we are interested in examining it in relation to the indicative epochal phases of Smart City development suggested above.

In the following section we present a case study that outlines the challenges and issues faced by a post-industrial agglomeration in the North West of England and its tentative attempt to become a Smart City. In order to preserve anonymity the name of the agglomeration has been changed to Northern Old World (NOW) City. Following this we develop a schema and typology with which to examine and debate the stakeholder dimensions of this process and experience.

4. THE CASE OF 'NORTHERN OLD WORLD' (NOW) CITY

4.1 Background

The focal case for this study is an urban agglomeration in the North West of England which at its center has a population of over 200,000 residents. In terms of population, NOW is relatively very small compared to its 'New world' counterparts, however, this is often a feature of 'Old World' and predominantly European settlements.

The location is strategically located between two other major cities and their conurbations and NOW has a long established heritage with a reputation for being an important progressive environment. During the Industrial Revolution a range of industries such as metal processing and manufacturing were established, and a canal system was constructed to facilitate freight transport linkages. During the 20th century the location continued to flourish and its strategic importance increased further as it became an integral part of the United Kingdom rail and road network. However, despite its history of success, more recently NOW has encountered a range of serious challenges. The post-industrial era has brought a relatively successful shift towards service sector activity, such as out-of-town retail operations, warehousing and call centers. Extensive residential developments have also occurred frequently involving conversion of industrial buildings into apartments and housing projects on brownfield sites. Along with this structural shift, NOW has an aging population which is significantly older than other parts of the United Kingdom. Also, the transport infrastructure that serves the area and its immediate locality is experiencing increasing pressures and, as a consequence, requires significant investment to keep pace with growing usage. Environmental issues and health and well-being concerns are also highlighted as key challenges.

It should also be noted that 'NOW' City has a strong historical cultural backdrop. Among these features are musical brass bands (a legacy of the collieries), rugby league sport (the predominantly tactile and demanding Northern-based version of game of English rugby), a particular 'northern' accent, and a mind-set linked to strong civic pride which has been tested by varying economic fortunes during the end of the last century.

4.2 NOW's Organizational Engagement with the Smart City Concept - Issues

The opportunity to explore the idea of creating a Smart City arose due to the possibility to bid for a

major tranche of United Kingdom Government funding through the 'Future Cities Demonstrator competition' led by the Technology Strategy Board (TSB). TSB is a business-led executive non-departmental public body established by the United Kingdom Government. Its role is to promote and support research into technology and innovation for the development and benefit of United Kingdom business, to increase economic growth and improve quality of life. It is sponsored by the central government Department for Business, Innovation and Skills.

In response to the competition, NOW aimed to develop an integrated *'people-based, place-centered approach'* that was designed to *'create a fully integrated information solution designed to meet needs of the people of NOW.'* (NOW, 2013: 10-13). A broad range of stakeholders, including the local government authority, members of the community, health workers, police, fire and rescue services, and local businesses and industry groups were involved in the design and planning stages of the strategy. The planned 'Vision for the City' utilized an interactive system to facilitate innovative solutions for challenges in key areas such as mobility, community, health and well-being, and environmental protection. Some of the technological components of the proposed system included superfast (fiber optic) broadband, tablets and smart phones connected via Wi-Fi, smart TVs, integrated open data public service systems, smart cards for cashless payment and incentive schemes, and smart meters and sensors to monitor and control environmental performance. It was anticipated that the Smart City system would generate a range of organizational economic, social, financial, and environmental benefits. Economically it was hoped and anticipated that better physical and digital connectivity would enhance business productivity and facilitate a more streamlined and transparent commercial environment. From the social perspective it was anticipated that benefits such as better access to public services and information, reduced isolation and deprivation, and more engaged enterprising citizens would accrue. Financial benefits were expected to include reduced demand on public services and new revenue generating opportunities such as leasing out street lighting for increased Wi-Fi connectivity. Potential environmental benefits included better air quality, reduced emissions and increased awareness of environmental information to facilitate decision making.

However, although the creation of a Smart City was comprehensively planned and discussed the project was not implemented; the funding bid to the TSB was not approved. The following section analyzes and discusses the perceived problems the project sought to address but which ultimately contributed to the failure of the project.

4.3 NOW: Socio-Economic and Demographic issues

NOW is a community of stark contrasts, containing some wealthy neighborhoods and also some of the most deprived areas in the United Kingdom with regard to the residents' levels of income. The main change for NOW people came with designation as a New Town, which expanded the area rapidly in terms of businesses and residents in the early 1970s. The young professionals and families who moved to NOW in this period are currently nearing retirement; this explains why NOW has an age profile that is older than much of the rest of the United Kingdom. The impact on the service needs of residents is changing rapidly as a result. The total population is projected to grow by another 10% by 2033. The number of older people (aged 65 and over) is expected to grow disproportionately as well, estimated to show an increase of 79.7% since 2008, compared to 65% in England and Wales overall.

As required by United Kingdom law, the local government authority undertook a Joint Strategic Needs Assessment, which enabled them to develop a 'Strategy for Wellbeing'. This strategy highlighted that the people of NOW face four main issues:

- Aging population
- Alcohol (misuse)
- Mental health and wellbeing – personal resilience
- The need to reduce demand on services over time by focusing on prevention rather than cure

These four areas were key to the development of the foundational Smart City concept as they contributed to forming focused areas for improvement in the 'Strategy for Wellbeing' that a Smart City, aided by technology, was expected to alleviate.

However these four points did not make up the entirety of the program. The local government authority development team was quick to identify that other areas of public policy must be strongly connected to this area. These other areas included the fields of activity indicated below (NOW, 2013: 5-8). Furthermore, due to generational (e.g. X) issues of the generally aging population, the adoption of technology was also a question over the project.

4.4 NOW: Environmental issues

In 2009, the narrow majority of NOW's carbon emissions (38%) were from transportation, with industrial and commercial emissions accounting for 37%, and domestic emissions amounted to 27%. Emissions per capita in NOW were slightly higher than the average for its region and for the United Kingdom as a whole, partly due to its position on a strategic road network, and partly due to the relatively low density of housing.

There were three Air Quality Management Areas within NOW, comprising one area around the motorway network and two in the center. In all cases nitrogen dioxide was extremely high with the main cause attributed to road traffic. Those living in and around these areas (almost 400 properties) were at increased risk of health impacts related to air quality. These issues are aggravated by a road system (outside the nearby motorways) laid out on an old medieval and Victorian road network. This network struggles to deal with traffic in peak hours and it was recognized that even with the most innovative technology the Smart City proposal would have a major challenge to reconcile in this domain.

There are also almost 7,000 homes, businesses, and other buildings within the 1 in 100-year floodplain area or 1 in 200-year tidal flood extent within NOW. These properties have a 1% (fluvial) or 0.5% (tidal) chance of flooding in any given year. This number rises to almost 15,000 properties when the extreme 1 in 1000-year fluvial and tidal flood event is considered. A National Assessment of Flood Risk in 2009 identified NOW as having the 10th highest number of properties at significant risk of flooding in England and Wales.

4.5 NOW: Housing issues

Central to the NOW New Town Development Corporation expansion plan in the early 1970s was a targeted increase in population to around 200,000 people by 1991. NOW met those targets and continues to see growth across the area. Over 90% of new homes were built on previously developed land. NOW expects to see an increase of 11,000 new homes over the next 15 years to 2030.

NOW had fewer 'non-decent' homes than the national average, however 31% of privately rented homes were still classified as 'non-decent'. The local government authority perceived the local housing market to be particularly susceptible to the then-envisaged – and later realized, as a result of government legislation – housing benefit reforms both in terms of housing affordability and fuel poverty. The housing stock presents a challenge for the development of a Smart City in terms of engendering effectiveness and efficiency through technology. The majority of housing and residential zones in NOW have not been constructed with integrated Internet and social media applications in mind. This means that the integration of the networks and materials has to be overlaid onto an existing and, in many ways, inappropriate or outdated infrastructure. Newer developments provide an exception to this but access to sufficient amounts of electricity in houses wired three or four decades, or in some case, more decades ago is highly likely to be inadequate over the medium or longer term. In contrast, newly built homes and conversions of old industrial buildings (for example, factories, textile mills and warehouses) possess updated internal infrastructure and thus can incorporate specifications for Smart City approaches more readily.

4.6 NOW: Skills and Education issues

There are approximately 100 primary and high schools in NOW. Many of the high schools include 6th Form (i.e. university preparatory) provision but there are also two further education colleges offering programs for youths aged between 16-18 years alongside adult education courses. A mid-ranking university has a local campus. NOW is also well served by access to universities in other urban conglomerations within 20 miles.

In general, educational attainment in NOW exceeds the national average, however lower educational attainment for children living in deprived areas persists. Substantial challenges remain to ensure the population has the skills and qualifications to access local employment opportunities, most particularly in disadvantaged areas. While the younger generations (or to employ common terminology – Generations Y and Z) have fluency with the technologies that underpin Smart City, nevertheless, a mismatch exists between low educational attainment among some groups and the Smart City aspirational environment. This means that the skill base on which NOW aimed to construct a Smart City was not as strong as it might have been.

4.7 NOW: Economic and Corporate Organizational Issues

NOW is, on some measures, a prosperous community. Headline gross value added (GVA) within NOW was approximately £4bn, which means that at approximately £20k per head it was the highest in the region. This was expected to increase to around £28k per head by 2030 despite the projected growth in population. Moreover, the Centre for Cities report "Cities Outlook 2012" featured NOW in some of its key rankings. NOW sat within the top ten cities with an employment rate over 75%, representing a 3.2% growth from 2010 and was the only one of 11 centers seeing its employment rate rise by more than 2%. NOW also numbered among the top ten with the highest proportion of private sector employment, which had helped insulate NOW from the worst of the public sector spending cuts in the wake of the 2008 recession which affected large swathes of advanced Western economies.

Industrial and commercial sectors supported this economic success and industrial buildings both in use and converted were much in evidence, including a large chemical factory and plant. The conurbation is close to significant power generating facilities which generates electricity for many business and homes in the region. Other key businesses in NOW include a venture capital company, a recycling company, and a utilities firm which are highly ranked in industrial listings. The nuclear power business is also very active and a forum was recently established with substantial research facilities nearby. The area therefore has a substantial potential base on which to build its Smart City approach.

4.8 NOW: Future Economic Development

NOW has ambitious plans for future development with a number of high profile projects progressing in the next few years. The local government office has worked with developer partners to bring forward important sites for renovation or reuse to provide facilities for local people and support aspirations for growth. These projects, which included significant center regeneration, the development of a major new waterfront area, and a large distribution hub amongst others, were forecasted to create a further 38,000 jobs for the town before 2030 (NOW, 2013: 7).

Nevertheless, by far the biggest economic development within the North-West region, and one which fed strongly into the Smart City planning, was the development of the Atlantic Gateway. The Atlantic Gateway proposal is one of the largest infrastructure projects in the United Kingdom. The project is backed by a £50 billion investment granted over a 50-year period and aims to create a critical mass to achieve a new level of growth not previously achieved in the United Kingdom outside of London. Building on four key themes (growth, connectivity, infrastructure, and sustainability), the local government authority of NOW believes there is the potential to achieve up to 250,000 new jobs in the region covered by the Atlantic Gateway project, involving £14bn of local investment. Project leaders see NOW as one of the key infrastructure network nodes of the Atlantic Gateway, linking waterborne freight along the canals with the national rail freight network and the motorway road network. NOW is centrally located to take full advantage of the inward investment in this project.

However, the realities of the increased traffic that would attend the Atlantic Gateway represent a potential risk which was a key influencer in the design of the Smart City project. The increase in traffic in past years had left parts of the local network under increasing stress. The main nearby motorways, in parts, suffers from daily stress levels in excess of 150% of capacity on both the northbound

and southbound carriageways. Increased emissions from expanded business activity and the greater number of vehicles expected as a result of the Gateway initiative will have a negative impact on the natural environment and air quality. Similarly, increased waterborne freight on the canal, though positive in economic terms, was forecasted to lead to the swing [road] bridges being raised more often with the result of further congestion on the roads and increased delays. Thus development pressures, high levels of car ownership (a third of households in NOW own two or more vehicles), and a fast growing economy would all lead to high traffic growth with concomitant environmental concerns.

The local government authority had a plan to reduce the carbon footprint of traffic within the area through the increased use of low carbon buses, implemented by a publically owned and managed bus company which operated the majority of local services, and the encouragement of electric vehicle use particularly along the strategic routes surrounding NOW. The Smart City project was seen as key to this aim by enhancing the electrical network and allowing improved information to all users of local transport networks to facilitate better journey planning, avoid congestion 'hot spots' and unforeseen incidents, and allow people to manage their mobility choices better.

As the NOW Smart City plans were developed, the key projects to be funded fell into four general categories:

Mobility: Efforts would be placed into creating an improved infrastructure for electric vehicles, creating and implementing an easily accessible real time traffic information to enable citizens to avoid congestion-prone areas at key times of the day, and promoting public transport. Planners believed this could be achieved through an interactive platform which would allow innovative solutions to be developed, integrating traffic sensors, a smart journey planner, "smart ticketing" and "smart cards" which would be connected to other reward systems, and initiatives for personal wellbeing and environmental protection.

Mind and Body: Information technology support would be offered to help elderly people who wished to remain living at home to do so – particularly those with dementia. The incentivizing of positive public health and active lifestyle choices might benefit from better information and access to activities and healthy food networks. An integrated platform together with a smart card system would provide incentives for activity through a rewards program and a healthy eating and community activity agenda to encourage sustainable and active life choices. This system would operate through a central data platform in conjunction with learning and training activities in libraries, schools, leisure and community centers, and care homes.

Environment: The plans include improved monitoring and real time information to those at risk of flooding and those in areas of poor air quality. This would be achieved through encouraging demand management of energy in homes and businesses via smart meters and the initialization of decentralized energy networks in new urban developments. Moreover the smart monitoring of waste collection services would improve quality of service and promote behavioral change such as recycling.

Community: In order to support the changes above the local government authority promoted the creation of an open data platform that would enable individuals and businesses to create applications to suit their own needs and those of fellow citizens. In this way the local business community, and engaged citizens with appropriate skills, could co-create the infrastructure of the city's system to suit local needs as directly as possible.

To summarize, in this respect, the proposals from NOW reflected earlier work on the "intelligent city" by Komninos (2002, 2008), that brought to the fore the citizen's role in the Smart City through the last of the four main components, interconnected infrastructure:

- the application of a wide range of electronic and digital technologies to communities and cities
- the use of information technologies to transform life and work within a region
- the [physical] embedding of such ICTs in the city
- the 'territorialization' of such practices in a way that brings information technologies and people together to enhance the innovation, learning, knowledge, and problem-solving opportunities that the technologies offer.

Reflecting on the issues and opportunities, in conjunction with the key ambitions and drivers, confronting NOW, Hollands (2008: 306) encapsulated this concept and vision by identifying Smart Cities as:

> *'territories with a high capacity for learning and innovation, which is built in to the creativity of their population, their institutions of knowledge production, and their digital infrastructure for communication.'*

The key elements of this definition relate to the use of networked infrastructures as a means to enable social, environmental, economic, and cultural development. And, this focus upon the ICT infrastructure (mobile and landline telephones, satellite televisions, computer networks, electronic commerce, and internet services) involves a shift away from the e-commerce challenges of enterprise architecture and transaction-based business logic underlying the development of e-government services and towards something much 'smarter' – *the social capital of networked communities* (Halpern, 2005). Furthermore, importantly this is more than simply a collection of data garnered from measuring citizens' activities. Instead, Halpern (2005: 508) asserts that the social capital inherent in the Smart City includes *"a cluster of norms, rules, values, and expectations; and sanctions."* Implicit is the notion that users (the citizens) are creating their own norms and values simply through their interaction with the systems and that solutions or new systems can and will emerge from those norms and values rather than being imposed upon the system from above. The establishment of dynamic relationships and connections of these types marks a significant shift in the social contract between the citizen and the state, possibly moving onto new ground historically. No longer is it the state's role simply to provide services to citizens; now it is the state's role to develop systems to gather real time information and thus inform citizens in such ways that enable them to make positive choices about their lives. This was something to which future cities may aspire:

> *'While the vast majority of community ICT experiments have to date not met the conditions above [ecological integrity, equity, democratic renewal, etc.]…ICT networks may have great potential to boost local social capital, provided they are geographically "intelligent," that is, are smart enough to connect you directly to your neighbors; are built around natural communities, and facilitate the collection of collective knowledge. They have the potential to connect the work-poor and work-rich.'*
>
> (Halpern, 2005: 509-510)

Here is the key difference between "Intelligent" and "Smart" cities. While many authors have seen these phrases as synonymous others have seen the distinction as vitally important:

> *'The thing to bear in mind here is that for smart cities the capacities that intelligent cities have sought to develop over the past twenty years or so become the technical platform for their application across a host of service-related domains.... For it is here and at this stage of development that the point of emphasis and intervention begins to shift from innovation to application, from the back-office to front-line services, and in policy terms, the emphasis also shifts from the corporate to the civic, from the market to the community, and from the bureaucratic administration of the economy to a liberal democratic governance.'*
>
> (Allwinkle & Cruckshank, 2011: 9)

This distinction thus highlights the perceived difference between these two forms of civic organization in the sense that while the intelligent city gathers the data necessary to become a Smart City, it is the largely social transition away from market structures and information asymmetry to community engagement and unrestricted access to the system which characterizes a truly Smart City. Our article has mapped out the nature of Smart Cities and the issues they present in relation to 'Old World' cases such as NOW. We move on next to discuss the manner in which the challenges unfolded and why the NOW Smart City project did not progress as envisioned.

5. DISCUSSION

The issues outlined above facing NOW in its present state and in its short-term future pose a number of challenges for local public sector partners. In this case study, we saw that following the thinking of Hollands above policymakers set out to address the community's needs through a focus upon human behaviors rather than upon technolog-

ical developments alone. This shows a rejection of Phase I thinking in favor of Phases II and III.

There was a shared conception among the development team that the key to a Smart City was not the design of *specific solutions* to *specific problems* imposed by the state onto the citizenry – that was seen as a "short-term quick fix" model. Rather, they wanted to support the citizens of NOW to become equipped with skills and adaptive behaviors which would see them able to engage in and solve problems as they emerged – and this centered on notions of developing "resilience of the city" (NOW, 2013: 1-11). The planners wanted NOW to be *"stronger, more adaptable, more capable of dealing with the challenges ahead"* and identified three levels on which they wanted to achieve this increased resilience: economic, environmental and personal (NOW, 2013: 11). This approach aligns very well with earlier claims that the upper limit to regional or national economic growth is ultimately reliant upon the productivity growth experienced by its workforce (Tyson, 1999). Better-equipped citizens and workers offer enhanced long-run economic benefits.

Personal resilience was seen as the most fundamental aptitude which would influence both economic and environmental improvements in NOW by producing 'enterprising citizens'. Enterprising citizens would be more able to cope with the range of issues that would face them. They would have the skills and knowledge to find solutions and work creatively to overcome barriers. It was the avowed vision of the project to foster a community where this ability would be common to all (NOW, 2013: 11). The funding would be used to create catalysts in NOW to build towards a positive 'tipping point' which would occur when the behavior and innovation in the community broke through resistance to establish dynamic relationships and become common practice and a self-sustaining cycle.

In this sense the technology involved did not exist for its own sake nor to support improved measurement of people's movements and activities. Instead, it was to be a motivational force which encouraged individuals to "act better". Here then is a clear perspective of 'Old World' development of the Smart City: this is not a matter of technological penetration and exploitation but a process of structural industrial and, moreover, psychological change. A schematic of what developed as a result of this call for proposals is shown below, with multiple levels of technological integration from the sensors and distribution methods (e.g. fiber optic cabling) on the bottom through the middle-level 'integrated platform' where the data from a variety of sources could be viewed, combined, and sorted, through to the user-facing applications intended to deliver 'digested' information to the citizens of NOW and receive their feedback. This system aimed to enhance people's lives through more informed decision-making, better environmental monitoring and control, and easier access to public services (Figure 2).

But was this achieved? The project was led on a day-to-day basis by the local government authority's environmental management supported by strategic staff whose role was to provide vision for the future direction of the local government authority. These staff members in turn linked to creative policy thinkers external to the local government authority in statutory public and in private sector agencies. Therefore, the spirit and aspiration of the project was directed towards Phase III approaches and conversations. However, as the project developed there was an increasing influence of the technical needs, capacities and limitations available in designing the approach. Moreover, the discussions – perhaps generationally influenced by those holding office and engaged on the project – increasingly seemed to revert towards both Phase I and Phase II thinking. In this way, it was if the aspiration was transformed into something more technologically orientated than envisaged at the outset. The final report was submitted by the local government technology staff. While they were indeed a dynamic positive and creative force in the design of the concept, they were also by their nature technological staff and well-versed in using the structures and discourse of technology rather than the discourse(s) of community engagement. Indeed, the nature of the call for proposals meant that almost inevitably the project eventually settled upon a vision for a future city which saw technology viewed as a way to supply comprehensive solutions to urban issues and situations, that is to say, a Phase I based vision.

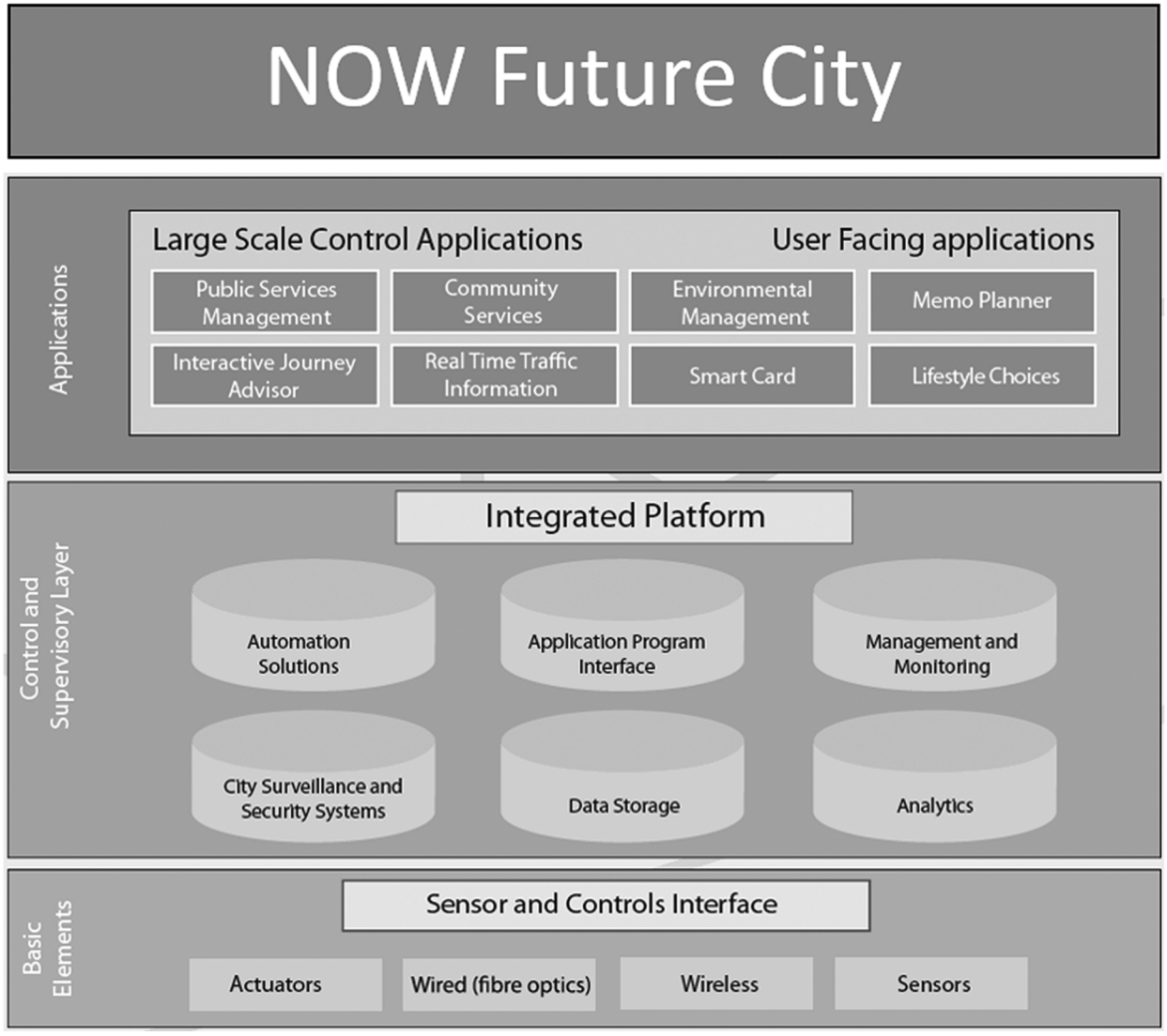
The overall appraisal of the 29 cities across the United Kingdom which were shortlisted for funding

found that 26 of them proposed web-based or virtual service platforms, which in the words of the evaluators:

> *'… will allow more efficient and responsive services, to be delivered with fewer resources, enabling citizens to develop solutions independent of the local government, and businesses to develop and thrive in an open information marketplace.'*
>
> (TSB, 2013:15)

And here resides a key issue, for time after time the focus upon the cultural capital developed by the technologies within Smart Cities has under-estimated the bureaucratic reality of installing and developing the systems needed to develop a truly Smart City in line with stated visions. While there is a strong literature on the technological innovations themselves, often supported by technology companies working through universities (Greenaway & Rudd, 2014: 50) and the literature on the development of cultural capital is starting to emerge, little has so far been done to explore the mechanisms whereby practitioners and policy makers (both public and private sector) are able to integrate new technological concepts into existing, often long-standing and rigid, local government policies. Nam & Pardo (2011: 85) point out that *'[t]here is a gap in existing literature of a Smart City. Most writers address only technological aspects. So far the liter-*

Figure 2: Northern Old World (NOW) City of the Future



ature has viewed a Smart City as a manifestation of innovative ideas, mostly neglecting considerations of the policy and managerial side of innovation.' Moreover, it may be suggested that this debate is taking place predominantly in New World economic contexts rather than in Old World contexts. The historical legacies and issues (and indeed opportunities) which confront NOW as an 'Old World' context – generational thinking of aging populations, updating Victorian and Twentieth Century industrial and transport systems, wrestling with socio-cultural transformations linked to educational aspiration and mindsets – mean that the bureaucratic governmental and working group mechanisms find the varied and multiple deep-rooted stakeholder mindsets and governmental and societal structural issues a major challenge. From the analysis of the case of NOW a typology of mindsets, competing dynamics and approaches emerge:

1. The role of 'thinker/radical/idealist' tendencies in the debate

   In the case of NOW this tendency came most interestingly from the planners in local government. Stereotypically we might have anticipated a more conservative response from this group with correspondingly more excitement from private business or social activists in the community. This unexpected response could arise from a genuine desire to make a positive change in the life of the local community, to establish a legacy of one's work and career, or to use the successful implementation of a large-scale project as a stepping stone to a future career in politics.

2. 'Luddite' Trepidation and Fear tendencies in the debate

   This tended to come from the lower socio-economic groups whose concern boiled down ultimately to "are they going to make us all lose our jobs?" In the United Kingdom there is also a sense of widespread weariness with government surveillance and closed-circuit video security systems; a Smart City initiative could strike many residents merely as increased government monitoring rather than the empowering, educating movement for their own benefit it was intended to be. Finally, concerns remain that social groups who are currently difficult to connect with digitally will remain so in the future despite Smart City initiatives, especially the elderly, the very poor, immigrants with weak English language skills, etc.

3. Technocrat[ic] tendencies in the debate

   There are participants in this field who are disconnected from the local context, largely if not exclusively driven by secondary (perhaps personal) motives, for whom Smart City planning and implementation is just another political process. This might be seen as the obverse side of the coin to the Phase III mindset: rather than reflecting the cautious, critical-minded and socially-orientated Phase III mindset alongside many of the other stakeholders, the technocrat holds a rather cynical mindset which enters the arena of the post-industrial Smart City development, performs a certain service or function, and then moves on with little regard for the outcome of the project for the local residents. Such a person may 'move on' to generate another funding bid for other purposes aimed at national or international granting agencies.

It might be argued that the private sector has both substantial capital and innovative thinking which together may be capable of breaking through these kinds of barriers. However, in the case of NOW, a series of meetings was held with key private sector innovators; these were companies which design creative infrastructure systems and often implement them as well. While this process offered ideas and support, it proved unable to modify the bureaucratic and societal regimes which prevailed in NOW's context. The importance of collaboration and the establishment of dynamic relationships between the private sector as 'innovators' and the public sector as 'providers' in this field has been discussed elsewhere (see Giaglis, Klein & O'Keefe, 2002; Dois, Llerena, & Labini, 2005; Chesbrough, 2006; Fung & Weil, 2010). Much of this work has seen the private sector and public sector entering into collaboration from very different perspectives. A statement from this perspective might argue that:

'The main problem in the private sector is the sourcing of novel and relevant ideas in a search space enlarged by globalization...In the public sector, however, where the objective is not exclusively finding new solutions but also building and acti-

vating ecosystems to meet the challenges of society, the main problem to solve is how to effectively connect and engage communities around these challenges.'

(Bakici, Almirall, & Wareham, 2013: 313)

This was certainly the case in NOW. Throughout the planning stage, local government authority officers remained aware of three separate but interlinked 'risks' to the project:

1. Commitment from other areas of the public service sector – most notably social welfare providers who instinctively distrust partnership with the private sector;
2. A critical press which could report that spending public money on technology was wasteful when traditional services were being reduced in a recessional 'Old World' context;
3. The willingness of citizens to engage in the program. This included fears about citizens who did not wish to see themselves as public service users and would not wish to use new technologies, and those who were intensive users of public services but see themselves purely as passive recipients rather than co-producers of those services.

These three 'risks' all shared a similar element: the general distrust of, cynicism or at least skepticism towards, the state by its citizens. In all three cases key groups were identified who, it was felt, were unlikely to respond positively to the widespread use of technology even if it aimed at ultimately beneficial changes in the life of the community. Indeed, it was strongly assumed by some public sector workers planning the project that all three groups would react negatively, would do so very quickly (probably as soon as they discovered that planning was taking place), and would be intransigent in their criticism. It should be noted that these fears came almost exclusively from public sector representatives and not from private sector visionaries for whom these planning sessions represented an opportunity to talk excitedly about the potential of social change through technology.

6. CONCLUSIONS AND RECOMMENDATIONS

The evidence from NOW is that the local government planners undertook planning a transition to Smart City status with the perspective and mindset of achieving a Phase II, or even perhaps a Phase III, approach. However, very quickly the project was pulled more towards a Phase I-style of considering the issue which concentrated on achieving possible technical solutions rather than more socially- or culturally-informed solutions. While there are a number of possible reasons for this outcome, an important one must be that the genesis of this proposal and the work that went into it arose out of a funding application to the United Kingdom national government for support. Thus rather than being a ground-swell movement of NOW residents eager to embrace a vision of what they interpreted as a better and more sustainable lifestyle, this began as a top-level planning office project with which many citizens in NOW had little knowledge or sympathy. Individuals in government worked on the project diligently to realize the *initial* goal of winning funding from an external agency, after which elements of a Smart City might be developed. Local businesspeople, especially those attached to companies which design, produce, install, or maintain information technology architecture, were understandably enthusiastic because they recognized the business opportunities a successful bid could generate for their firms. However, the project brief – based upon the planning team's reading of the call for proposals – gravitated further towards a Phase I interpretation of Smart Cities than originally intended for three key reasons. Firstly, the United Kingdom would not be likely to bestow substantial funds to alleviate social problems on their own, even if this helped to prepare the ground for a transition to a Smart City in the near future; the use of information technology would be expected to play a central role in overcoming such ills, a position which reflects clearly the Phase I mentality. Secondly, the offers of partnership or assistance from the private sector tended to coalesce around technological solutions more than around socially-oriented focal points. This was perhaps not surprising given the business community's desire to participate in what could be expected to be a massive investment in public infrastructure if the bid was approved. And finally, the residual sta-

tus quo of historical infrastructure, mindset and demographic spread and disposition – all set against an Old World economy in post-recessionary maneuvering likely to last for a long time – was perhaps predicated towards quick-fix tangible solutions rather than longer term community building.

Ultimately, the NOW Smart City project found itself situated in a dynamic tension of hybrid of Phase I and Phase II. The significance of the project starting out with a Phase III orientation but soon arriving at a hybrid of Phase I & II seems indicative about the inherent tensions of a Smart City transition in a post-industrial context. Furthermore, the experience of NOW questions the ability of technology to enable social and cultural development of the citizens of these regions, and illustrates the deep reluctance some people have about (appearing to be) ceding control to ICT systems because of what it might mean for the future of urban areas and their inhabitants.

We have drawn attention to particular factors and contexts that might play a role in the 'Old World' post-industrial Smart City context and the recognition that not only increasing urbanization but transformation of *long-standing urbanization* is a significant, and somewhat overlooked, aspect of Smart City discourse and action. The most critical of these issues is perhaps also the most obvious: securing the participation of a wide variety of stakeholders in the community whose voices can influence the design and implementation of the eventual Smart City to be developed. In the case of NOW, the origins of the idea of the Smart City appeared to arise out of the opportunity to secure funding from a national source, and thus the funding agency's call for proposals, and the conversations surrounding it, may have shaped the final outcome in ways that did not serve the city as well as it may have done had it began as an organic movement within the city itself. Therefore, the requirement for the application for Smart City funding to appeal to the perceived desires of those external to NOW may have led planners to shape the bid in a manner somewhat alien to the needs and character of NOW.

We have contextualized this in a historicization of the Smart Cities phenomenon and we have provided a schema and typologies with which to examine and understand these issues. We remind the reader that this is an introductory typology and that we welcome further discussion on it in the future. This provides a model that has value to practice and practitioners.

Furthermore, we have provided micro-level post-industrial data that can be linked to the macro-debate and context of wider Smart City discussions. This is timely as the United Kingdom national government sits in the early stages of refining protocols for considering the design, shape and form of Smart Cities. This has taken the form of a commissioned piece of work by the Department for Business Innovation and Skills from the quality framework organization the British Standards Institute (BSI). The case of NOW and the resultant models provide a number of important thoughts to inform such actions. First, that the Smart City transition for an established 'Old World' economic center could be expensive and that therefore external funding on a national or international level (likely to be awarded on a competitive basis) may be required. The manner in which that funding offer is structured is likely to influence heavily the bids that are produced and submitted. Second, that it is essential that the Smart City agenda seeks to generate wide support within the community and thus does not appear to residents to be a top-down government initiative aimed at controlling or monitoring residents by the ruling elite. Whether the project is led by local government or by local business, there will always be a portion of the community that is skeptical of the sponsor's ultimate goal(s) for the project and will seek to resist it in favor of the comfortable (if flawed) *status quo*. Third, that private companies across a range of sectors with expertise in collecting, analyzing, and interpreting complex data get involved at an early stage to inform policymakers and community representatives of the benefits and, perhaps more importantly the limitations, of the technology itself. Fourth, that high-speed digital infrastructure is a driver for economic growth. In this context, it is not just about saving money but about driving the economy and making the step change into high-value-added job creation and the eventual transformation of NOW into a digital based economy. Finally, that everyone involved in the proj-

ect wants to achieve the highest value for the city for the money spent; governments – at least in the United Kingdom currently – means money cannot be afforded to be spent carelessly, and businesspeople who are otherwise happy to contribute will demand some reasonable social return for their money. This is, ironically, part of the goal of the Smart City – to enable residents to utilize public services as efficiently as possible to increase the quality of their lives. Once this virtuous cycle begins the efficiencies generated hold the potential to create greater savings while maintaining, or possibly expanding, the provision of services in a city like NOW.

EXTENDED SUMMARY / IZVLEČEK

Hiter razvoj urbanizacije in pojav mega-mest so že v dvajsetem stoletju napovedovali številne probleme, ki bodo izziv za voditelje in oblikovalce politik tako na razvijajočih se trgih t.i. novega sveta kot post-industrializiranih gospodarstev t.i. starega sveta. Medtem ko se večina obstoječe literature osredotoča na vsebine novega sveta, ta članek obravnava izzive dinamičnih odnosov in vprašanj, s katerimi se soočajo post-industrijska strnjena naselja na severozahodu Anglije, ki poskušajo postati "pametna mesta".

Za mnoge avtorje ponujajo pametna mesta trajnostno rešitev za izzive, ki jih prinaša tako večja urbanizacija kot upad pomena industrije. Koncept pametnega mesta vključuje uporabo naprednih tehnologij pri načrtovanju, razvoju in delovanju urbanih sistemov (Harrison & Donnelly, 2011: 8). Bolj celovito opredelitev ponujata Caragaliu & Niikamp (2012), ki predlagata naslednje funkcije pametnega mesta:

1. uporaba mrežne infrastrukture za izboljšanje gospodarske in politične učinkovitosti ter socialnega, kulturnega in urbanega razvoja;
2. osnovni poudarek je na poslovnem vidiku razvoja urbanega okolja;
3. močna osredotočenost na cilj doseganja socialne vključenosti različnih prebivalcev mest v javnih storitvah;
4. poudarjena ključna vloga visokotehnoloških in ustvarjalnih industrij v dolgoročni razvoj mest;
5. temeljita pozornost je namenjena vlogi socialnega in relacijskega kapitala pri razvoju mest;
6. socialna in okoljska trajnost kot glavna strateška komponenta.

Prehod iz post-industrializiranih mest oz. širših mestnih območij starega sveta v pametna mesta odpira veliko vprašanj in sooča z različnimi izzivi. Študija primera v tem članku izpostavlja številne pomembne vidike, ki bi jih bilo treba upoštevati pri raziskovanju možnosti takega prehoda. Avtorji so v članku ugotovili, da so pri tem ključna socialno-ekonomska in demografska vprašanja. Na širših mestnih območjih na primer živi veliko starejšega prebivalstva, ki ima odpor do sprejemanja in uporabe predlaganih novih tehnologij. Kot potencialno področje težav pri vzpostavitvi projekta so bila opredeljena tudi okoljska vprašanja. Območje je ob konicah močno obremenjeno s prometom in to predstavlja celo za najbolj izpopolnjene tehnološke rešitve velik izziv. Poleg tega je na tem območju veliko starejših gradenj, v katerih ni mogoče izkoristiti vseh tehnoloških potencialov pametnih mest (npr. zastarele električne napeljave ipd.). Ugotovljeno je bilo tudi neskladje med nizko stopnjo izobrazbe nekaterih skupin prebivalcev na teh področjih in ambicioznim okoljem pametnih mest. Zdi se, da nivo oz. raven znanja na teh področjih ni dovolj visoka, da bi lahko pametno mesto razvili in zgradili v celoti.

Obravnava podatkov iz študije primera je omogočila razvoj tipologije miselnosti, konkurenčne dinamike in pristopov:

1. tendence vloge "misleca / radikalista / idealista" v razpravi,
2. tendence "Luddite-ne" zaskrbljenosti in strahu v razpravi,
3. tehnokratske tendence v razpravi.

Temelječ na tej tipologiji ter tudi na predhodnih razpravah in analizah študije tega primera, so avtorji v članku pripravili priporočila, ki so namenjena obveščanju o strategijah oblikovanja, načrtovanja in izvajanja pametnih mest:

1. Uvedba pametnega mesta je za gospodarska središča "starega sveta" lahko draga in zato potrebuje zunanje financiranje na nacionalni ali mednarodni ravni (ki bi lahko bila dodeljena na podlagi meril konkurenčnosti).
2. Bistveno je, da se pri uvajanju pametnega mesta doseže široka podpora v lokalni skupnosti in ne gre zgolj za posledico ukaza na podlagi vladne pobude, s pomočjo katere želi vladajoča elita imeti nadzor nad prebivalci.
3. Že v začetni fazi morajo pri projektu sodelovati zasebne družbe s strokovnim znanjem o zbiranju, analizi in razlagi kompleksnih podatkov različnih sektorjev, da oblikovalce politik in predstavnike lokalnih skupnosti obveščajo o koristih in, morda še pomembneje, o omejitvah predlaganih tehnoloških rešitev..
4. Digitalno infrastrukturo visokih prenosnih hitrosti je treba promovirati kot gonilo gospodarske rasti.
5. Delovanje vseh zainteresiranih strani mora biti usmerjeno v doseganje največje koristnosti za mesto naporabljen denar - to pomeni, da denar ne sme biti porabljen malomarno in da prebivalci lahko čim bolj učinkovito uporabljajo javne storitve ter si tako povečajo kakovost svojega življenja.

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