



Smart City Approach: Challenges and Opportunities

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ABSTRACT

In this paper, we focused on rudiments of what constitutes a smart city which we define as a sustainable building city in which ICT is merged with traditional infrastructures, coordinated and integrated using new digital technologies. These technologies establish the functions of the city and also provide ways in which citizen groups, governments, businesses, and several agencies that have an interest in generating more efficient and equitable systems can interact in augmenting their understanding of the city and also providing essential engagement in the design and planning process. Sustainable building also known as green construction or Green building refers to both a structure and the using of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition. Smart cities are often pictured as constellations of instruments across many scales that are connected through multiple networks which provide continuous data regarding the movements of people and materials in terms of the flow of decisions about the physical and social form of the city. Cities however can only be smart if there are intelligence functions that are able to integrate and synthesize this data to some purpose, ways of improving the efficiency, equity, sustainability and quality of life in cities. We will focus directly on ways in which this infrastructure can be integrated, how the data that are being collected can be mined, how services delivered by traditional means can be organized and delivered much more efficiently using these new technologies, all part of the idea of the Planetary Nervous System that is central to our proposal. In this paper we set out the enormous challenges facing cities, the size of the opportunity afforded by the focus being given, worldwide, to addressing those challenges by transforming city infrastructures and city systems, and the key actions needed to seize those opportunities.

KEYWORDS : Sustainable building, Intelligence functions, Integrated and synthesized approach, green construction, etc.

Introduction

As consumers of private goods and services we have been empowered by the Web and, as citizens, we expect the same quality from our public services. In turn, public authorities are seeking to reduce costs and raise performance by adopting similar approaches in the delivery of public services. However, the concept of a Smart City goes way beyond the transactional relationships between citizen and service provider. It is essentially enabling and encouraging the citizen to become a more active and participative member of the community, for example, providing feedback on the quality of services or the state of roads and the built environment, adopting a more sustainable and healthy lifestyle, volunteering for social activities or supporting minority groups. Furthermore, citizens need employment and "Smart Cities" are often attractive locations to live, work and visit. But the concept is not static: there is no absolute definition of a smart city, no end point, but rather a process, or series of steps, by which cities become more "liveable" and resilient and, hence, able to respond quicker to new challenges. Thus, 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. It brings together 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. There are five key aspects to smarter approaches, which are strongly information driven:

A modern digital infrastructure, combined with a secure but open access approach to public re-useable data, which enables citizens to access the information they need, when they need it;

A recognition that service delivery is improved by being citizen centric: this involves placing the citizen's needs at the forefront, sharing management information to provide a coherent service, rather than operating in a multiplicity of service silos (for example, sharing changes of address more effectively), and offering internet service delivery where possible (at a fraction of the face to face cost);

An intelligent physical infrastructure ("smart" systems or the Internet of Things), to enable service providers to use the full range of data both to manage service delivery on a daily basis and to inform strategic investment in the city/community (for example, gathering and analyzing data on whether public transport is adequate to cope with rush hour peaks);

An openness to learn from others and experiment with new approaches and new business models; and

Transparency of performance, for example, city service dashboards to enable citizens to compare and challenge performance, establishment by establishment, and borough by borough.

Objectives

- To study the future scope of sustainable building.
- To analyze the challenges and opportunities of smart city approach.

Research Methodology

In this paper the research is based on secondary data. The data is taken from different research reports, journals, websites and research papers. The research is based on the study of smart city planning and its challenges and opportunities in India.

Discussion

Visionary Approach:- For much of the 20th century, the idea that a city could be smart was a science fiction that was pictured in the popular media but quite suddenly with the massive proliferation of computable devices across many scales and with a modicum of intelligence being embedded into such devices, the prospect that a city might become smart, sentient even, is fast becoming the new reality. The convergence of information and communication technologies is producing urban environments that are quite different from anything that we have experienced hitherto. Cities are becoming smart not only in terms of the way we can automate routine functions serving individual persons, buildings, traffic systems but in ways that enable us to monitor, understand, analyze and plan the city to improve the efficiency, equity and quality of life for its citizens in real time. This is changing the way we are able to plan across multiple time scales, raising the prospect that cities can be made smarter in the long term by continuous reflection in the short term.

SMART ECONOMY (Competitiveness)	SMART PEOPLE (Social and Human Capital)	SMART GOVERNANCE (Participation)
<ul style="list-style-type: none"> ▪ Innovative spirit ▪ Entrepreneurship ▪ Economic image & trademarks ▪ Productivity ▪ Flexibility of labour market ▪ International embeddedness ▪ <i>Ability to transform</i> 	<ul style="list-style-type: none"> ▪ Level of qualification ▪ Affinity to life long learning ▪ Social and ethnic plurality ▪ Flexibility ▪ Creativity ▪ Cosmopolitanism/Open-mindedness ▪ Participation in public life 	<ul style="list-style-type: none"> ▪ Participation in decision-making ▪ Public and social services ▪ Transparent governance ▪ <i>Political strategies & perspectives</i>
SMART MOBILITY (Transport and ICT)	SMART ENVIRONMENT (Natural resources)	SMART LIVING (Quality of life)
<ul style="list-style-type: none"> ▪ Local accessibility ▪ (Inter-)national accessibility ▪ Availability of ICT-infrastructure ▪ Sustainable, innovative and safe transport systems 	<ul style="list-style-type: none"> ▪ Attractivity of natural conditions ▪ Pollution ▪ Environmental protection ▪ Sustainable resource management 	<ul style="list-style-type: none"> ▪ Cultural facilities ▪ Health conditions ▪ Individual safety ▪ Housing quality ▪ Education facilities ▪ Touristic attractivity ▪ Social cohesion

Challenges Faced by Traditional Cities and the Need for Smarter Approaches:- Our starting point is the wide range of challenges that are driving change in Indian cities:

Economic restructuring, combined with the economic downturn, has raised levels of unemployment, particularly among young people, and so economic growth and building a resilience to further change is a key priority for city authorities;

The urban infrastructure has grown piecemeal and rising urban populations are putting pressure on housing and transport;

Concerns about climate change, and the fact that 30% of the Indian population live in cities, inevitably means that cities have a key role in improving energy efficiency and reducing carbon emissions, while promoting energy resilience in terms of security of supply and price;

The paradigm shift towards online entertainment and online retail/consumer services is beginning to change the nature of the High Street;

An ageing population is placing an increasing burden on adult social care, to the point where it is absorbing an ever-increasing proportion of local authority budgets;

Notwithstanding recent flexibility accorded to Local Authorities in relation to Council Tax and Business Rates, grants from Government Departments are still the main source of local authority funding, especially for cities, and local authorities consider this to limit their ability to provide integrated responses to the challenges they face.

The scale of the challenges is forcing cities to rethink their strategies and to innovate in order to maintain service levels, in particular:

- outsourcing services using outcomes based contracts;
- service integration, both back office and increasingly front line services;
- online service delivery;

Releasing data to enable new services to develop and citizens to make informed decisions e.g. providing real-time information on traffic to assist citizens in planning journeys; and

Reducing demand on services, for example, promoting independent living allows older people to live much longer in their own communities with less statutory support.

However, the complexity and the pace of change, combined with the need for integrated and systemic solutions, are presenting a major challenge to local authorities who, traditionally, have developed responses in a “siloeed” fashion. This requires organizational change as well as deploying innovative technology and the Technology Strategy Board (TSB) has sought to provide support to cities, developing more integrated approaches, by providing a platform for Indian businesses to develop the solutions they require. In 2012, it launched a competition, to invite cities to develop feasibility studies, in preparation for a competition to fund a large scale Future Cities Demonstrator. The choice of Glasgow as host for the demonstrator was announced in January 2013. This process highlighted the difficulties which many local authorities are facing. It is not simply a question of the capability within local authorities to develop smart concepts. There are significant barriers to adoption/uptake, which we discuss in Section 7. Furthermore, with the support of Arup, we have developed a broader perspective of how a number of leading global cities have responded to their own challenges, providing us with evidence of good practice, which is summarized in Section 8, and published separately as supporting evidence. We now turn to the concept of smart cities and then the scale and nature of the market opportunity.

We stand at a threshold in beginning to make sense of new information and communication technologies that will be deeply interwoven with conventional material technologies within the next decade. Already 20 percent of all people in the India have smart phones in which they are able to access online services and this is growing at around 32 percent each year. At this rate, there will be total penetration by smart phones (see <http://en.wikipedia.org/wiki/Smartphone/>) for mobile devices by 2015. Other estimates suggest that by 2015, there will be more than 2 billion smart phone users globally which suggests that access to online services will be the dominant mode of accessing information by the end of the Future ICT project in 2022.

The opportunities for the development of smart cities using mobile and other platforms at every spatial scale and over very different time spans will be enormous but the real challenge is to put in place new technologies that will integrate individualized and local technologies that are fast proliferating. For there to be real synergy, the idea of the smart city with all its economic and social benefits will only become a reality if such coordination is specifically addressed. This will involve a blend of sciences and arts which Future ICT is extremely well placed to initiate. It will involve a clear synthesis of hardware, software, database, and organizational technologies that are able to relate to the key problems of society and will require entirely new methods and models for synthesizing diverse data and ideas that are currently not being addressed. This in turn implies a massive paradigm shift in how we address social and economic problems using ICT. The smart city will be at the forefront of this revolution.

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Today...	What if a city could...	Already, cities are...
City services <ul style="list-style-type: none"> • Service delivery in silos with one size fits all 	<ul style="list-style-type: none"> • Tailor services to the needs of individual citizens 	<ul style="list-style-type: none"> • Using technology to integrate the information systems of different service delivery agencies to enable better services for citizens
Citizens <ul style="list-style-type: none"> • Cities have difficulty using all the information at their disposal • Citizens face limited access to information about their healthcare, education and housing needs. 	<ul style="list-style-type: none"> • Reduce crime and react faster to public safety threats, by analyzing information in realtime? • Use better connections and advanced analytics to interpret vast amounts of data collected to improve health outcomes? 	<ul style="list-style-type: none"> • Putting in place a new public safety system in Chicago, allowing realtime video surveillance and faster more effective response to emergencies • Giving doctors in Copenhagen instant access to patients' health records, achieving the highest satisfaction and lowest error rates in the world.³⁸
Transport <ul style="list-style-type: none"> • Transporting people and goods is dogged by congestion, wasted hours and wasted fuel. 	<ul style="list-style-type: none"> • Eliminate congestion and generate sustainable new revenues, while integrating all transport modes with each other and the wider economy? 	<ul style="list-style-type: none"> • Bringing in a dynamically priced congestion charge for cars to enter Stockholm, reducing inner-city traffic by 25 percent and emissions by 14 percent, while boosting inner-city retail by 6 percent and generating new revenue streams.³⁹
Communication <ul style="list-style-type: none"> • Many cities have yet to provide connectivity for citizens • "Going online" typically means at slow speeds and at a fixed location. 	<ul style="list-style-type: none"> • Connect up all businesses, citizens and systems with universal affordable high-speed connectivity? 	<ul style="list-style-type: none"> • Merging medical, business, residential and government data systems into a so-called ubiquitous city in Songdo, Korea, giving citizens and business a range of new services, from automated recycling to universal smartcards for paying bills and accessing medical records.
Water <ul style="list-style-type: none"> • Half of all water generated is wasted, while water quality is uncertain. 	<ul style="list-style-type: none"> • Analyze entire water ecosystems, from rivers and reservoirs to the pumps and pipes in our homes? • Give individuals and businesses timely insight into their own water use, raising awareness, locating inefficiencies and decreasing unnecessary demand? 	<ul style="list-style-type: none"> • Monitoring, managing and forecasting water-based challenges, in Galway, Ireland, through an advanced sensor network and realtime data analysis, giving all stakeholders – from scientists to commercial fishing – up-to-date information.
Business <ul style="list-style-type: none"> • Businesses must deal with unnecessary administrative burdens in some areas, while regulation lags behind in others. 	<ul style="list-style-type: none"> • Impose the highest standards on business activities, while improving business efficiency? 	<ul style="list-style-type: none"> • Boosting public sector productivity, while simplifying processes for business in Dubai through a Single Window System that simplifies and integrates delivery and procedures across a range of almost 100 public services.⁴⁰
Energy <ul style="list-style-type: none"> • Insecure and unsustainable energy sources. 	<ul style="list-style-type: none"> • Allow consumers to send price signals – and energy – back to the market, smoothing consumption and lowering usage? 	<ul style="list-style-type: none"> • Giving households access to live energy prices and adjust their use accordingly, as in a Seattle-based trial, reducing stress on the grid by up to 15 percent and energy bills by 10 percent on average.⁴¹

Source: IBM Center for Economic Development analysis.

Conclusion

Sustainable building also known as green construction or Green building refers to both a structure and the using of processes that

both disruptive and synergetic effects, particularly on forms of social organization that are required for future forms of governance and community action as well as business.

A sense of what this research promises is available from the many contributions arrayed on the Future ICT. It might also seem at first sight that a programme related to smart cities would be strongly focused on hardware and networks but our focus will be much more on questions of organization that imply software development and management of large scale computer resources, networks and data. The models will simulate the city dynamics as self-organizing evolution processes, which mimic the Darwinian biological evolution in a balance between innovation and selection mechanisms.

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