RE-Engineering the City 2020-2050

How will cities develop the knowledge and capability to systematically re-engineer their built environment and urban infrastructure in response to climate change and resource constraint?

The Impact of Information and Communications Technology on Retrofitting the City in Response to Environmental, Social and Economic Pressures.

Abstract

The paper reviews futures thinking and identifies the potential dangers of relying on the extrapolation of statistical trends and accepted wisdom. Case studies of the past show that the future with hindsight is often different from what was predicted, and reflects "predictable surprises". As we look to the future we find we have the knowledge and technology but may not have the necessary desire.

Change it is argued is both physical and perceptual, and that much of our urban fabric for the next 40 years will reflect the legacy of our existing infrastructure and planning decisions. Subtle, incremental changes will be triggered by shifts in political and economic outlooks and social expectations. Information and Communications Technology is shown to be a major driver of both technological and social change. The impact of ubiquitous, cheap, mobile, hand held information and communications technology (ICT) has changed the way we work and live, and increased the opportunities for collaboration and innovation. ICT whilst heralding new technologies and opportunities is a disruptive force in changing business models and the way we operate.

Looking ahead living with paradox, intensifying the use of existing resources by managing both space and time, balancing individual desires with the public interest, and creating resilience through thinking holistically are identified as themes to structure the agenda and steer the debate.

Our existing constructed environment can be an asset in that it can yield untapped capacity but also a hindrance in representing inefficient methods of operating. Step changes in the way we plan, deliver and manage our built environment will require, in

addition to technological innovation, organisational innovation and a radical willingness to rethink education, professional structures and the management of assets.

Keywords: futures thinking, predictable surprises, managing change, disruptive forces, Information and Communications Technology(ICT), Intelligent Buildings, Smart Cities, paradox, managing space and time, resilience, thinking holistically, collaboration, changing perceptions, diversity, Civic Society.

Introduction

Crystal ball gazing is an uncertain pastime. With hindsight the future is full of *Predictable surprises* (Bazerman and Watkins 2004) to which perceived wisdom often blinds us. Why then concern ourselves with the future? Some would argue that to look ahead can only divert us from the task in hand and open up uncertainties. Changing or contemplating change is always challenging, but without change we cannot progress.

Futures thinking is more than idle speculation, visualized as fantasy scenarios. Probing the future can sensitise an individual or organisation to the opportunities and dangers ahead, confront organisations with issues that are taboo to consider and help plan the journey forward. Dissecting the future, however, is of little use unless we can ground it in current debate so as to influence future policy making.

The paper draws on experience as a strategic consultant advising leading organisations and cities on how Information and Communications Technology (ICT) is impacting on their use and planning of space and managing the process of change (DEGW 1998). In the last thirty years ICT has had a dramatic effect on the way we live and work (Worthington 2006). With the opportunity for "distributed working" office work is no longer defined by the building. The city has become the office with ICT acting as the glue (Harrison, Wheeler and Whitehead, 2001). The Intelligent Building paradigm of the 1990's (DEGW & Teknibank, 1992) has been realized as the "splintered city" (Graham and Marvin, 2001) and shifted to the supplier's vision of the Smart and Connected City (IBM Institute for Business Value, 2012; Cisco Connected Cities, 2012). A review of experience in delivering the Intelligent building will address the question of whether lessons can be transposed from a re-invention of the office to a re-engineering of the city.

Looking Ahead by Reflecting on the Past.

Predicting the future, it can be argued, is only as accurate as the toss of a coin, at best a 50/50 chance. Predicting the future will always be at the mercy of a changing context and human responses. The important step, however, is the process of thinking through the future.

  To nurture an open approach to futures thinking requires firstly an organisational culture that accepts fuzzy thinking and secondly an inquisitive mind. Fuzzy thinking (Kosko, 1994) requires a willingness to question the status quo and search out the unusual. Organisations that are best able to face the future are those that are addressing, what Horst Rittel refers to as "wicked problems" (Rittel and Webber, 1973), those problems that cannot be easily defined. Inquisitive minds are those that are prepared to look laterally. Geoff Woodling of Business Futures Network proposes a method of "scanning" as a way of becoming more sensitive to possible developments ahead, challenging prevailing mind-sets and stimulating new visions for the future (Loveridge and Woodling, 2003)

  In **Predictable Surprises** Bazerman and Watkins explore the phenomena of events or groups of events that take organisations by surprise, despite prior awareness of the information required to anticipate the event or its consequences. Thinking "outside the box," questioning and then innovating are perceived to be risky, time consuming and disruptive. Looking forward to potential "predictable surprises", three issues are identified by the authors, all of which are now firmly on the political agenda. Each is central to the issues that lie ahead for the built environment.

Firstly let us consider global warming and the related concerns of energy usage and carbon footprint. For long considered the domain of cranks, doom mongers and fanatics, it is now recognised politically as a threat to our future. Some big corporations and nations still blindly hope the problem is not real, though they are now in a minority, and international political institutions are gradually taking action. For the built environment professionals the implications are profound. Are we pursuing spatial strategies and building typologies that will prove to be inappropriate? Are we framing design problems in a way that uses society's resources in the most efficient and effective way for the future? The knowledge exists (Hawken, Lovins and Lovins, 2000), Womack and Jones's seminal book on how to achieve more with less through lean thinking (Womack and Jones, 1996) and the excellent post occupancy evaluative work for Probe (Leaman and Bordass, 2001). The question for society as we look ahead is not so much do we have the knowledge, but are we prepared to grasp the challenge and rethink the paradigm.

Secondly, the demographic time bomb, and the insufficient pension savings to pay for an extended period of old age has now been recognised by all political parties. Politicians are now gently advocating an extended working life. Has the PFI initiative, with the desire to take capital expenditure off the balance sheet and defray risk, stored up larger problems for the future? A sustainable approach is taking a longer term holistic view, by investing in the adaptability of the infrastructure and an appropriate specification, coupled with tenure agreements that link initial design with continuous management. In reality PFI became short term expediency, with design teams being forced into addressing the wrong questions, and flexibility and innovation being reduced by legal strait jackets (Hodge, Greve and Boardman, 2010; RIBA, 2006; Helm, 2010).

For their final predictable surprise the authors cite the phenomena of air miles and loyalty cards. In 1981 American Airlines introduced a marketing programme where flyers could earn miles for flights in the future. All airlines are now providing the service and storing up indebtedness of free journeys they must honour. In desperation they are increasing the number of miles required for many routes and reducing the number of seats and routes available for redemption. In 2004 it was predicted that the debt in air miles the five major American airlines owed their customers exceeded $20 billion, whilst the stock of the same airlines was below $4 billion (Bazerman and Watkins, 2004)). If the majority of travellers decided to redeem their air miles, a predicable surprise would emerge and the airlines would be forced to default. This example was proved to be prophetic with the credit crunch of 2008. Has our property and construction model of investment been constructed on false demand and hopes for the future? Is regeneration using large scale, comprehensive, new build development on "green field" sites, sustainable? Issues that are currently being debated by urbanists and planners (Smart Urbanism, 2012).

The visionary prognosis is a valuable contribution which, however "futuristic" it might sound, should be heeded. As we end the first decade of the twenty first century, we have a number of eminent future studies compiled in the 1960's that can be assessed for their insights. In 1967 Herman Kahn and the Hudson Institute published **The Year 2000: A framework for speculation on the next thirty three years** (Kahn and Wiener, 1967). Compared with the fanciful, often prejudiced and even comical writings from the early twentieth century (Bell, Ibid) Kahn applies reason and a methodology. Forty years on, after these speculations, some of his insights are scarily accurate.

Today predicting the future is sometimes seen as a science. Many countries have their Foresight programmes, investment houses employ risk analysts, and large corporations such as Shell have underpinned their corporate strategies on scenario building. However, despite the availability of experts who can manage the process of "forecasting" the role of the individual, insightful commentator has a vital role to play. The persistent voices of writers such as Rachel Carson (1962) and practitioners such as

Ian McHarg (1969) in the 1950's and 60's were a strong force in creating the environmental movement of today. Professor Peter Hall has played a prophetic role in planning by standing on the high ground to see the potential geography of the future, whilst continuously matching his foresight to the policies of the day. In **London 2000** Hall (1963) presents a snapshot of London forty years ahead. Twenty five years on he revisited his vision in **London 2001**(Hall 1989) and reflects that it is "in some respects remarkably similar, but in some very different, but in spirit I hope identical". He predicted 2 million additional jobs, a million extra households within London's political boundaries and 8 million extra cars commuting further. His predictions were wrong in that London did not grow within its political boundaries but has shown dramatic growth over the wider South East region. London 2001 published in 1989 envisions a "many centred city" with real communities in real places. "These will be nodes for working and also for entertainment and public life. Each will be surrounded by residential areas which will contain local jobs and services". He stresses that unlike the goal of the 1960's this does not mean "self containment" but will result in a network lifestyle with a majority of inhabitants having their personal means of mobility and "exerting their right to exploit the fact".

Peter Hall's prophetic vision went largely unheeded by policy makers despite the phenomena existing for all to see. New labour thinking championed the compact city and centrality, with Lord Rogers (1995) report on the Urban Renaissance as the blueprint. Though Hall's projections of demographics 40 years on were close, the spatial configuration and life styles were very different, due to the impact of the internet and mobile technology.

A Future Combining Technological Prowess and Organisational Innovation

Predicting which technological innovations will impact our lives is fraught with difficulty. If the technological predictions of 50 years ago about the 21st Century were right, by now we would be flying cars, living a mile high and having robots to serve us. The fact we are not, is not because we do not have the technology, but perhaps because we do not have the desire. Technological uptake is dependent on societal acceptance and organisational innovation. If we look backwards we can see the major innovations, such as mobile communications, have grown out of new applications of combinations of existing technologies. In the early 1980's McKinsey projected a world market for mobile phones of just under a million by the year 2000. In 2004 nearly a million handsets were sold every three days, recognising the prime rule of the new information economy that the more handsets available the greater the value of the network. The paradox is that many of the changes of the last twenty years are not sudden new inventions, but the

gradual coming together of a number of day to day innovations that add up to a seismic change in the way we live our lives.

Future opportunities and how we manage the change will be a combination of technological prowess combined with political, economic and organisational innovation. The internet was a dormant, but powerful technology during the cold war period, it took a political shift, the entrepreneurial inventiveness of Google and the techno/organisational innovation of Cisco, to create today a networked environment that has changed the way we think and operate. Change is both physical and perceptual. Futures thinking is about envisioning the future, changing perceptions and managing the process of physical and organisational change.

Where we are now

Thirty years of change

Change is both seismic and incremental. A snapshot of the world of work over the last thirty years, is a stark example of the process of change and a valuable analogy for understanding the current context. Looking back thirty years to 1980 when IBM launched the desk top computer we now recognise a seismic event that marked the democratization of computing as it moved from the domain of the computer department to the office workspace. More fundamentally it represented a move from the Industrial, manufacturing economy to the Service economy and the heralding of the Knowledge economy. The next decade with the growth of personal computing and new communications technologies (DEGW and Teknibank, 1992) not only changed the nature of work but saw profound changes in the way the property and construction sectors operated and the role of the professional (Foxell, 2003). The beginning of the 1990's was more than a recession. It defined a restructuring of the office service economy; flexible working, outsourcing, downsizing and flat organisations (Scase, 2002) were some of the themes that characterised the shift to distributed lifestyles in a networked environment (Harrison, Wheeler and Whitehead, 2001). As we reached the millennium, computing had dramatically reduced in price, shrunk in size and become ubiquitous in usage (Worthington, 2006), "new ways of working" were rapidly being accepted as "the way of working". Living, working, learning and pleasure were becoming blurred. 2008 with the collapse of Lehman Brothers heralded the credit crunch and another seismic shift with the potential restructuring of the financial services economy.

We stand today, as we look forward thirty years to 2040, at a finely balanced point of two value systems jostling each other to become the defining force; "Credit Crunch" V "Climate Change". The values of the market, self-interest and short term returns are being questioned by recognition of the need to balance the short term interests of the

individual with the longer term interest of the community, and the environment. The outcome is in the balance, as we move in Europe to a coalition, middle ground, pattern of government, there is a recognition that both the command and market economies have been found wanting. There is a growing dialogue around the values of the Civic Society (00:/research, 2011).

The pervasive impact of Information and Communications Technology (ICT) is influencing the way we think, act, operate and locate. Extrapolating, from the world of work ICT clearly will be a critical *disruptive technology* and a major driver of change.

Disruptive forces

 If change is both physical and perceptual, it could be argued, the maximum returns on building a new building or applying a new technology are gained when a new building or technology is matched with new thinking about processes and the way of operating. This in turn requires a change in perceptions to stimulate a long term paradigm shift.

Looking ahead three fundamental changes can be identified which have been triggered by ICT. Firstly the way we conceive and organise work. The fundamental structures of companies are being broken down as it becomes possible to work remotely. Firms are reappraising relationships so they both compete and collaborate with competitors to enlarge markets, and rely on external networks to capture the most creative talent. The impact on the planning and management of the urban infrastructure is that buildings will become simpler, organisations more adaptable and cities will be more complex. The bulk of the new building stock will be simpler, and valued for its resilience in meeting the changing demands of users and their activities (Worthington, 2009a). Organisational mobility is reducing the attractiveness of ownership compared with leasing; resulting in the emergence of new real estate delivery, construction and management services (Worthington, 2009b). The city is becoming more complex in its governance and management, with multi modal accessibility, highly serviced and managed environments and an emphasis on the value of effective infrastructure services and amenities (Worthington, 2009a).

Secondly ICT is impacting on patterns of production and consumption. Supply chains are being reduced as intermediate layers are being stripped out as the product progresses from the producer to the consumer (The Economist, 2012). The internet, Amazon and Apps are reshaping the publications and media industries. The bookshop is a place to browse, and the author or artist has direct contact to the consumer. Production is short run on demand, and publications can be a co-production. Leaman (Worthington 2006) perceived as the Logistical City, characterised by time replacing space as the main factor affecting locational decisions. The vision is characterized by;

intensification of critical business functions in highly serviced, secure locations; waste avoidance; greater use of public transport; with less predictable journey patterns; more working from home; and a more dynamic and opportunistic approach to time management. This holistic view is a major challenge and opportunity for infrastructure planners, providers and managers.

Lastly as we look ahead we can see the way that ICT will impact on the construction sector and its business model. Stimulated by the PFI programme, the sector has amalgamated investment, development, production and operations within one organisation. Looking ahead, the question is, are new organisations being formed whilst at the same time rethinking the most effective service from the city and consumers' perspective. Fundamental changes are ahead, for the structure of the professions (Foxell, 2003), the integration of design, delivery and operating services and the way that the function and value of the built environment providers is perceived both by the professions and the consumer has changed (RIBA Building Futures, 2011).

A Framework for a Response

CABE/RIBA Building Futures as a conclusion to a number of sectoral views of the future, commissioned Charles Landry to set a conceptual framework to support built environment professionals in looking ahead so as to better understand and respond to future possibilities and pitfalls. The result **Riding the Rapids: Urban life in an age of complexity** (Landry, 2004)) is still as relevant and insightful today as it was in 2004. Landry's conceptual framework makes a distinction between fault lines, battlegrounds, paradoxes and drivers to help structure our understanding of unfolding change. The fault lines are deep seated, intractable and shape our world view. He identifies two themes affecting societies today which will have a downstream impact on our cities: faith or secular world views and environmental ethics and economic reality .The battlegrounds are the big debates around: multi-culturalism or inter-culturalism; environmental sensitivity; social equity; central or local; chain power and distinctive shopping; compaction or dispersal;; authenticity and global markets; holism and specialism's; hard and soft indicators. These themes for debate will inevitably become binary, rather than allowing for both approaches to co-exist. He identifies six paradoxes which could have significant impact on the future development of the city;: creativity and risk; calculating tangibles in a world of intangibles; accessibility and security; porousness and identity; city and country and age and technology. Lastly he articulates the drivers, which may shape the way the future city unfolds: Pre-existing decisions; Dominant ideas and mind-sets; Demographics; Climate change; Energy supply; Waste and recycling; Space; Safety and surveillance; Health and urban design; Time and speed; Price differentials; Global terms of trade; Boundary blurring; Living with diversity; The real, the virtual and the fake; Localism and rethinking democracy. The two major

issues he sees emerging from the "ocean of change "for the future of our cities are: "How will the spatial dynamics of Britain unfold and how will we manage that change".

Structuring the Agenda

In response to the question: *How can cities develop the knowledge and capabilities to systematically re-engineer their built environment and urban infrastructure in response to environmental, social and economic pressures they may face in the period 2020-2050,* I have drawn out five current themes to structure the agenda and steer the debate.

1. **Living in a paradoxical world.**

Charles Handy in the Empty Raincoat (Handy, 1994) was the first to articulate for decision makers that many problems could no longer be framed as a binary choice between this or that, but were a balance, of often contradictory demands, both of which needed to be addressed to reach a symbiotic solution.. Designers to render complex problems manageable, accentuate one aspect to optimise the outcome. The twenty first century is characterized by paradoxical demands. We wish to be both secure and accessible, we recognise that success is built on innovation but we are risk averse, we want to be communal but value our privacy. The great paradox of sustainability is that for environmental reasons we want to minimize carbon emissions, but for economic and social sustainability we want to provide slack in the system to allow for future adaptability.

A world of increasing uncertainty and conflicting demands will place a pressure on project managers and planners, to minimize risk by reducing uncertainty, whilst at the same time allowing for ambiguity and change. As we look ahead, to allow for long term adaptability, designers and their clients will recognise the value of; loose fit, generic solutions, where decisions are layered (Blyth and Worthington, 2010)

At the end of the last century, as information and communications technologies began to converge, service and product suppliers bundled their offerings under the umbrella title of Intelligent Building (Boyd, 1994)). Intelligent or Smart buildings were rated by the number of features they contained, rather than their appropriateness to the demands of the user. **The Intelligent Building in Europe,** a multi- client study undertaken with leading ITC and real estate providers as sponsors (DEGW and Teknibank, 1992) re-defined building intelligence as any building which "Provides a responsive, effective and supportive, intelligent environment, within which the organisation can achieve its business objectives". Successful Intelligent Buildings, it was argued, rely on the provision of three layers of inter-related solutions:

1. Common sense; the provision of an effectively designed shell which has the flexibility to absorb ICT and adapt to growth and change
2. The appropriate I.Q; sufficient ICT applications to meet the needs of the immediate target market so as to reduce costs and improve performance in building, space and business management, and an ability to add additional features as required. Over provision for the context could be counter- productive, resulting in a "dumb" building.
3. Integrating technologies and services; which allow disparate, organisations, systems, data and personnel to focus on the common goal of increased business effectiveness.

As we look ahead, could the same definition be used to assess the sustainable, Intelligent City? The definition encompasses capacity to meet future needs, includes appropriate attributes sufficient to meet current requirements, and advocates a holistic integrating supporting infrastructure.

2. Intensifying use by managing space, time and technology

Cities can be defined as organic, open, continuously changing systems (Sennett, 2008). As cities have developed over the last 100 years, with global urbanization and improved transport technologies, they have sprawled and given precedence to individual desires. New building on green field sites has been perceived to be cheaper, quicker and good for growth. The result has been a hollowing out of our city centres with an under-utilization of existing resources, and a growing recognition of the negative impact this may have in achieving a more sustainable future.

Our desire to measure success through economic growth fuels a desire for new construction, yet with careful husbandry, we have spare capacity in the buildings and infrastructure that already exist..

New building places a significant impact on resources. It has been argued (Dobbelsteen, 2004) that by re-use and designing for long-lasting, multi- functional buildings the environmental load of building materials could be reduced by a factor of 30. Dobbelsteen in **The Sustainable Office** concludes that major improvements in sustainability will be achieved by more than just technology. To achieve a factor 20 improvement requires a paradigm shift, that in addition to green building technologies already being pursued, is prepared to explore new typologies for buildings and communities, and rethink behaviour and operations , by embracing new ways of living and working. Successful firms today are focussed on managing both space and time to allow for parallel working across time zones. Functions are overlapping with a shared use of space in a wide variety of settings. Mobile technology has allowed work to disperse, and eliminate the "fixes" that currently make change so difficult and

expensive. **The Office: Past Present and Future** (Harris, 2011) posits a concept of "spaceless" growth achieved by extending time in use, sharing amenities and working across locations.

The opportunity for intensifying the use of space and increasing capacity is significant, when organisations are prepared to re define the way the service is delivered or the organisation operates. The virtual reality rides of Sega World, can be reproduced in 10 m2 copared with the third of a hectare of space required for the big dipper at Blackpool. Airport capacity at Heathrow was increased by airlines selling cheap interconnecting tickets for off peak usage, with the result that plane capacity was increased with no extra demand for runway space, and transfer passengers staying airside reducing the pressure on landside facilities (Worthington, 2009a). TU Delft has undertaken work on the Randstad rail system which shows major opportunities to improve rail capacity and open up accessible space for development (Sprintstad, 2012)

The story of Heathrow's expansion clearly shows how capacity can be dramatically increased if a company is prepared to think creatively outside the confines of the expected construction solution. The success of the budget airlines has been through their willingness to, reconsider the perceived demands of the passenger and apply "yield management" and lean thinking.

Such shifts in thinking by both the demand and supply side of the built environment sectors are going to be required if we are to make major changes in the way we deliver infrastructure and use resources in our cities by 2050. Density will no longer be measured as amount of space provided, but also by its intensity of use. By changing the language, through defining space no longer as rooms or buildings with fixed functions ,but as settings for activities ,utilization can be transformed and perceptions changed (DEGW and OGC, 2004; DEGW and OGC, 2008).

With a focus on both space and time density is being redefined as both intensification and diversification (Leaman, 1996). Intensification reflected in the range of activities that can be undertaken in the same space over an extended period of time, and diversification in the location and overlap of functions. The paradox of the twenty first century networked city is that of a low density city region in a high density landscape with well connected high density nodes (Frieling 2001). With the take up of new ways of working, organisations are exploring alternative means of allocating space, with less space to the individual and more to shared settings, dispersed over a variety of locations. With improved virtual and physical communications we no longer need to be in physical proximity. A well serviced polycentric city region allows functions to locate in the most cost effective locations resulting in a wider range of choice for the consumer and a more effective overlap of resources (Echenique 2001)

3. **Balancing individual desires with the public interest**

Planning it might be argued is firstly about creating economic success and then distributing the results of that success equably. Effective planning is a balance between participatory, local involvement, and regulatory democracy, ensuring that the individuals rights are respected. Has the British planning system lost some of its strength in plan making and become over concerned with control?

Compared with the Continental European planning system, UK decisions for the allocation of financial resources largely emanate from central government; dialogue between parties is invariably confrontational and local community expectations reflect a history of dependency on social services.

The current government agenda focusing on Civic Society and local decision making reflects a growing movement across Europe to a greater awareness of the role for the voluntary, or not for profit sector, in shaping, delivering and maintaining public services. Think tanks such as the RSA, the Young Foundation and Nesta have championed the Civic Society, identified change makers and given inspiration to new initiatives.**The Compendium for the Civic Economy** (00:/Research, 2011) through 25 case studies shows more sustainable ways to share prosperity through, new organising tactics, connecting people and collective investment and exchange. The stories are an inspirational example of how "civic entrepreneurship can turn ideas into action and impact." As we look ahead we can conceive a more balanced distribution of power and resources between the state and local community groups with the State, planning, managing and providing the long term infrastructure platform, to support local initiatives. Copenhagen is an example where government has supported the provision of a central platform for power, heat and waste into which local enterprises can be both providers and consumers (Happold, 2012). In Helsinki, where the municipality owns the majority of land, an integrated infrastructure of utilities provides the platform for managing the planning and delivery of urban change.

4. **Creating resilience**

Climate change and sustainability are now firmly on most government agendas, however, too often the two concepts are indiscriminately interchanged. Optimising energy saving features and applying precise fit solutions may reduce carbon emissions, but at the same time can hinder long term flexibility, and the agility to respond to future needs (Worthington, 2011). The emerging focus on achieving resilience, the ability to respond to unpredicted change, is increasingly recognised as an essential feature for achieving long term urban sustainability.

Cisco reflects commerce's concern to address these issues. Their Internet Business Solutions Group, charged with exploring the opportunities of ICT networks in city development,, have produce a series of excellent white papers as part of their Connecting Cities programme (Villa and Mitchell, 2010).**The Resilient Society, Innovation, Productivity, and the Art and Practice of Connectedness** (Cho, Willis and Stewart-Weeks, 2011) explores how distributed networks can support City leaders in achieving greater innovation and effectiveness to ensure resilience. Resilience they define as an idea that combines two dimensions; "bouncing back" from the last unexpected emergency and "bouncing forward" to anticipate, prepare and "avoid the worst excesses of the next disruption". They call for a combination of productivity, "doing things better" and innovation "doing better things". Drawing on Gary Hamel's writing on building organisations that are fit for the future –"resilient, inventive, inspiring and accountable". Hamel argues that the many corporations that are still operating with "zero-sum thinking, profit obsession, power, conformance, control, hierarchy and obedience don't stand a chance against community, interdependence, freedom, flexibility, transparency, meritocracy and self-determination". The paper argues these ambitions are the values of the web; open, merit-based, flexible and collaborative. The technologies of connectedness provide the opportunity for co-production between those who need and those who deliver the services which will go to make a more liveable city. The authors advocate firstly for decision makers to be pro-active, focusing on forecasting risk and building adaptive capacity to manage unforeseen disruptions, rather than taking a reactive stance of managing the risk efficiently when it occurs. Secondly they advocate for not only increasing the resilience of government but also to support communities to become more adaptive.

The focus is less on controlling through regulating and more on being self- organising and innovative, by supporting a culture of testing by doing and learning through trial and error. To achieve this vision of a new resilient society they propose that; *Governance will assume a more collaborative and flexible approach to getting things done using a range of new platforms and spaces, often highly informal, rapidly developed and flexible for empowerment, choice and personalization.* Actions to make these changes would be through; designing, implementing and testing new systems, platforms and practices; growing communities of influence and monitoring and measuring how public sector institutions are performing, as they combine innovation and productivity in the search for resilience. Cisco has established Amsterdam, San Francisco and Seoul as pilot cities. Others, such as Siemens (2012) are exploring how their array of products and services can be integral to future city change and development. Arup, stand out as a consultancy firm who have focussed on understanding the drivers of change (Arup 2012) and innovating in how technology can be used to enhance the quality of urban life (Wilson, 2010)

5. **Thinking holistically**

Richard Sennett (2008) in his think piece on the public realm starts with the question why it is that vernacular environments of the past have proved more flexible, sustainable and stimulating than those designed more recently. Sennett then contrasts the closed system as one in "harmonious equilibrium" as distinct from the open system, which is in "continuous unstable evolution." His proposition is that "the closed system has paralysed urbanism, while the open system might free it".

The closed system, the end game being sought by planners and architects, is one of perfection and completeness, whilst the open system is never complete always adapting and self-organising over time. By definition open systems are open ended and un-predictable they thrive on ambiguity, blurring and paradox and are often seemingly chaotic and out of control.

Looking ahead, what ways of thinking might be required, which will accept ambiguity, balance conflicting demands and rapidly absorb change? I would suggest an approach to briefing and project management (Blyth and Worthington, 2010) that firstly challenges the design team to find solutions that balance conflicting demands, and secondly recognises the need to respond to changes over different time scales. The logic of the open system is that it provides the frame work of long term underlying patterns, for example the rhythm of the seasons matched with the short term uncertainty of meteorological conditions. City plans, can be perceived as a series of large and small scale projects undertaken at different time scales. Some stand alone and others are interdependent.

A holistic view of design is questioning the current approach where complex messy problems are broken down into discrete manageable parts with an emphasis on quantifiable data. The city and its complex systems are perhaps less amenable to such an approach, value being dependant on the values and expectations of a diverse range of users (Ibid).

"Efficiency" the easiest attribute to measure, but often the one with the least impact on performance and subsequent success, has now to be assessed against" Effectiveness", improving productivity and wellbeing and " Expression", the ability to define identity and transmit values, the least transparent and most slippery to measure.

True long term value results from understanding the holistic system and applying integrated solutions. The Construction Industry Council (CIC) **Design Quality Indicators** (DQI) are a valuable pointer to a more holistic approach to design, integrating the process of briefing evaluation and design (Gann, Salter and White, 2003) The disappointment is that in practice it has become a tool for audit. Ticking the boxes

has become more important than asking the questions that lead to innovative solutions and better quality design decisions.

Re-Engineering the City 2050: The what and the how

What needs to be done?

Looking back thirty years to the start of the1980's, we can now realise we were at a watershed which would have been hard to perceive at the time. The command economy of the Eastern blocks was weakening and "worker-power" in the west was disintegrating. Personal computing was democratising the workplace and perceptions were changing. The market economy, enterprise and individual initiative were a driving force which would shape the next three decades. Today the values of the market economy, the dominance of individual interests over responsibility to the community and the power of the corporation are being questioned against a context of shrinking resources and global shifts in wealth and power.

Within the built environment sectors to achieve greater resilience will require a willingness to rethink our professional institutions and educational systems, to respond to the, environmental, social and economic uncertainties that lie ahead. Central to planning is the management and moderation of change. Four attributes are proposed which would strengthen our approach as we move forwards.

The recognition of the strength of diversity

 Most people are not afraid of change; they are against having change thrust upon them. Diversity, challenge and edginess make dynamic urban areas but it can easily spill over into conflict and divisiveness. LEAF a research project that the University of Sheffield undertook (Lawson, Worthington, Phiri and Bassino, 2002) to understand the briefing process in organisations with continuous building programmes, found that intentions, what was called for in the brief, what was delivered in practice and the aspirations of the different members of the design and development team were seldom the same. The conclusion was that to achieve lasting improvement did not require all three to be aligned. Success was achieved through recognition of differences and a common set of ambitions and expectations built through listening sharing, and feedback. The future will require an awareness of how to manage different perspectives, and conflicting requirements.

Understanding the value of envisioning the future

With the future so unpredictable it is easy to dismiss the future. However if we accept that we cannot control the future but we can think ahead to design for alternative futures and take positive steps to take decisions to minimise the outcomes we do not want, looking ahead becomes intrinsic to how we act today. The understanding of future scenarios, options and risks is only of value if we believe in them. Envisioning is an intrinsic part of the process of change, and change is a collaborative process.

Speeding up the change of perceptions

Perceived wisdom can be a major barrier to innovation and positive change. Outdated perceptions are reinforced by vested interests, inappropriate assessment criteria and limitations of language. Anna Minton (2009) in **Ground Control** presents a brilliant analysis of the fears and anxieties we face in the twenty first century city. She describes the impact that the research on defensible space had on our subsequent understanding of the value of a balance between security and accessibility. She convincingly highlights the paradox of security, in that fear breeds fear. The government initiative "Secured by Design" (1989) through the words used and the design solutions proposed, heightened the sense of separation, so reinforcing fear.

Working collaboratively

Kevin Kelly (1998) in **New Rules for the New Economy** identifies that value flows from abundance, recognising that in the network economy, the more plentiful things are, the more valuable they become. Generosity begets wealth. In the world of computing "As computers get smarter we transfer some of that intelligence to the production line, lowering costs of goods and raising their perfection…. Cheaper chips lower the cost of setting up a competing enterprise, so competition and spreading knowledge lowers the price yet more". By collaborating to compete together, we first increase market awareness to then compete. The new technologies are stimulating networks for co-creation and co-production (The Hub 2012) where members work together sharing a common set of values, sometimes collaborating and at other times competing.

How might we achieve a fresh approach to make the Built environment sectors stronger to approach thirty years forward? One of the main themes underpinning this paper is paradox. The paradox of the way ahead is that to face the urban challenges of the twenty first century we require a major shift in values and mind-sets, which if it is to happen will happen incrementally. John Kay (2011) in **Obliquity** persuasively builds an argument that lasting success comes from understanding what people actually do, rather than the building of abstract models of what we think they should do. Kay

suggests that "If people are predictably irrational, perhaps they are not irrational at all: perhaps the fault lies not with the world, but with our concept of rationality". Responding to the challenges that are ahead will require a paradigm shift in outlook, which will happen in small steps augmenting and adapting our existing institutions.

How we might change:

A start would be by changing perceptions, through building trust, tolerating a diversity of values, building a culture of continuous improvement and recognising that innovation can be achieved incrementally in small steps.

Changing perceptions will mean rethinking old structures. Our professional education has become intertwined with professional validation structures and government agendas, often driven by short term goals and narrow vested interests. Some of the most exciting break-throughs in built environment education are outside the formal system. Communities of practice, such as the RSA or the Academy of Urbanism which cross disciplines and professions, may provide a model for greater collaboration and lateral thinking in the future.

Diversity is the lifeblood of dynamic, enterprising and successful cities, yet that diversity can easily form the seeds of divisiveness. The seeds of divisiveness are nurtured by intolerance for the different beliefs and values others might hold and the value they place on achieving their goals. **BE Valuable**, A report prepared for constructing excellence by Richard Saxon(2005) sets out an encompassing definition of value and the broad range of different types of value and stakeholders which should be considered. CUDE (Clients and users in Design Education) mapped the changing roles of the Built Environment professions and identified barriers and opportunities for improving understanding of others perspectives and fostering cross disciplinary working (Nicol and Pilling (Eds), 2000)

The focus on performance indicators (KPI's) championed by Sir John Egan, was a valuable beginning to instilling a culture of improvement through targets and measuring outcomes. To make an impact, goals should be realistic, expectations easily measurable and the reward for success balanced between celebrating the team and individuals. Awards such as those initiated by CABE or the professional institutions have done much over the last ten years to raise awareness of best practice and stimulate collaborative working.

The problems ahead are complex and can look daunting. The "big idea" needs an overarching vision and plan, but to succeed can most likely be achieved as a portfolio of small projects trusted to independent teams with clear measures for success. Project management over the last two decades has shifted from product project management to managing the wider process of meeting the client's prime objective in using his building

to achieve organisational success. Successful examples such as the delivery of the London Eye, the Shard and the site for the Olympics are good exemplars to be celebrated, evaluated and learnt from by the built environment sector.

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