

BUILDING FUTURE SCENARIOS: A REFLECTION FOR THE RESEARCH AGENDA

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Over the last decade, there has been numerous foresight studies conducted across countries and industries, including within the UK construction industry. While these studies help signpost future scenarios, it is questionable as to whether consideration of these scenarios actually translates into practice at grassroots level in the industry. This paper therefore reflects on the relevance of foresight studies in developing research agendas. Through a review of a selection of foresight studies, a number of shared future trends and implications for the built environment across the studies were elicited. The trends include an aging population, flexible working and living, globalisation and a shift towards the service industry; while implications encompass increasing competition, move towards customer-centric models and investment in people. A workshop was conducted with practitioners and academics to validate these commonalities. Finally, the current research portfolio of the Salford Centre for Research and Innovation (SCRI) was mapped along these themes to establish gaps that the centre could develop as future research. Such an exercise if done regularly should prove useful to ensure that research is always kept abreast with current trends and that research is conducted to meet the challenges ahead.

Keywords: construction, future scenarios, research, workshop

INTRODUCTION

“Oracles, futurists, visionaries [...] divine the shape of things to come before anybody else. And we all avidly await their predictions (Grossman, 2004)”. Over the last decade, following the elevation of gurus like Schwartz (1991), there has been a growth in foresight studies across different countries and industries. The basic assumption governing these studies is that “[the] future will be different from anything we have seen before” and that foresight studies represent an attempt “to gauge how the longer-term future may manifest itself (Edkins, 2000: 4)”. The impetus, therefore, for the understanding of future scenarios is to better prepare the general population for uncertainty and challenges ahead. Yet, in our view, it appears that these foresight studies tend to be conducted via a top-down approach, often based on select committees within governmental (e.g. DTI) or institutional (e.g. nCRISP) organisations (see Table 1 below). As such, the ability of these foresight studies to bring about real change at grassroots level remains questionable. This article reports on recent work that is done to engage with practitioners to help make future scenarios more relevant at the grassroots level and illustrates how the research community could more proactively embrace future thinking in determining their research portfolio. The

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paper is organised as follows. First, a review of key foresight reports pertinent to the construction industry is presented before discussing the conduct and outcomes of practitioner workshops. Finally, implications for the research community are drawn.

CONSTRUCTION FORESIGHT STUDIES

Within the confines of this paper, five major construction future studies have been reviewed. These reports were selected from the UK (3) and USA (2) so as to maintain as far as possible a view of the future beyond that of the UK construction industry. The organisations driving the publication of the selected reports and the details are summarised in table 1 below. This section succinctly presents the emergent findings from these reports.

Table 1: Background information to the selected reports.

Organisation	Title	Author(s) (Publication Year)	Country
Construction Research and Innovation Strategy Panel (nCRISP)	<i>Building future scenarios</i>	Edkins (2000)	UK
	<i>Constructing the future</i>	Broyd (2001)	
	<i>Nanotechnology and implications for products and processes</i>	Gann (2003)	
Construction Industry Research and Information Association (CIRIA)	<i>UK construction 2010 – future trends and issues briefing paper</i>	Simmonds and Clark (1999)	UK
Commission for Architecture and the Built Environment (CABE)	<i>The professionals' choice – the future of the built environment professionals</i>	Royal Institute of British Architects(2003)	UK
Construction Industry Institute (CII)	<i>Vision 2020</i>	CII Strategic Planning Committee (1999)	USA
Civil Engineering Research Foundation (CERF)	<i>The future of the design and construction industry (projection to 2015)</i>	Building Futures Council (c. 2000)	USA

nCRISP

The Construction Research and Innovation Strategy Panel (CRISP) was originally formed in July 1995 as a joint industry and government panel to identify and develop priorities for research funders and help set the agenda for construction research and innovation in the UK. Renamed as nCRISP in 2002, following the Fairclough (2002) report, nCRISP continues the remit of prioritising and promoting research and innovation that will sustain a first class construction industry and enhance the value of its contribution to the quality of the built environment and the wealth and well being of society. nCRISP has a widely based Council that meets two times a year, whose membership includes construction clients, major industry bodies, government departments and agencies with a significant interest in construction and the built environment and the research community.

The priorities of the panel include a wide-ranging selection of ongoing foci, encompassing customer needs, sustainable construction, design, technologies and components, process and performance, information and communication technologies (ICT), housing and construction research base, regulatory and financial framework and motivation and communication. From these priorities, it can be seen that nCRISP has a largely technological focus. In fact, as part of identifying future trends for the construction industry, the panel embarked on the foresight programme in the late 1990s, which has as its aim the desire to increase the UK's exploitation of science.

Three key reports were produced as a result, which include *Building future scenarios* (2000) that led on to *Constructing the future* (2001) and latterly a third review into *Nanotechnology and implications for products and processes* (2003). Based on the Social, Technological, Economic, Environmental and Political (STEEP) framework, future scenarios were developed by the researchers involved. The key emerging trends identified were as follows:

- **Social:** ageing population, rise of the urban population, restructuring the notions of the “family”, “home” and “work”, and rise of individualism;
- **Technological:** use of ICT in facilitating a knowledge culture, use of biotechnology in materials, food and medicine, growth of nanotechnology, and alternative energy sources;
- **Economic:** shift towards the service industry, greater utilisation of human skills and technology, and consideration of the location of firms;
- **Environmental:** climate change, regional sea defences and water storage and supply, and levels of governance (i.e. local, regional and national) and its impacts on the environment;
- **Political:** Layers of governance (see *environmental* above), and the innovative use of the public purse;
- **Specific to the built environment:** globalisation and increased competition, provision for housing in terms of design, construction and use, implications of increased use of ICT at the workplace, development and use of sustainable materials, safe construction and refurbishment and reuse of buildings.

The identification of these trends led the panel to come up with nine action points that entailed the promotion of “smart” buildings and infrastructure, improvement of existing built facilities and health and safety, investing in people, enabling supply chain integration, the need to exploit global competitiveness, embrace sustainability, increase returns on investment and forward planning.

CIRIA

The Construction Industry Research and Information Association (CIRIA) is an independent research and innovation organisation in the UK with three main research foci: building and facilities, transport and water facilities. Their key concerns rests upon technical issues, legislation and regulation, training, management and economics. Complementing the efforts by nCRISP (see above), a research team at CIRIA embarked on research project aimed at eliciting future trends from industrial practitioners. This fulfilled part of “Adopting foresight in construction”. Simmonds and Clark (1999) interviewed more than 140 participants across 8 companies (undisclosed and no mention was made regarding research methodology) and came up with the following implications for the construction industry:

- Increasing customer-centric focus;
- Types/use of buildings and shorter building life cycles;
- Rising importance of housebuilding and infrastructure;
- Increasing globalisation and international trade and competitiveness for the industry;

- Changes in planning and development in terms of restrictions on Greenfield sites and rise of the self-build sector;
- Changes in construction processes with a growth in standardisation and prefabrication;
- Growth in skills and competence development, and;
- Increasing importance of sustainable materials and use of land.

CABE

The Commission for Architecture and the Built Environment (CABE) is an executive non-departmental public body based in the UK with ongoing foci on educational and healthcare facilities, residential homes and a strong design remit. CABE is primarily concerned with engaging with young people where design of the built environment is involved, housing and regeneration agenda, the design and use of public space, environment, skills and planning. As part of introducing the debate about the future, a book entitled *The professionals' choice: the future of the built environment professions* was published in 2003. This book contained several scenarios which were each taken up by a leading academic expert to “imagine forward and [write] backwards”. These scenarios included:

- **Regulatory:** increasing self-regulation of the professions, professionals providing more “consultancy” in risk management, flexible working;
- **Economic:** towards a service industry with user-centric focus, increasing agenda for environmental sustainability, growth in leasing rather than owning, need to rethink skills to meet ever-changing business models;
- **Technological:** decline in construction undergraduates, increase mass customisation and diminishing role of the professions, growth of alliances and supply chain integration;
- **Social:** increase personal autonomy and decline in traditional education in terms of career paths/choices, increasing need to be culturally sustainable, shifting definition of work and impact on personal lifestyles, rising importance of environmental and sustainability issues;
- **Managerial:** integration of construction professions, shift towards softer “creative” skills and move away from hard engineering and management, construction becoming a more stable sector due to shift towards the offering of whole package of building and servicing.

CII

The Construction Industry Institute (CII) based at the leading University of Texas at Austin, USA is a network of more than 90 organisations representing clients, contractors and suppliers in both the public and private sectors. Its main remit is to engage with these industrial partners to deliver business effectiveness and improvement of capital facilities over its life cycle through dealing with such matters as safety, quality, schedules, cost, security, reliability, operability and global competitiveness. To guide its long-range planning process, the CII's Strategic Planning Committee began in November 1997 a series of meetings and consultations to develop blue-sky thinking in a number of areas. These culminated in the production of a report entitled *Vision 2020* in 1999, which is summarised as follows:

- **Globalisation:** intertwining of national and regional economies, rise in international procurement, increasing geographic dispersion of integrated teams, skills needed to align different cultures and interests, upgrading of technical competence in developing countries;
- **Technology:** increase use of ICTs blurring the lines between project phases, sustainable materials, automation on-site;
- **Business relationships:** increase in project alliances, more comprehensive project management skills, reshaping of business entities, changing stakeholders' roles, growing importance of risk management;
- **Characteristics of projects:** increasing focus on renovation and renewal, rising importance of flexibility, operations, maintenance and decommissioning becoming more crucial at the front-end, increase project complexity;
- **Planning, design and construction practice:** increase use of prefabrication and standardisation, enhancement in resource planning coupled with increase automation, rising importance of intelligent handheld systems, need for real-time performance measurement;
- **Workforce:** minimised use of craft labour and increase in capital substitution, growing need to consider work-life balance, importance of recruitment and retention of high-quality engineering graduates, increase industry-academia collaboration.

CERF

The Civil Engineering Research Foundation (CERF) forms part of the American Society of Civil Engineers (ASCE). Based in Washington DC USA, their main remit is to act primarily as the engine for dissemination and application of research and innovation in the industry. The ongoing foci at CERF lie within the areas of productivity, performance and sustainability within design and construction through collaboration and innovation. CERF also holds the directorship of the Building Futures Council (BFC), an organisation aimed at promoting future-oriented thinking across the American construction industry. The key paper produced by CERF entitled *The future of the design and construction industry (projection to 2015)* identified future trends including the heavy use of IT, 24/7 production with three global shifts, lean permanent core staffing with significant outsourcing, increased specialisation for small firms, increase computer literacy, need to demonstrate an understanding for human behaviour and lifestyles and the understanding of social roles and economic implications. These identified trends led CERF to a series of key questions (implications for the built environments), encompassing:

- **Engineering emphasis:** sustainability and the question of balance between economic, environmental and social imperatives, need for more global understanding and shift towards being a service industry, the age-old question of doing more with less and the possibility of reverting to the “Master Builder” concept;
- **Clients:** the changing role of public agencies, large firms becoming major clients for small firms, growth of the non-governmental organisation (NGO) sector;

- **Characteristics of projects:** increase collaborative working, rise in prefabrication and mass production, growth of build-operate-transfer (BOT) sector, increase automation;
- **Internet and software development:** growth in the use of sensory devise, self-heal materials, use of technology reducing inspection and maintenance costs, electronic networking and data management;
- **Workforce:** increasing diversity amongst the workforce, emphasis on high-tech nature of the industry, move away from research-oriented to practice-oriented;
- **Public relations for the professions:** changing professional roles and liability, rising importance of risk management;
- **Small firms:** increase specialisation, delivery on request, more networking and more consolidation with larger firms;
- **Miscellaneous:** decentralisation of infrastructure, increase knowledge of advanced materials, understanding of the interaction of energy, information and infrastructure.

Key trends and implications

Based on the selected reports outlined above, the key trends and implications for the built environment are summarised in Table 2 below.

Table 2: Key trends and implications for the built environment.

	nCRISP	CIRIA	CABE	CII	CERF
<i>Trends</i>					
Aging population	●	●			
Flexible working and living	●		●		●
Rise of the individual	●	●	●		
Globalisation		●		●	●
Move to service industry	●		●		●
Increased use of ICT	●	●	●	●	●
Demand for lifelong learning		●	●		
Sensors and communication technology		●		●	●
Automation		●		●	
Nanotechnology	●				
Climate change	●	●	●		
Alternative energy sources	●	●			●
<i>Implications</i>					
Smart materials and buildings	●	●		●	●
Sustainability agenda	●	●	●	●	●
Prefabrication and standardisation	●	●	●	●	●
Mass customisation			●		●
E-everything	●	●	●	●	●
On-site automation				●	●
Shift towards customer focus		●	●		●
Emphasis on housebuilding/infrastructure		●			●
Growth in PFI/PPP		●	●	●	●
Growth in self-build	●	●	●		
Increasing need for refurbishment/renewal	●	●	●	●	
Changes to planning restrictions	●	●		●	
Global competition	●	●		●	●
Invest in People	●	●	●	●	●
Growing worth of professional judgement			●	●	●

THE WORKSHOP

Following the review of the various foresight studies above, a practitioner workshop was held in conjunction with the Northwest Development Agency (NWDA) and nCRISP. The object of the workshop was three-fold. First, it was expected that the workshop would validate the key trends and implications determined in the review of the foresight reports. Leading on from this, the workshop aimed to draw relevance of future scenarios for the construction industry in the Northwest. Third, it was hoped that action plans could be established by the practitioners to take the future scenarios forward for the construction industry in the Northwest. Therefore, the chief aim of the workshop was to make future scenarios more practitioner-oriented.

The workshop was conducted by a researcher at the Salford Centre for Research and Innovation (SCRI) and facilitated by two external consultants involved in the construction industry. A total of twenty practitioners signed up to the event representing a range of organisations including the NWDA, suppliers, contractors, construction clients and academia. The event lasted a full day and the agenda was largely driven by the participants with the researcher observing the process. A report was then published and disseminated (see Cooper *et al.*, 2005). The key findings from the workshop are presented in this section. In general, the event followed three stages: *the bigger picture* (i.e. what is the perceived future for the world and the industry in the NW), *the drivers* for the perceived future and a plausible *action plan*.

The bigger picture

The facilitators started the event by getting the participants to brainstorm on where the future of the world is heading. Two models (see Figure 1 below on global scenarios and individual vectors) were used to enable the participants' discussion. Although there was a lack of consensus in the outcomes of this introductory session, it was interesting to note that there was a general recognition of three key areas. First, the participants believed that the world was heading towards greater chaos signified by increased fragmentation in the economy and the growth of the small firm. Second, things appear to be moving faster than they used to be (i.e. greater speed) and third, there is an unstoppable trend towards individualism.

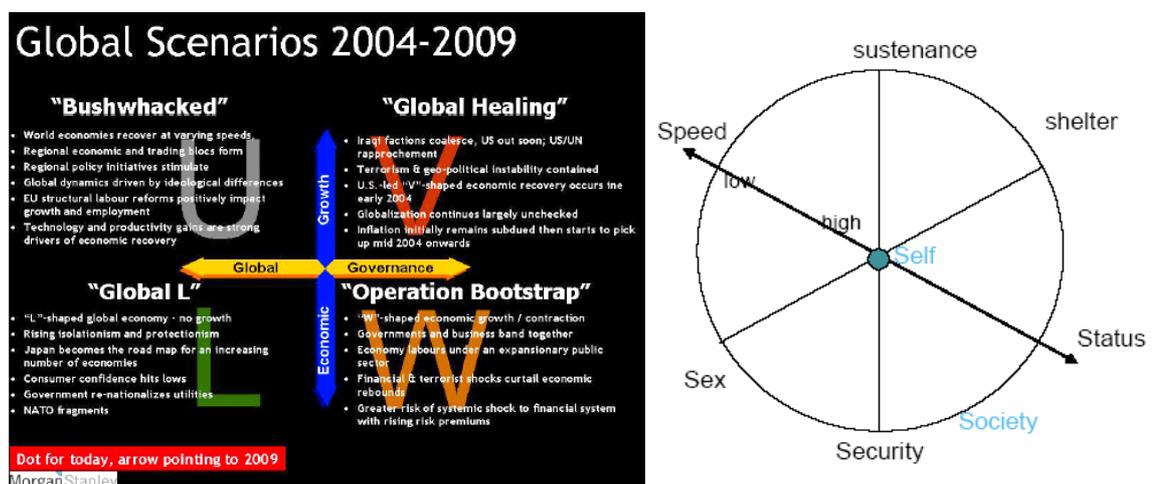


Figure 1: Global scenarios (left; source: Morgan Stanley) and individual vectors (right)

Drivers for change

In the second stage, the participants were split up into four groups and each group were tasked to come up with a list of drivers of change that led them to perceive the future scenarios in the introductory session. Participants were also asked to consider the enablers and barriers of the change. The key issues from the discussion of drivers are shown in Table 3 below. From the table, it is comforting to note that the issues discussed corroborated with the findings from the review of the various foresight studies. For instance, the participants reiterated the problem of an aging population, the ramifications of climate change and the lifestyle changes resulting from rising individualism. Additionally, the participants accepted the tide of globalisation especially the rise of China/India, but added the caution of possible terrorism. However, a number of participants were surprisingly upbeat about a terrorist attack, claiming that it could open up new lines of work (e.g. surveillance and security) and possible new markets.

Table 3: Drivers for change: issues and barriers

Drivers	Enablers	Barriers
Aging Population	Workforce Issues Changing consumer profile Prefab/self-build/automation Foreign Labour Changing industry image	Lack of preparedness and financial issues (eg pension crisis)
Climate Change	Increased Legislation - Cost, knowledge & training Increased Building Regulation Building on/under water?	Cost and political will
Individualism	More single person accommodation - Affordability - Location - Newbuild - Conversion Increased traffic - New roads? Poorer environment. Increased Leisure and support facilities Importance of education	Technological advancement Cost
Lifestyle expectations	More and better products More and better paid jobs Better quality products Balance of choice and opportunities	Politics/funding Uncertainty over Public/Private provision. Planning issues Need culture shift Widening gap between rich & poor Money, saving and education
Political Change	Europeanism - UK in charge of own destiny? Local/regional government	Infighting/bureaucracy
Rise of China/India	Opportunity to export our expertise Material Shortages Capitalising on NW Chinese/Indian populations and students	Awareness and understanding of markets
Technology and Communication	Companies need to invest in Research and Development to stay ahead Skills and Training Businesses require smart buildings New entrants into construction market Industry growth	Lack of market stability for investment Uncertainty of benefits from Research and Development Short term culture
Terrorist Threat	Surveillance New Markets	Fear

Action plans

Based on the emerging drivers of change, the participants were then asked to develop an immediate action plan for the construction industry in the Northwest of England. Whereas the participants were enthused and invigorated with the blue-sky discussions, it was emphasised at this stage that the action plans had to be realistic to ensure that momentum was not lost through inaction. As a result, the participants came up with immediate actions including the following:

- Build up a knowledge economy by honing in on skills and sharing experiences;
- Create a culture of trust (within the supply chain, with employees etc.);
- Develop pilot projects and invest more in research and development;
- Influence government procurement practice through its centre of procurement excellence;
- Invest in infrastructure;
- Make construction less demanding;
- More collaboration with universities and be prepared to fail;
- More efficient use of resources (including time);
- Rethink working practices.
- Set longer budget periods (end revenue/capital split), and;
- Support the NWDA cluster of clients, contractors, suppliers, local authorities and the community at large.

Indeed, one might argue that some of the action points depicted above (e.g. influence government procurement practice) may seem vague and improbable. However, one should bear in mind that these discussions resulted from a day workshop. Therefore, given the time constraints, it is important to consider the benefits of the process of making future scenarios relevant for practitioners. That is, future scenarios are not merely the remit of select committees in high office, but the responsibility of *everyone* if we desire to tackle the challenges and uncertainty ahead. Moreover, it is useful to go beyond identifying future scenarios to develop a list of actions that could be enacted at the local level – in this case, the construction industry in the Northwest. This was felt, both by our observations and the feedback received from the participants after the event, to be achieved through the practitioner workshop.

REFLECTION FOR A RESEARCH COMMUNITY

What then are the implications for the research community? At first glance, it was refreshing to see practitioners engage in a full day of blue-sky thinking. Although it is premature at this stage to report on any real changes resulting from the action points – this will be ongoing work where we hope to track the progress of the participants through future linked events – engaging the practitioners in this way is invaluable in that it translates what might be another report on future scenarios into practical actions/implications. Needless to say, what the workshop achieved, in particular, is the ability to make future scenarios more real and personal for the participants involved. Such transference to practice should be further encouraged if we were to foster greater investment in research and development and collaboration with academic institutions.

Following the event, the researchers involved at SCRI also attempted to map our current research portfolio with the key trends and implications that emerged from our crude review of the foresight studies and the practitioner workshop. What we found was interestingly comforting. We observed that the variety of research projects (completed and ongoing) have in some way addressed issues that relate to the key trends and implications of future scenarios. However, there were undeniably gaps in our portfolio, including our weakness to address issues such as security, automation and sensors on-site and the impacts of planning restrictions. Nonetheless, such an exercise allowed SCRI as a research centre to reflect on the type of research we are doing and question ourselves as to whether we are able to meet to tackle the future. Again, this reflective process, alike the practitioner workshops, should be encouraged and repeated to ensure the relevance of our work.

CONCLUSIONS

This paper began by considering the recent hype in undertaking foresight studies in the construction industry and reviewing a number of reports from the UK and USA. A synthesis of these reports revealed a number of key trends and implications for the built environment. It was argued, however, that numerous foresight studies have been commissioned by select committees within governmental and institutional organisations. As such, the relevance of these studies is often detached from the wider practitioner-community. This led us to conduct a workshop to validate our review of the foresight studies and more importantly, engage with practitioners in imagining the future and to develop potential action plans for the construction industry in the Northwest. Such effort was immensely valuable in that it *personalises* future scenarios and translates a somewhat academic exercise into practical actions/implications. Moreover, a further reflection of our research portfolio illustrated that SCRI is well-equipped to meet the challenges ahead. However, we identified research gaps in areas of security, automation and planning that could potentially be developed. It was suggested that the practitioner workshops and reflection for researchers should be encouraged to ensure that there is greater collaboration between academia and industry, and to ensure that research is always kept abreast with current trends.

REFERENCES

- Broyd, T (2001) *Constructing the future*. London: CRISP.
- Building futures council (c. 2000) *The future of the design and construction industry (projection to 2015)*. Washington DC: CERF.
- CII (1999) *Vision 2020*. Texas: CII.
- Cooper, R, Aouad, G, Abbott, C and Chan, P (2005) *Construction futures and SCRI strategy*. Salford: SCRI.
- Edkins, A (2000) *Building future scenarios*. London: CRISP.
- Fairclough, J (2002) *Rethinking construction innovation and research: a review of government R & D policies and practices*. London: DTI.
- Gann, D (2003) *Nanotechnology and implications for products and processes*. London: CRISP.
- Grossman, L, (2004) Forward thinking. In: Time magazine, 25 October, 46 – 52.
- RIBA (2003) *The professionals' choice: the future of the built environment professionals*. Foxell, S (Ed.), RIBA: London.

Schwartz, P (1991) *The art of the long view*. New York: Currency Doubleday.

Simmonds, P and Clark, J (1999) *UK construction 2010: future trends and issues briefing paper*. CIRIA: London.