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Keynote paper

“21st Century Hazards and the Built Environment:
How Futures Thinking and the Foresight Principle Can Prepare Us”

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Abstract

There is the challenge to the professions of the built environment to create a mindset and a skillset within its ranks that promotes a greater awareness of risk and an improved facility in hazard appraisal and disaster management.

The aims of the paper are fivefold.

- To explain why 21st Century hazards are different.
- To explore the global hazards we face.
- To examine the attributes of global challenges.
- To evaluate the nature of ‘foresight’ and the potential role of ‘futures techniques’ in preparing for hazard appraisal and risk management.
- To espouse a futures-oriented mindset among built environment researchers, educators and practitioners in facing and addressing the natural, man-made and environmental hazards that lie ahead.

The overriding rationale being that:

“No problem can be solved from the same level of consciousness that created it. We must learn to see the world anew” [Albert Einstein].

Keywords: 21st Century challenges. Hazards. Foresight Principle. Futures thinking. Prospective

1. Exordium

There is a growing awareness that humankind is on a non-sustainable course which could lead to “grandscale catastrophes” [e.g. Lovelock, 2006; Rees, 2004]. At the same time, however, we are unlocking formidable new capabilities. This could be humanity’s last century, or a century that sets the world on a new course towards a spectacular future. Echoing the warnings of Hawken et al (2000), and their promotion of ‘natural capitalism’ as a necessary fundamental
change in the way of doing business, the global economy seems to be outgrowing the capacity of the earth to support it. As part of all this, there is also generally the need to understand, prepare for, and respond to natural, man-made and environmental disasters. Most particularly, in the context of this conference, there is the challenge to the professions of the built environment to create both a mindset and a skillset within its ranks that promotes a greater awareness of risk and an improved facility in disaster management. This paper proposes that ‘futures thinking’ through the adoption of the ‘foresight principle’ and the employment of ‘scenario planning techniques’ can contribute significantly to research and education in this field.

2. 21st Century Challenges

There is widespread recognition that we live in an era of rapid change in which new discoveries, philosophies and technologies play an ever more prominent part in shaping social and economic development. The world is becoming increasingly complex, more competitive and better connected. There is economic internationalisation on the one hand, yet cultural decentralisation on the other. Society has shifted from an industrial base to an information and knowledge orientation. Advances in genetics, materials, energy, computing, robotics, miniaturisation, medicines, therapies and communication proceed apace. The developed world is getting smaller, older and wealthier, whilst the developing world grows bigger, younger and relatively poorer. A blurring of boundaries between disciplines, industries and social enterprises is taking place. And, as those boundaries fade, the lines connecting the constituent parts become more critical, so that networks, systems and holistic thinking are more meaningful. Moreover, crucial issues on a global level – demographic, natural resources, the environment and human culture – have to be addressed. All in all, a veritable transformation, or great disruption, is occurring. Something old is coming apart at the seams, and something new is emerging.

2.1 Why the 21st Century is Different

Until relatively recently humankind retained a simplistic view of the world. Back in the 1960’s, and early 1970’s, it seemed possible to keep an overview of development, take future changes into account and make five to ten year planning proposals based on ten to twenty year forecasts. It was a period of trend projection, time series, network analysis and mathematical modelling. Above all, perhaps, it was an era with a belief that tomorrow would mostly resemble today. The future was a given, and planning of all kinds sought to adapt current trends to meet that predestined condition. During the 1970’s, and into the 1980’s, however, the view of the future changed. With sudden and significant economic disruptions and social upheavals the future did not seem as predictable as had previously been imagined. Indeed, it became recognised as uncertain. There was no longer only one likely future path of development, but several different and possible futures. All these futures, moreover, would be shaped by a number of critical challenges.
• **Too many people.** As the world’s population grows to about 9 billion around 2050, global tensions will climb as a result of dropping water tables, rising and changing consumer demand, uncontrolled migratory movements, demands for equality in healthcare, pollution, famine, congestion, unemployment, poverty, disease, starvation, social violence and the like. The challenge is to determine and achieve a stable and sustainable population for the earth.

• **Not enough resources.** Conflict over valuable resources – and the power and wealth they confer – is fast becoming a prominent feature of the global landscape. International security experts argue that in the early decades of the new millennium, wars will be fought not over ideology, but over dwindling supplies of precious natural commodities. The challenge is to shift economic thinking from an emphasis on human productivity to a radical increase in resource productivity through the concept of natural capitalism.

• **It takes time.** Many, if not most, of the major ‘momentum trends’ for the 21st Century are long-term in their formation, impact and necessary control. We need to ‘stand in the future’ and create a strategic view that is unrestricted by the exigencies of the present – imagine ahead and plan backwards. Whilst we cannot predict the future in detail or with surety, we can study the alternative directions it might take and how to influence them over time. The challenge is to learn how to handle long-term, intergenerational, lead-times.

• **There will be new technologies.** With 20th Century technology, there was a massive gulf between natures systems and man-made systems. At the dawn of a new century we are witnessing new discoveries, innovations and adaptations that combine living and non-living systems. There are new forms of medicine and farming. There is also the prospect of new forms of ‘artificial life’. The challenge is to decide how to use these technologies responsibly and harness them to create a better world.

• **What’s the risk?** Risk in the future could reach magnitudes of harm unimaginable hitherto in modern times. Due to the interdependence of economics and societies, risks in one country can spread rapidly to others, so the notion of risk needs to be broadened and precautions put in place at global, regional and national scales. Vital systems need greater protection and citizens need to be more fully involved as partners in decisions. The challenge is to build trust and share the burden between the public and those in charge.

• **Redefining the enemy.** Increasingly we are at war not with enemy states or foreign armies but with small groups of people or specific individuals: fugitive terrorists, drug traffickers, warlords, dangerous dictators, rogue scientists, villainous zealouts and the like. The needs of safety, security and defence are different. Yet powerful institutional barriers to fundamental change remain. The challenge is to alter radically how we organise to defend and to fight.

• **Economics are complex.** When viewed in out-of-equilibrium formation, economic patterns are all too often simplified into the facile equilibrium of standard economic models. In reality, economics are everchanging, showing perpetually novel behaviour and emergent phenomena. The challenge is to portray the economy not as
deterministic, predictable and mechanistic; but as complex, process-dependent, organic and continually evolving.

- **Détente with dilemma.** Well-schooled in solving problems, governance at all scales needs to re-educate itself in the art of acting intelligently, and also compassionately, in situations that have no solution. Agencies and organisations of all kinds will have to find tools and processes for teasing-out the first-, second-, and third-order dilemmas in these situations. They will also have to reconcile multiple stakeholders and design processes that generate new value out of apparent conflicts of interest. *The challenge is to reach some kind of détente with dilemma in a world with no externalities.*

- **Running the show.** There will be a redistribution and relayering of power and governance at all scales and across all sectors of society. Representative government is fine in theory, but frequently fails in practice. Why? Three reasons are suggested. First, populations tend to elect the average. Second, elected representatives tend to be members of short-sighted, self-serving political parties. And third, large numbers of people in the democracies’ feel alienated from the political process. *The challenge is to promote more effective leadership, bring about a step change in the degree of collaboration between key players in a process, and foster a deeper engagement between local people and large organisations.*

- **There will be surprises.** Wildcards or jokers will be played from time-to-time. Some of these might be totally unexpected – some could be unlikely yet predictable. Leaders in organisations at all levels, and in all situations, need to collect the information, study the signs and confront the issues surrounding the degree of probability and scale of impact of macro-uncertainties that might impinge upon their areas of responsibility. *The challenge is to avoid tragedy by both anticipating and preparing to mitigate damage done by ‘predictable surprises’.*

Perhaps the main difference that distinguishes the 21st Century from those that proceeded it is *the need to develop a mindset that can tackle the conscious design of large systems* – cities, communities, corporations, countries, cultures, domains and the earth itself.

### 2.2 The Hazards We Face

All the dimensions of change – frequency, magnitude, complexity, rapidity and visibility – are happening at an ever-accelerating pace. In the past, there has been a discernible pattern to change. This time, however, it is different, for change is far less sequential and certain, showing much greater discontinuity and unpredictability. Evolutionary change, however, is largely in human hands, and humanity, it is argued, must learn the rules in order to see a transition during this century to a planet managed well enough to make its long-term survival more likely [Martin, 2006]. A starting point, in the context of 21C hazards, is some form of classification of the hazards we face. The following ordering has been compiled by the author from several authoritative sources [Canton, 2006; Glenn and Gordon, 2006; Leggat, 2006; Martin, 2006]. It identifies the five most significant hazards in each sector – economic, environmental, geopolitical, societal and technological.
2.2.1 Economic

*World Trade.* Widening disparities in wealth and welfare could cause serious disruptions unless a global partnership emerges based on ethical market economies to reduce the gap between rich and poor.

*Rising Energy Demand.* World energy demand will probably increase by about 60% between now and 2030, so the time has come for an Appollo-like programme to increase the global supply of non-polluting energy safely and efficiently.

*Extreme Poverty.* Market economics and globalisation are lifting the bulk of humanity out of extreme poverty, but special measures are needed, funded by affluent countries, over the next few decades to help the planet’s 1 billion indigent populations out of conditions of dire poverty.

*Natural Capitalism.* A fresh economic paradigm is starting to emerge founded on four central strategies of radical resource productivity, biomimicry, service and flow relationships between producers and consumers, and investment in natural capital.

*Corporate Responsible Behaviour.* How companies manage their strategic, tactical and operational activities to produce an overall positive impact on society is becoming a powerful imperative in the world’s economy.

2.2.2 Environmental

- *Global Warming.* Further exacerbated by the induced release of methane from the permafrost or from clathrates on the continental shelves.
- *Biota Extinction.* The eruption of continental flood basalts leads to the mass extinction of 95% of biota.
- *A New Ice Age.* Caused either by natural cycles or by abrupt climate change from reduced Atlantic thermohaline circulation, leading to a loss of 65% of current land biomass.
- *Quakes and Eruptions.* Especially the super-eruption of somewhere like Yellowstone, producing a five to seven year volcanic winter reducing solar and wind power.
- *Water Resources.* Ensuring that everyone, everywhere can have access to sufficient clean water without conflict.

2.2.3 Geopolitical

- *Peace and Security.* At the extreme, preventing war among nations using weapons of mass destruction. But also determining when it is right to use force to intervene in the affairs of another country.
- *Terrorism and Ethnic Conflict.* Promoting a set of shared values and new security strategies to reduce the means and motivations for terrorism and ethnic conflict.
• **Organised Crime.** In contrast to military spending of around $1 trillion a year, annual income for organised crime has passed $2 trillion and is impeding governments’ ability to act.

• **Leadership and Ethics.** Global ethical standards are merging from a variety of sources, but the education and development of decision-making for policy makers is lagging well behind.

• **Global communication.** The use, control and reliability of the internet and any successor information system will be crucial as the majority of the world’s population becomes connected.

2.2.4 **Societal**

• **Health and Medicines.** Reducing the threat of new and re-emerging diseases and immune micro-organisms that could threaten civilisation, and slashing the costs of treating the world’s most devastating illnesses.

• **Population Growth.** Balancing population growth, resource availability and sustainable development is a key issue with inherent risk. As humanity swells toward nine billion in the next half century it will undergo historic changes in the balance between young and old, rich and poor, urban and rural, so that choices now and in the years ahead will determine how well we cope with our coming of age.

• **Opportunity and Capability.** Developing the capability latent in everyone, with particular emphasis on changing the status of women to improve the human condition, and helping young people everywhere understand the meaning of the 21C.

• **Decision Making.** Making policy formulation more sensitive to long-term prospectives, improving the capacity to decide as the nature of work and institutions change and incorporating more routinely ethical considerations into decisions at all levels.

• **Biodiversity.** Developing a new understanding of how species become extinct, and how to preserve them, is a hallmark of a civilised society.

2.2.5 **Technological**

• **Scientific Experimentation.** There is the danger that some scientific developments could change the fundamental fabric of the universe in a way not previously seen in nature.

• **Nanotechnology.** The theoretical threat exists of planet-wide spread of exponentially self-replicating nano-machines utilising DNA/chlorophyll (‘green goo’), or bio-vorous fully artificial nanoreplctors (‘grey goo’).

• **Acclerating Technology.** Factors causing the acceleration of scientific/technological innovation are themselves accelerating, to such an extent that perhaps an international Sci/Tech agency or organisation may be needed to examine the potential consequences.

• **ICT Convergence.** Hazards prevail in determining how the global convergence of information and communications technologies can work for the benefit of everyone and be safeguarded from corruption, distortion and criminality.

• **The Singularity.** A number of scientists believe machine intelligence will surpass human intelligence within a few decades, leading to what has become known as the
‘singularity’, and producing in the words of Ray Kurzweil (2005) technological change so rapid and profound it could create a rupture in the very fabric of human history. What we have to do perhaps is understand how any ‘transhumanist’ changes to Homo sapiens can be made without negative consequences.

Then, of course, there are the real ‘wild cards’, such as an asteroid or comet over 10km striking the earth, or the collapse of a supermassive star causing an intense pulse of x-rays, cosmic rays and muon particles. A ‘wild card’, however, need not necessarily be bad, it can be marvellous – a ‘benestrophe’ rather than a catastrophe [Cornish, 2004]. Those might include: war fades from history; energy that is almost free; a happiness pill is perfected; death becomes an ecstatic experience; permanent human settlements in space; drugs to boost human intelligence; a really effective ‘youth treatment’ is found; or a ‘world brain’ is constructed. But perhaps such ‘benestrophes’ raise more questions than catastrophes?

3. The Foresight Principle

3.1 Futures-oriented Thinking

Foresight is the principle producing the prime methodology for the practice of futures studies. The main purposes of adopting a futures approach have been listed elsewhere as follows [Gannon and Ratcliffe, 2006].

- Extending thinking beyond the conventional and fostering more forward thinking as a result.
- Forcing thoughts and stimulating conversations about the future.
- Helping identify assumptions about the future that might require examination, testing and subsequent modification.
- Encouraging people to have regard for the positive possibilities and opportunities that tomorrow might hold, as well as the potential threats and disasters.
- Making more intelligent decisions today concerning the future by focusing the mind on the most important questions that must be resolved in order to formulate better policy.
- Inspiring people to ‘think outside the box’.
- Widening perspectives and increasing the number of options available for exercising more deliberate decision-making towards positive change.
- Preparing for, and managing change better by enhancing the capacity to learn.
- Making response times to actual future events much shorter and reactions more relevant.
- Fostering active participation in strategic thinking leading to decision-making.

In the context of major disaster management, the use of futures methods offers a rigorous, comprehensive and integrated approach towards anticipating, planning and implementing recovery and reconstruction operations, relying, as it does, more on intuition, participation and adaptability than conventional strategic thinking and planning systems. Most excitingly, a futures approach can constitute an effective platform for collaborative planning. A
collaborative futures process helps to develop successful solutions and ensures that the ownership of these solutions is embedded in the community so that they have a greater chance of implementation. It also enables the development of preferred visions of community futures through mobilisation – bringing together and facilitating the network of key stakeholders and sources of knowledge. Above all, perhaps, foresighting reduces risk. Thus, the ‘foresight principle’ enacted through ‘foresight programmes’ provides an opportune, seductive and feasible approach for studying the hazards that lie ahead and preparing ourselves to meet and overcome them.

3.2 The Foresight Process

Foresight is a systematic, participatory, future-intelligence-gathering and medium-to-long-term vision building process aimed at present day decisions and mobilising joint actions [FOREN, 2001]. There are said to be five essential elements of foresight – anticipation, participation, networking, vision and action (ibid). And the most important aspects of the Foresight process have been précised as being [Irvine and Martin, 1984]:

- communication between parties concerned;
- concentration on the longer term;
- co-ordination of research and development;
- consensus created on future directions and policies; and
- commitment generated among those responsible for implementation of policy.

A defining characteristic of foresight is that, in essence, it is a human capacity to think ahead and to forecast possible outcomes of present decisions. Turning towards the practical operation of the process, the stages of a strategic foresight activity, together with the relevant objectives for each stage and the intended outcomes are shown in Exhibit 1.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>OBJECTIVES</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framing</td>
<td>Scoping the project : attitude, audience, work environment, rationale and purpose, objectives and teams.</td>
<td>Focal Issue</td>
</tr>
<tr>
<td>Scanning</td>
<td>Collecting the information : the system, history and context of the issue and how to scan for information regarding the future of issue.</td>
<td>Information</td>
</tr>
<tr>
<td>Forecasting</td>
<td>Describing baseline and alternative futures : drivers and uncertainties, tools, diverging and converging approaches, and alternatives.</td>
<td>Baseline and Alternative Futures</td>
</tr>
<tr>
<td>Visioning</td>
<td>Choosing a preferred future : implications of the forecast, and envisioning desired outcomes.</td>
<td>Preferred Future</td>
</tr>
<tr>
<td>Planning</td>
<td>Organising to achieve the vision : strategy, options and plans.</td>
<td>Strategy and Plans</td>
</tr>
<tr>
<td>Acting</td>
<td>Implementing the plan : communicating the results, developing action agenda and institutionalising strategic thinking and intelligence systems.</td>
<td>Action</td>
</tr>
</tbody>
</table>

*Exhibit 1: A Strategic Foresight Activity (Bishop and Hines, 2006)*
Central to the use of Foresight, however, is a strong dose of common-sense. It is, at heart, about avoiding danger, reducing risk, optimising opportunity and developing a strategy to reach a preferred future.

### 3.3 Prospective Through Scenarios

A particularly progressive and proactive form of foresight is to be found in *prospective*. The prospective, or more familiarly “la prospective”, has French origins, but is now bring more popularly applied across Europe in a variety of strategic planning settings. In the francophone context, however, ‘prospective’ refers to a much wider approach and activity than other futures methodologies as it comprises not only the study of the future, and an evaluation of alternative outcomes against given policy decisions, but also the will to influence the future and to shape it according to society’s wishes. Furthermore, it is a very formalised, inclusive, comprehensive and rigorous methodology when compared to more generalised future studies. In many ways, it is similar to foresighting, but would be better understood as a specific means of applying the foresight approach.

One of the most popular and persuasive techniques used in futures studies and foresighting is *scenario analysis*. Scenarios have long been used by government planners, corporate strategists and military analysts as powerful tools to aid in decision making in the face of uncertainty. They are instruments for ordering people’s perceptions about alternative future environments in which today’s decisions might play out. In practice, scenarios resemble a set of stories built around carefully constructed plots. Such stories can express multiple perspectives on complex events, with the scenarios themselves giving meaning to these events.

Despite their story-like qualities, scenarios follow systematic and recognisable phases. The process is highly interactive, intense and imaginative. It begins by isolating the decision to be made, rigorously challenging the mental maps that shape people’s perceptions, and hunting and gathering information, often from unorthodox sources. The next steps are more analytical: identifying the driving forces, the predetermined elements and the critical uncertainties. These factors are then prioritised according to importance and uncertainty. Subsequently, three or four thoughtfully composed scenario ‘plots’, each representing a plausible alternative future, against which policy options can be tested and implications identified, are developed. Then, the deeper structures and systems behind the scenario stories, and their underlying logics, are elaborated to explain them and reveal their crucial differences. Finally, the key events, or turning points, that would channel the future towards one scenario rather than another are identified.

At The Futures Academy, in DIT, an approach has been developed which combines the above methodologies and is known as Prospective Through Scenarios. It has been applied across a wide range of policy issues over the past ten years, and is confidently put forward as an effective means of getting those concerned with hazard appraisal and risk management to think, talk, plan and act, creatively and differently, together. This particular process is described in Exhibit 2.
4. Built Environment Foresight

The world is changing at a pace hitherto unknown, and previously unimagined. There is a need for academic institutions and professional bodies in the field of the built environment to play a more positive role in addressing the 21C hazards we face, and the potential disasters that might ensue. Some of the tasks that might be tackled include the following.

Raising issues of common concern that may be overlooked taking the traditional short-term view.

Highlighting dangers, alternatives and choices that require attention before they become critical.

Publicising the emerging picture of the near-term future in order to involve the public and contribute to present-day decision-making.

Contributing to a body of knowledge about foresight and the macro-processes of change and continuity that frame the future.

Identifying the dynamics and policy implications of the transition to sustainability.

Helping to identify aspects of a new world order so as to place these on the global political agenda.

Facilitating the development and application of social innovations.

Helping people to deal with fears and become genuinely empowered to participate in creating the future.

Assisting organisations to evolve in appropriate ways.

Providing institutional shelters for innovative futures work which might not be carried out elsewhere.

In proselytizing the simple yet profound message that we do not have to walk blindly into the hazards we face surrounding the future of the built environment, it is possible to pose a few questions to participants at this conference, or readers of this paper:

- How flexible is your organisation in adapting to change, and does it use outside ‘visionaries’ to question the basic assumptions held internally?
- Since planning invariably takes longer than events to happen, is enough time spent on contingency or parallel planning?
- Does your organisation devote enough time to ‘relationship management’, both internally for colleagues, and externally for actual or potential customers and collaborators?
- How ready is your organisation for significant shifts of ‘culture’ in the environment within which it operates – exploring the way people think, believe and behave?
- Is your organisation managing efficiently and effectively its intellectual capital and knowledge base to think and plan creatively and collaboratively?

5. Propositum

What does the future hold? Are we living at a turning point in human history? Can we master the hazards ahead, or does a new Dark Age menace? Contemplating the critical trends, issues and threats raised earlier in the paper, let alone their possible convergence, it is tempting starkly to suggest that without rapid and positive action we could actually be bringing history to an end. As one leading futurist, James Martin (op cit), succinctly states:
“We are travelling at breakneck speed into an era of extremes – extremes of wealth and poverty, extremes in technology, extremes in globalisation. If we are to survive, we must learn to manage them all”

Turning to another prominent futurist, Dr. Patrick Dixon [2004], it is imperative, he argues, to become ‘futurewise’. It is an extraordinary time to be alive. The world is being transformed before our eyes from a technological twentieth century society into something altogether new and different. Either we take hold of the future, he concludes, or the future will take hold of us. At a practical level, Dr. Dixon offers ten proposals for organisations facing the hazards of planning and managing their affairs in the 21C.

1. Prepare for the unexpected.
2. Generate faster reactions times.
3. Create flatter structures.
4. Build teams and forge partnerships.
5. Learn to live in the global village.
6. Become more culturally aware.
7. Invest in technology.
8. Foster a family feeling with a sense of identity, value and belonging.
9. Develop purpose and meaning.
10. Recognise that leadership will be everything.

It is largely futures thinking through foresighting that helps achieve this.

On a more personal note, this paper ends with the proposition that to face the Grand Challenge of the 21st Century a more informed, structured and imaginative approach towards the study of the future is demanded of those professions concerned with the stewardship of the built environment and the promotion of sustainable urban development, and that this can most effectively be provided by the Futures Studies field through the adoption and adaptation of the Foresight Principle through Scenario Planning and associated techniques. We need a new mindset – a futures-oriented mindset.

“We are made wise not by the recollection of the past but by the responsibility for the future!”

[George Bernard Shaw].

References


