Australian Centre for Innovation Limited

Methods and Tools for Breaking Mindsets and Bringing New Perspectives to the Table

by

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1. The Evolution of Foresight

As foresight has moved into common practice as a tool to assist planning and strategy over the past 20 years, it has undergone a significant process of evolution.

One way of tracing this evolution is to compare the definitions of foresight used over this period. A selection is presented below:

- foresight is a tool or set of tools used "to survey as systematically as possible what chances for development and what options for action are open at present, and then follow up analytically to determine to what alternative future outcomes the developments would lead." (1989)[1]
- a systematic means of assessing those scientific and technological developments which could have a strong impact on industrial competitiveness, wealth creation and quality of life. (1996)[2]

The emphasis on priority setting for science and technology was substantially broadened in the 21st century, leading to definitions such as:

- Foresight is a means of systematically addressing the future, and acting on it.[3]
- 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.[4]

Another way that this is captured is via the concept of 'generations of foresight'. Thus Johnston[5] proposed five stages in the chronology of foresight, with technology forecasting and futurism leading to technology foresight, from which emerged foresight, with its wider understanding of the economic and social processes that shape technology. He notes the strong progression within foresight studies towards being embedded within and directed towards planning and decision-making processes at a level appropriate (frequently local or sectoral) to the responsible organisation.

[1] Martin, B. and Irvine, J., *Research Foresight: Priority-Setting in Science*, London-New York, Pinter Publishers, 1989.
[2] Georghiou, L., 'The UK Technology Foresight Programme', *Futures*, Vol 28, pp359-377.
[3] Johnston, R., APEC Center for Technology Foresight, 2005.
[4] IPTS FORLEARN, http://forlearn.jrc.ec.europa.eu/guide/A1_key-terms/foresight.htm
[5] Johnston, R., 'The State and Contribution of International Foresight: New Challenges', The Role of Foresight in the Selection of Research Policy Priorities, IPTS Seminar, Seville, 13-14 May 2002

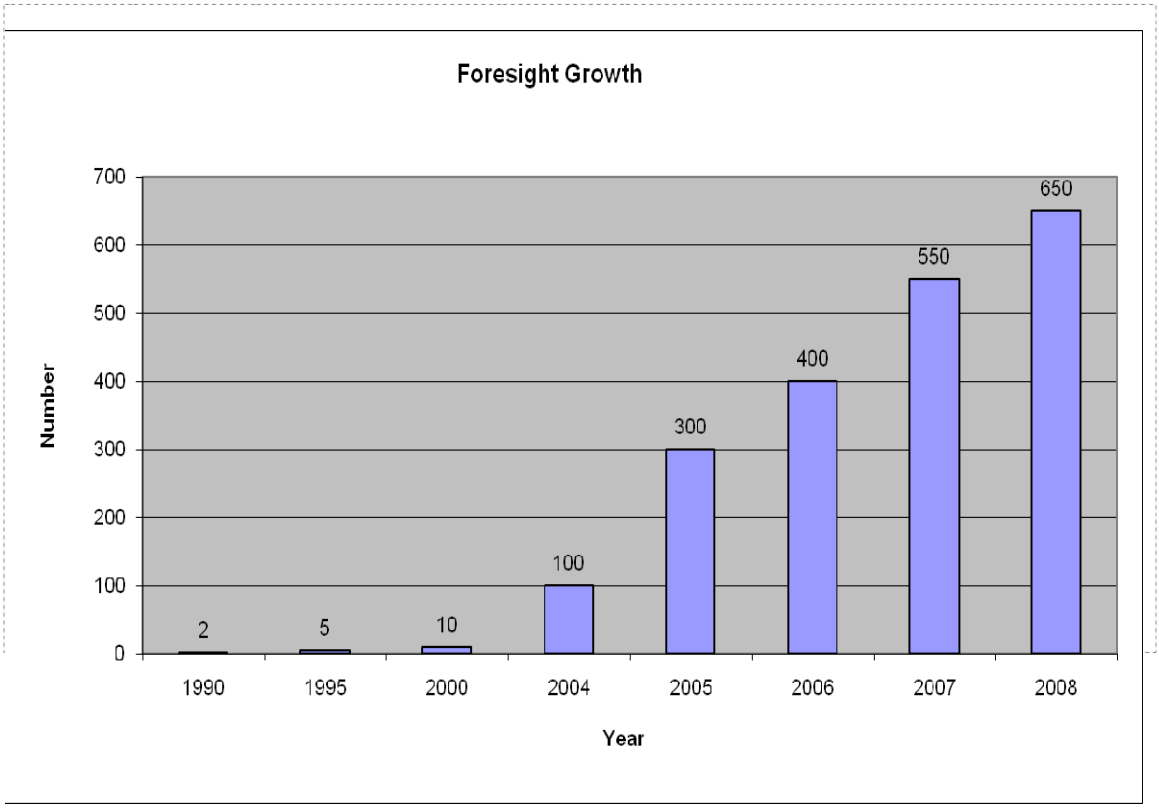
This approach was amplified Georghiou et al[6], who argued that the development of foresight can be characterised in terms of five generations of activity, in an analogous manner to the five generations of innovation:

1. *First Generation*: Foresight is emerging from what are mainly technology forecasting activities, with the analyses driven mainly by the internal dynamics of technology.
2. *Second Generation*: Foresight projects seek to grapple with technology and markets simultaneously. Technological development is examined in terms of its contribution to and influence from markets; there is also a strong emphasis on matching technological opportunities with market developments (and also with non-market needs such as environmental and social problems).
3. *Third Generation*: Foresight's market perspective is enhanced by inclusion of a broader social dimension, involving the concerns and inputs of a broader range of social actors. The need to take into account complicated issues concerning social trends and alternative institutional arrangements means that the methods used and the knowledge bases drawn on have to be expanded to deal with such issues.
4. *Fourth Generation*: Foresight programs have a distributed role in the science and innovation system, rather than being "owned" by a single policy sponsor. Multiple organisations sponsor and/or conduct exercises that are specific to their own needs, but are coordinated with other activities (eg sharing resources and results, having shared working groups).
5. *Fifth Generation*: A mix of foresight programs and exercises, also distributed across many sites but in combination with other elements of strategic decision-making. The Principal concern of these activities is either (a) structures or actors within the STI system, or (b) the scientific and technological dimension of broader social or economic issues.

These shifts need to be understood and interpreted within the remarkable growth of foresight over this period. Precise quantitative data of the number of projects that have been conducted are unavailable, given problems of definition and access. Nevertheless an approximate, judgment based exercise by the author, drawing on a number of other reviews, presented in Table 1, provides an indication of the scale of exponential growth.

[6] Georghiou, L., Cassingena Harper, J., Keenan, M., Miles, I., and Popper, R., *The Handbook of Technology Foresight*, Edward Elgar, 2008, pp15-16.

Table 1
Growth of Foresight Activity



As a consequence, there is a general agreement among foresight practitioners that:

- future-oriented thinking is vital for any forward planning, decision-making or policy development to meet future challenges;
- foresight enhances such thinking by gathering strategic anticipatory intelligence
- there are a variety of tools available to conduct foresight; each has a different basis, different strengths and limitations, and different applicability; and
- foresight is most effective where it is directly linked to existing planning and decision-making tools which are addressing specific issues of the future.

Moreover, the primary objectives of foresight exercises should be to:

- gather intelligence on possible longer-term developments and how these may interact with the decisions made today;
- provide strategic visions and create a shared sense of commitment to these visions among participants and stakeholders;

- build networks that bring together people from different sectors and institutions; and
- provide alerts on major future risks and opportunities.

This evolution of foresight has seen a significant transformation in many of its characteristics beyond just definitions. A wide range of applications have been developed, including for example:

- identification and characterization of emerging technologies;
- establishment of research priorities;
- planning for industry sectors;
- natural resource management;
- business strategy formulation;
- driving innovation into a supply-chain;
- regional economic development; and
- education.

There have also occurred major shifts in a number of features of foresight exercises:

- the emphasis of the majority of foresight projects has moved away from the development and demonstration of methods to a greater focus on outcomes and policy;
- the view of foresight methods as highly specialised tools, which can me comprehended and applied only by the trained foresight specialist is progressively being replaced by a recognition of the value of embedding foresight tools as a standard management practice;
- while national foresight studies continue, the predominant focus has shifted from national to the regional, sectoral, and local level and within organisations and communities – the experience is that national foresight studies represent the most difficult case, merely because of their breadth and the logistics management requirements; more focussed exercises are far easier to design, manage and implement;
- the sphere of primary application has moved beyond priority-setting for public research to include planning and decision-making, innovation, technology transfer – indeed all aspects of planning and management of an STI system;
- as suggested above, the scope has broadened from a primary focus on the technological dimension to fully incorporate broader socio-economic, environmental and social outcomes.

Experience is also being accumulated[7] about different socio-economic and cultural contexts for the application of technology. For example, In Western predominantly market economies (eg US, UK, Germany) identification of potential key technologies operates as a signal and information to which private sector corporations can respond. In contrast, in more planned Eastern economies (eg Japan, Korea) public investment in research and technology development can be more explicitly steered through foresight studies.

2. Changing Mindsets

Within the foresight discipline, it would be commonplace to identify one of its functions as the changing of mindsets ie shifting thinking about future possibilities. Interestingly, though, there appear to be relatively few explicit references to changing mindsets. A detailed search of the foresight literature by the author identified only a small number of citations to the specific phrase.

These include:

> Foresight is about changing mindsets. . . . Foresight is *not* centralised planning. Rather, it is a process where we generate, and keep generating, a shared sense of where we wish to go as a society. It is about being better prepared for the future, by understanding key trends, uncertainties and influences and drivers that will shape the way the future develops.[8]
>
> Scenario-planning is a tool used in Technology Foresight exercises to test the strategies being proposed for each sector for their relative robustness in the face of any combination of future uncertainties. This approach … facilitates large companies, smaller enterprises, the public sector partners and researchers to break out of the constraints of thinking about the future based only on current experience and trends. The systematic process of Technology Foresight can, therefore, be of immense value in fostering a new *shared mindset* amongst the partners.[9]

In addition, an analysis of the use and impact of foresight mentions that the foresight process "can reduce uncertainty because participants can align their endeavours once they arrive at shared visions" and that users of foresight place value on it, among other

[7] For example, through IPTS FORLEARN activities in disseminating foresight skills to new and prospective member States of the EU, and through projects of the APEC Center for Technology Foresight involving a range of Asian APEC Member States eg Vietnam, Laos, Myanmar.

[8] The Foresight Project, *Sci-Tech*, Newsletter from MORST 8 (3) August (1997), p. 1, cited in Martin, B., and Johnston, R., 'Technology Foresight for Wiring Up the National Innovation System', *Technological Forecasting and Social Change*, 60, 37–54 (1999).

[9] Technology Foresight Ireland - http://www.forfas.ie/icsti/statements/tforesight/overview/tforeire.htm; note the emphasis is on a shared mindset rather than a changed mindset.

reasons, because it provides "a means to challenge and catalyse staff and stakeholders."[10]

In practice, it can be concluded that while part of the rhetoric of foresight has been about challenging mindsets and establishing new visions, the predominant emphasis has been on getting foresight accepted as good practice, a standard tool of planning and management, appropriately adapted to the environment it is seeking to influence.[11]

The remainder of this paper will address the concept of mindsets, their efficacy and constraining characteristics, the need to challenge mindsets, and some approaches that might be incorporated into foresight to more effectively achieve this goal.

So what is a mindset? A mindset is a set of assumptions, methods or notations held by one or more people or groups of people which is so established that it creates a powerful incentive within these people or groups to continue to adopt or accept prior behaviours, choices, or tools."[12]

Snyder[13] argues that humans (and all creatures for that matter) are profoundly shaped by our adaptation to our environment, which means that our survival depends critically on our ability to rapidly identify and interpret key information. The very price of this survival is that we have adopted mental paradigms which exclude alternative possibilities and apparently extraneous data.

> It would appear that we are all blinded by our mental paradigms—by our mindsets! We emphatically do not examine each situation anew by logically considering all possibilities. Instead, we look at the world through our mindsets, mindsets acquired from our past experiences. Put simply, we are intrinsically prejudiced…
>
> This world has an indefinite number of potential surprises, but only a restricted subset is of critical importance to an animal. And, this subset is dictated by the animal's lifestyle within its niche. If the animal is to be a master of its niche, an expert as it were, then it must react automatically to those things of importance.
>
> Mental paradigms—mindsets—make possible this automatic behaviour. But, the price for mindsets is fixed modes of thought and hence prejudice.

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[10] Havas, A., and Johnston, R., 'The Use and Impact of FTA', Third International Seville Seminar on Future-Oriented Technology Analysis, 16-17 October 2008, accessible at http://foresight.jrc.ec.europa.eu/fta_2008/anchor_paper_2.pdf

[11] Eriksson,E. and Weber, M., 'Adaptive Foresight: navigating the complex landscape of policy strategies', *Technological Forecasting and Social Change*, Vol 75, 2008, pp 462-482.

[12] Wikipedia

[13] Snyder, A., 'Breaking Mindset', *Mind and Language*, Vol 13, 1998, pp1-20.

Should we then seek to systematically rid ourselves of our constraining mindsets, to construct a world free of reliance on mental paradigms?

> True, such a mind would be more conscious of detail and hence potentially aware of alternative interpretations… But a mind without paradigms would have no language, no communication abilities and no thought as we know it. Communication, language and thought are symbolic systems. They all require mental paradigms. Such a mind would have difficulty in coping with anything but the simplest routines, because the world would be one of continual surprises. Everything would have to be examined anew by treating each detail with equal importance. This does not look like the recipe for conceptual leaps, let alone creative genius. Rather, this is a mind that is overwhelmed and bogged down in detail. In fact, a mind without paradigms appears to me like one with infantile autism.[14]

The explanatory power and limitations of paradigms was famously used by Thomas Kuhn to describe and explain the nature of scientific progress. Kuhn argued that science does not progress via a linear accumulation of new knowledge, but undergoes periodic revolutions, or paradigm shifts in which the nature of scientific inquiry within a particular field is abruptly transformed. Guided by the prevailing paradigm, *normal science* is extremely productive: "when the paradigm is successful, the profession will have solved problems that its members could scarcely have imagined and would never have undertaken without commitment to the paradigm."[15]

During the period of normal science, the failure of a result to conform to the paradigm is generally seen not as refuting the paradigm. However, as anomalous results build up, science reaches a crisis, at which point a new paradigm, which subsumes the old results along with the anomalous results into one framework, is accepted. This is termed *revolutionary science*. Kuhn argues that rival paradigms are incommensurable - it is not possible to understand one paradigm through the conceptual framework and terminology of another rival paradigm.

How then to escape the power, and the trap, of mindsets? Snyder proposes that, as we can not easily break them, an appropriate response is to multiply them.[16] Alternative mindsets can be generated by working in completely different fields, or exposing ourselves to very different cultures.

The challenge for foresight then, may be less the direct breaking of particular mindsets but rather the creation of a range of possible mindsets and the mental and psychological capability to readily migrate from one to another. This may be a particularly important task because of the scale of the challenges we face.

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[14] Ibid, pp2-3
[15] Kuhn, Thomas, *The Structure of Scientific Revolutions*. University of Chicago Press. pp. 24–25, 1962.
[16] Snyder, op cit, pp 7-8.

3. Addressing the Grand Challenges to Our Future

There are any number of grand challenges to the future of humanity and our planet. It may be argued that it was ever thus, and our perception is inevitably shaped by our own condition and experiences. Nevertheless there appears to be sufficient evidence from a wide range of different sources to suggest these challenges are very real, and threatening.

Among these challenges, drawn from many reports are:

- Food availability
- Energy availability
- Water availability
- Climate change
- Population and demographics
- National and personal security
- Transforming effects of cyberspace and social networking
- Managing increasing complexity
- Emergence of a multi-polar world. With increased power shifting to non-state organisations.

At the same time, we are witnessing a loss of legitimacy and authority of institutions, and of codified formal knowledge, which would appear to significantly transform thr mechanisms available to arrive at collective agreement on the nature of the grand challenges and the best measures to address them.

One set of statistics about the growth of social networking reports:[17]

- 234 million people age 13 and older in the US used mobile devices in December 2009;
- Twitter processed more than one billion tweets in December 2009 and averages almost 40 million tweets per day;
- Over 25% of U.S. internet page views occurred at one of the top social networking sites in December 2009, up from 13.8% a year before;
- Australia has some of the highest social media usage statistics in the world. In terms of Facebook use Australia ranks highest with almost 9 hours per month from over 9 million users;
- The number of social media users age 65 and older grew 100 percent throughout 2010, so that one in four people in that age group are now part of a social networking site.

[17] Wikipedia

Apparently, in the age of Internet-based social networking, traditional expert knowledge is losing its former authority. For some, this is a welcome move toward more democratic processes:

> The empowering capability of ICTs is centered on their ability to permit previously marginalized individuals and groups—who would otherwise be silent and invisible—to be heard and seen. By doing so, ICTs reveal the diversity in society, a range of opinion that has always existed, but was previously without voice in public decision making. This, in part, is due to the fact that ICTs facilitate the dispersal of power away from centralized governments with the result that rational, administrative institutions are being challenged as a sole means of political and social control. In what appears to be a worldwide phenomenon, bureaucratic institutions are losing their monopoly over key sources of information and the capacity for surveillance, permitting alternative voices in civil society to emerge.[18]

An alternative view is that:

> the traditional control of knowledge, involving specification, standardization, and validation, by professors, teachers, researchers and experts, is paradoxically challenged and amplified at the same time. It is challenged by alternative, more individualized re-expression of traditional knowledge, and because new areas of application gain recognition. At the same time, the appearance of experts on the mass media scene, as providers of explanations and background commentaries, and in the market arena, as consultants, has opened new control opportunities for knowledge owners, as suppliers of rationality, according to a just-in-place and just-in-time logic.[19]

A more strident opinion is that:

> Out of this anarchy, it suddenly became clear that what was governing the infinite monkeys now inputting away on the Internet was the law of digital Darwinism, the survival of the loudest and most opinionated. Under these rules, the only way to intellectually prevail is by infinite filibustering.[20]

It appears safe to conclude that new approaches to engage the community in understanding and addressing the grand challenges which many believe we face will require the positive use of all the tools of education and communication available.

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[18] Milakovich, M., 'The Internet and Increased Citizen Participation in Government', *Journal of Democracy*, Vol.2, pp.1-9, 2010.

[19] Skagen Roundtable, 'Sharing Knowledge and Experience in Implementing ICTs in Universities', 2001, accessed at www.iau-aiu.net/he/icts/rtf/icts_confsk**age**n1.rtf.

[20] Keen, A., *The Cult of the Amateur*, Random House. p.15, 2007.

In addition to the challenges to institutions and knowledge, the nature of the problems themselves that we face are raising new challenges. This is best captured by the now familiar concept of 'wicked' problems.

Wicked problems have a range of interacting characteristics:

- difficulty to clearly define - the nature and extent of the problem depends on who has been asked ie different stakeholders have different versions of what the problem is;
- many interdependencies, often multi-causal - which make them hard to clearly define; the disagreement among stakeholders often reflects the different emphasis they place on the various causal factors;
- attempts to address them often lead to unforeseen consequences;
- often not stable - a wicked problem and the constraints or evidence involved in understanding the problem are often evolving at the same time that attempts are being made to address it;
- usually have no clear solution - since there is no definitive, stable problem there is often no definitive solution to wicked problems; solutions are not verifiably right or wrong but rather better or worse or good enough;
- social complexity – this, rather than technical complexity, overwhelms most current problem-solving and project management approaches;
- rarely sit conveniently within the responsibility of any one organisation - they require action at every level, from the international to the local and by the private and community sectors and individuals;
- involve changing behaviour - innovative, personalised approaches may be necessary to motivate individuals to actively cooperate in achieving sustained behavioural change.[21]

Taken together, the features of the wicked problems suggest the need for alternative and multiple mindsets is urgently required.

4. Foresight Approaches to Challenge Mindsets

Perhaps the most important conclusion to draw from this analysis is that foresight which is transformative, or designed to challenge and change existing mindsets has different characteristics from adaptive or managerial foresight. The 'rules' which have been evolved to design and conduct the latter type of foresight with the objective of

[21] Adapted from 'Tackling Wicked Problems: A Public Policy Perspective', Australian Public Service Commission, 2007, accessed at http://www.apsc.gov.au/publications07/wickedproblems.htm

consensual change are not appropriate to the pursuit of changed mindsets and new perceptions. A different type of approach is needed.

A number of techniques have been developed specifically to facilitate the process of foresight designed to challenge existing mindsets. In particular, the literature on the management of strategic decision-making based on conflictual rather than consensual approaches would appear to offer some insights. Efforts to build conflict into strategic decision making have focused on two similar approaches, dialectical inquiry and devil's advocacy:

> Both approaches incorporate decisional conflict through formalized debate. A decision-making group is divided into two subgroups, each of which will be involved in the analysis and solution of the problem at hand. One subgroup develops recommendations and supports them with all key assumptions, facts, and data, all of which are provided to the other subgroup.
>
> At this juncture, the two approaches differ. In dialectical inquiry, the second subgroup develops plausible assumptions that negate those of the first, then uses these new assumptions to construct counter-recommendations. The two subgroups debate their assumptions and recommendations in a process that continues until they agree on a set of assumptions, whereupon they unite to develop recommendations based on those assumptions. In devil's advocacy, on the other band, the second subgroup subjects the assumptions and recommendations of the first to a formal critique, expounding upon their flaws and why they should not be adopted but offering no alternative.
>
> The first subgroup revises its assumptions and recommendations to satisfy the valid objections of the second subgroup, then presents them for a second critique. The process continues until both subgroups can accept the assumptions and recommendations.[22]

Another approach is based on the explicit creation of more 'extreme' scenarios. There is a well-known tendency in scenario construction to reject more radical events as 'not possible' or 'highly improbable'. Foresight practitioners rarely wish to attract the criticism of 'science fiction', 'fanciful', or 'total rubbish'. It may be important to resist this conservative tendency in foresight exercises designed to challenge mindsets.

Other approaches in the same vein include the introduction of highly challenging 'wild cards', the explicit construction of fantasy (sometimes by engagement of a creative writer), and the inclusion in the process of people who, by their nature are highly

[22] Schweiger, D., Sandberg, W. and Rechner, P., 'Experiential Effects Of Dialectical Inquiry, Devil's Advocacy and Consensus Approaches To Strategic Decision Making', Academy of Management Journal, Vol. 3Z. pp.745-772, 1989.

creative, out-of-the-box, thinkers, rather than experts. Indeed, based on the follow-up evaluation of the Japanese NISTEP exercises[23], experts are likely to be more accurate about short-term developments, but les accurate than non-experts in predicting longer-term developments.

In addition, the more conventional tool of 'stretch targets' can be applied to push scenarios beyond conventional limits. For example, a foresight exercise built around the stretch target of reducing carbon dependence to zero in five years might be rejected as implausible, but might also serve to identify the kind of technological, economic and institutional breakthroughs that would be needed to achieve the target.

5. Conclusions

On the basis of the analysis of this paper, and the extensive experience of the author, it is now possible to initiate the task of identifying the necessary elements of a ***Charter of Good Practice*** for both the managerial (adaptive) and transformational (mindset challenging) forms of foresight at the national level. I propose the following:

Charter of Good Practice in the Managerial Application of Foresight

1. A well-resourced over-the-horizon scanning capacity
2. Significant analysis of weak signals of change
3. Planning and decision-making conducted within a significant future-oriented environment
4. 'What if ?' analysis embodied as a regular component of risk analysis and management
5. Regular web-based engagement of multiple perspectives
6. Strategic conversation as a recognised KPI
7. Routine roadmapping towards defined objectives
8. Staff trained in use of foresight tools in all major Government Departments and Agencies

Charter of Good Practice in the Transformative Application of Foresight

1. A Strategic Intelligence Unit (SIU) at the level of the Cabinet Office, or equivalent with responsibility for raising challenging issues and options
2. SIUs or SI capacity in every major government department and agency
3. Mechanisms for collaboration, coordination and exchange of information between all SIUs
4. Application of transformative foresight techniques
5. Regular production and communication of SIU analysis and findings

[23] Accesssed at http://www.nistep.go.jp/achiev/ftx/eng/mat077e/html/mat077ee.html

6. Establishment of an appropriate community of practice around each SIU
7. Open communication models with all information routinely available to the public
8. Engagement with all forms of media to promote a reflective future orientation