GMI Theme Issue:
Foresighting and Scenario Planning

Foresighting for Development*

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WE ARE LIVING IN AN ERA OF unprecedented technological change. Technology is, in turn, one of the most fundamental drivers of social and economic development. Each radical innovation, incremental improvement and new deployment of technology both enables and spurs further phases of economic and technological change, in a positive reciprocating dynamic. Some estimates indicate that innovation per se now accounts for more than half of economic growth in the advanced economies, with much of the remainder derived from incremental technological and managerial improvements that raise per capita productivity and thereby increase output and real incomes (*TETQ* 2002).

There are a number of rapidly maturing technologies in the pipeline, and new composite materials, biotechnologies, informatics, microfabrication techniques and nanotechnologies will soon allow a wide range of radically new solutions and opportunities. The pace of change is liable to be further accelerated by the process of globalisation; the progressive removal of barriers to international trade, as the effect of liberalisation is to reduce costs, promotes greater specialisation and efficiency, increases competition and thereby spurs innovation. This combination stimulates development and growth, partly by forcing the pace of restructuring (which can present serious political and practical difficulties for economically weaker nations). It is important, therefore, to note that we are still at an early stage in this process. At present, only 20% of world output is *contestable*, which means open to both international acquisition and global competition in the supply of goods or services. If the political difficulties can be resolved, however, that segment will grow. Micklethwait (1999), analysing reports by McKinsey (Bryan *et al.* 1999), recently predicted that by 2030 80% of world output will be contestable (see also Micklethwait and Wooldridge 2000).

It appears, therefore, that we are moving into an era of particularly rapid change, where corporations and countries alike have to learn to operate in an increasingly fluid, dynamic and borderless world economy and where new technologies will constantly transform the array of business constraints and opportunities.

Traditional forecasting and planning methods are no longer adequate tools for mapping business or national develop-

* Sections of this Introduction have been summarised from Clayton *et al.* 2003.

ment strategies for coping with these transformations, because they have a limited ability to predict or survive **discontinuities**—that is, significant changes in the external or internal environment that force a fundamental re-evaluation of strategy or goals. Major discontinuities (such as the outbreak of war, the development of a new, disruptive technology, a political transformation or an economic collapse) can influence the interdependent relationships between the economic, social and political factors that determine the dynamics of development. As the socio-economic system itself changes, its behaviour in the past no longer forms an entirely reliable guide as to its probable behaviour in future. This also means, of course, that conventional forecasting will tend to become less useful at times of particularly rapid change, when companies and/or countries must respond quickly and decisively to a rapidly transforming array of problems and opportunities in the external environment and when significant discontinuities are relatively frequent.

We must, therefore, now look for new models: ones that can give us a more durable basis for charting a course through the increasingly uncertain years ahead. In general, such a model must be able to accommodate discontinuities, facilitate anticipation and proactive planning and thereby provide a robust action plan, a stable underlying strategy combined with flexible tactics. The model must also be able to support the necessary internal restructuring, as the fundamental challenge is to build the capacity to anticipate and adjust to constant change.

This is a particularly profound challenge for the less advanced transitional and developing nations, many of whom do not currently have the strong base of technical skills required to sustain large-scale external scoping and mapping studies and scenario planning exercises and little tradition of or experience in using these dynamic planning tools. This is liable to further exacerbate the divide between the economically strong post-industrial and industrialising countries and the economically weak under-developing countries.

The post-industrial and industrialising countries can usually respond effectively to external events and have the capacity for proactive development, whereas the economically weak under-developing countries have less capacity to anticipate change and respond proactively and are more driven by external events and impacts as a result. The latter group is also, in general, less able to recover from economic or other policy mistakes in the choice of development trajectories. The cost of an economic policy error in a rich country is generally that of wealth forgone, whereas the cost of a policy error in a poor country is measured in terms of additional poverty and suffering, a further haemorrhage of skills and capital and lost years of development potential. For some countries in the latter group—already handicapped by the lost decades of development failure, facing a rapidly increasing concentration of pressures from the spread of HIV/AIDS (human immunodeficiency virus/acquired immunodeficiency syndrome; now over a third of the adult population in the worst-affected cases), eroding commodity prices and a legacy of donor fatigue—the next decade may prove to be the last chance to resolve the obstacles to development before societal disaster.

It is important to note that the key divide, in this regard, is no longer between the advanced nations and the developing nations, but between the developing nations that are actually developing and those that are not. Countries such as China, India, Taiwan, Malaysia, South Korea, Mexico, Brazil and Singapore are in the first group; they now have (or are rapidly building) the technological capacity, infrastructure and the strong business–innovative dynamic needed to underpin a strengthening process of wealth creation. By contrast, some ten countries in Africa now have lower standards of living than they did in 1960; the income of the average African household being 20% less than it was in 1970. The contrast between these two

divergent paths is astonishing; in 1960, per capita incomes in Africa were three times higher than they were in East Asia, now they are less than half as high; a six-fold shift in relative prosperity over the period.

The under-developing countries generally have multiple, interlocking problems, including a lack of the capacity needed to develop or maintain technology, a weak innovative dynamic and poor infrastructure. These deficiencies, sometimes compounded by a cultural value system that inhibits change, or a clientilist political system that allocates resources on the basis of allegiance rather than the national interest, can seriously undermine the process of wealth creation. Thus it is the second group of nations that are currently at a real risk of being increasingly isolated from the mainstream of world development.

The emergence of this 'South–South' divide suggests that both theory and practice must now evolve to reflect the changing nature of the problem. Theory must evolve to support a more intelligent analytical separation between countries and between different development trajectories, as the simplistic dichotomy between 'industrialised–developed' and 'developing' is increasingly outmoded and no longer particularly useful. Practice must evolve to deliver a problem-solving planning approach that is pragmatic and robust, focused on actual markets, latent skills and real development opportunities. This may deliver fewer promises, but more actual economic development, which—if the country remains committed to the process—will eventually translate into higher productivity and better living standards and, ultimately, allow the country to achieve a more sustainable development path.

Part of the problem is a legacy of intellectual and political baggage. It has become clear, for example, that some traditional models of development have failed (although they still have adherents), and others are still current but have become increasingly contentious. In addition, the costly and largely ineffective history of theories and attempts at development, and the apparent intransigence of the barriers to development in the 'non-developing' countries, have left a legacy of donor fatigue and cynicism, both among donors and recipients. As Easterley (2002: 15-16) points out:

> If all foreign aid given since 1950 had been invested in US Treasury Bills, the cumulative assets of poor countries by 2001 would have amounted to $2.3 trillion. The World Bank's administrative expenses went from $81 million in 1959–60 to $1.5 billion in 1993–94 (in constant 1993 dollars), while its staff went from 657 to 7,106 (Kapur *et al.* 1997). Meanwhile, the typical poor country has stagnated over the last two decades, and in many aid-intensive African countries for even longer. There have been individual success stories and progress on other indicators like infant mortality and school enrolment. But the goal of increased living standards and reduced poverty in the typical poor country was not attained. The decline in the 1990s reflects some aid weariness amid the feeling that foreign aid created something much less than $2.3 trillion in productive assets.

This depressing history also partly explains why the Johannesburg World Summit on Sustainable Development in 2002 made most progress on basic health and infrastructure issues, such as water supply and sewerage, and on 'commons' issues, such as fisheries management. These are clearly essential goals in themselves, but the relatively limited set of agreements also represents a partial retreat from earlier, more ambitious development aims.

However, the growing contrast between development failures and successes does at least support the general conclusion that an approach that works well for one country will not necessarily work equally well for all. Development cannot be reduced to a simple formula; if it could, all countries would be prosperous. It is reasonably obvious that countries have diverse histo-

ries, climates, natural endowments, demographics, institutions, cultures, problems, opportunities and constraints, but these factors are not always reflected in policy prescriptions. This is surprising, as it is equally obvious, at least to people with actual field experience, that these factors can profoundly shape events and influence outcomes.

General understanding of some of the basic concepts and determinants of development has also changed and evolved over the past four decades. For example, it is now widely agreed that skill and knowledge are critically important factors in economic development, but the underlying model of the nature of knowledge has changed and evolved. Dependency theory, for example, saw knowledge as a fixed commodity, whereas it is now more generally understood as a dynamic configuration of information, skill, management, technology and infrastructure that has to be continuously updated and constantly restructured in order to keep pace with changing demand. It is now generally agreed that knowledge (in this broad sense), with the associated ability to innovate, is a key factor in enabling and underpinning the process of development. This capacity cannot be built without a supportive context, of course, which highlights the importance of the prerequisite sociopolitical reforms such as improved governance, a commitment to root out corruption, a sensible strategy to deal with issues such as HIV/AIDS and so on.

Foresighting

The inadequacy of central planning precipitated the demise of the centrally planned economies, but the basic problem remains how to prepare for the future (or attain a preferred future) in an increasingly complex world. As the pace of innovation and technological change accelerates and the world becomes increasingly dynamic and unpredictable, the past becomes a progressively more unreliable guide to the future. Some of the underlying features that provided stability in societies and companies in the past are being made redundant and thereby undermined by changes in technology, demography, human and capital mobility and global market liberalisation. Some of the linkages between social and economic factors are also transforming (e.g. the connection between national economic growth and changes to individual living standards has become more complex in recent years, as it has become clear that some sections of the community can remain encapsulated [isolated from the growing prosperity around them], trapped by a lack of current skills and a knowledge of the modern workplace).

Clayton and Radcliffe (1998) note that human societies, considered as complex systems, are either too complex or indeterminate to be amenable to classical reductionist analysis. This partly explains the well-known difficulties of trying to predict the future development of technology. As Popper (1957) noted, if we could predict precisely the future course of science we would also know the contents of that future science. This is not possible, partly because future scientific knowledge will enable new technologies of which we have no current knowledge. We cannot therefore predict their social, economic and environmental consequences with any certainty.

Another aspect of this problem, highlighted by Norgaard (1994, cited in Dresner 2002), is that some of our systems of knowledge co-evolve with the world. In economics, for instance, there may be a reflexive loop between the theory and the object of the study. For example, one of the difficulties in applying Keynesian theory (which suggests that governments sometimes need to take action to counterbalance markets) is that investors eventually become able to predict this pattern of government behaviour and can then act in such a way as to frustrate the government's intentions.

Thus plans can fail for different reasons. Sometimes it is simply that planners

fail to anticipate some of the consequences of their actions. The more fundamental problem, however, is that attempts to predict events and then to steer society accordingly must deal with a subject that is not merely intrinsically difficult to predict—like the weather—but one that can incorporate and respond directly to the prediction itself, and can therefore behave in a way that can either fulfil or confound the attempt to plan for events (Dresner 2002). Medawar (1984) suggested that this is ultimately why conventional economic prediction has had such limited success.

One further aspect of this problem is that the accuracy of predictions tends to decrease as time-horizons grow, partly because the probability that the period of analysis will include one or more significant discontinuities increases as a function of time. A classical example of this type of error concerns the predictions of the Club of Rome in the early 1970s (Meadows 1972), as its model failed to anticipate the extent of technological change within the time-span of its projections. Its widely publicised but (now) clearly wildly exaggerated forecasts of resource shortages still hamper a meaningful public debate about environmentally sensible resource use—especially with regard to oil.

Thus the task is very difficult and complex, but it is also unavoidable. There is an inescapable need to make some assumptions about the future. We cannot invest in a business, study for a career, save money or even send our children to school without making some assumptions about the shape of the future. The task for government, business and other planners, therefore, is simply to go about this task in a more conscious, deliberate and rational manner so that we can try to maximise the prospects of success and minimise the chances of a serious reverse. At government level, in particular, it is sometimes possible to use the self-fulfilling nature of social phenomena as a positive asset, so that countries can not only anticipate and prepare but also actively bring about and benefit from change in a deliberate and purposive manner.

The need, therefore, is for deliberative and planning tools that can support decisions about the future. **Foresighting** is one such tool. It represents a deliberate departure from the traditional, **forecasting** approach that evaluates the past and the present to make forecasts of what the future will (or should, or ought to) be, depending on the continuation of dynamic developments from the past to the future. Both have their appropriate uses and contexts, as will be shown below.

Foresighting is a technique now being used by many of the world's largest and most successful corporations, as well as by a dozen governments, to model, understand and shape the future to their advantage. It was developed partly in reaction to the failure of many conventional approaches to forecasting.

Definitions

There are various different definitions of foresighting in current use. In addition, these definitions tend to differ for different systems or problem foci, so there are models of foresighting for companies, regions, countries or the specific problem concerned. Each of these uses tends to adopt different definitions and terminology. For instance, the classical, albeit now slightly outdated, definition is from Coates (1985: 30):

> Foresighting is a process by which one comes to a fuller understanding of the forces shaping the long-term future which should be taken into account in policy formulation, planning and decision-making . . . Foresight involves qualitative and quantitative means for monitoring clues and indicators of evolving trends and developments and is best and most useful when directly linked to the analysis of policy implications.

The UK Foresight Panel defines the purpose of Foresight as (www.foresight.gov.uk):

- To create a vision of the future by looking at possible future needs, opportunities and threats and deciding what

should be done now to make sure that we are ready for these challenges

- To build bridges between business, science and government, bringing together the knowledge and expertise of many people across all areas and activities in order to increase national wealth and quality of life

The stated aim of the South African Foresight programme[1] is to help identify those sector-specific technologies and technology trends that will best improve the quality of life of all South Africans over the next 10–20 years. The project encompasses technologies that impact on social issues and wealth creation through product or process development. In particular, it seeks to:

- Identify those technologies and latent market opportunities that are most likely to generate benefits for South Africa
- Develop consensus on future priorities among the different stakeholders in selected (industrial, socioeconomic or service) sectors
- Co-ordinate the research effort between different players within selected sectors
- Reach agreement on those actions that are needed in different sectors to take full advantage of existing and future technologies

The definition adopted here is that foresighting is a deliberative process that involves not the identification of the most probable scenario but the evaluation of many possible, desirable or feasible scenarios. This helps to develop a deeper understanding of the options and hence supports better planning. This process typically involves three steps:

- Identification of different scenarios (where 'scenario' is broadly defined as an intrinsically consistent description of a possible future)
- Evaluation and discussion of the scenarios, reviewing the implications of each scenario for the system in question
- Development of an action plan for the attainment (or avoidance) of particular scenarios; this involves 'working back' from the future scenario towards the present, so that this step is commonly referred to as 'backcasting' (Dreborg 1996)

Thus the main applications of foresighting are to:

- Improve long-term decision-making
- Guide technology choices
- Generate alternative trajectories for future developments
- Improve preparedness for emergencies and contingencies
- Motivate change

The process of foresighting involves:

- Working with groups both inside and outside the institutionalised planning processes to identify possible future scenarios
- Identifying, comparing and evaluating a range of possible future options
- Backcasting

The process of backcasting—analysing back from the preferred scenario to the present day, tracing the sequence of critical events and changes—allows people and organisations to develop a strategic plan which will inform their actions as these critical events and changes unfold. This in turn allows people to become agents of change, rather than being driven by change, and to create trends rather than being the victims of trends.

1 As quoted at www.dst.gov.za/reports/forsight%5Freports.htm.

There are obvious links to scenario planning; in fact, some proponents of backcasting argue that scenario development and planning is a precursor to foresighting (see e.g. Holmberg and Robèrt 2000). We share this view, partly because it appears to be historically accurate and partly for structural reasons (such as the shared logic). Scenario planning, of course, has been used for much longer and is therefore better established. There is an asymmetrical relationship; the use of scenarios works well with foresighting and forecasting approaches, but foresighting and the associated development of development trajectories through backcasting definitely works best when underpinned by scenarios, as the first four of this special issue's papers (Berkhout and Hertin) highlights particularly well.

It is important to note that foresight-based planning must be a constant, iterative process. This is because the external and internal environment will continue to change, so the foresighting process itself, as well as the strategic plan it generates, must constantly adapt and evolve with it. The most prevalent applications relate to technology foresight, where firms and countries discuss and evaluate the future direction of technological development and analyse the social, economic or business implications of particular scenarios.

We have been involved in the development of a 'foresighting for development' model. This uses foresighting techniques in a social, deliberative and participatory process to support a durable process of national development. Some of the key components are drawn from theories of the social shaping of technology and innovation studies. There is frequently an issue, for example, as to where, when and how best to exploit technology to underpin the development of viable innovation clusters, the idea being to foster sector-specific development in areas with significant growth potential and strong internal linkages, so that they can serve as the engines of a wider process of economic development. One of the core functions of this model is to provide a context for assessing the important factors in a country's internal and external environment, identifying development options and thereby assisting in the resolution of obstacles.

Who uses foresighting?

Scenarios and scenario planning have been used as planning tools for over 50 years. The foresight process has not been in use for as long, but it has now been used by a large number of national governments and departments. The USA and Japan were the first countries to launch foresight programmes, four decades ago, followed by European countries, notably the United Kingdom,[2] but also France, Austria, Germany, Sweden and Portugal, then by those of Asia. There are currently technology foresighting initiatives in the Czech Republic, Hungary, Poland, Slovenia, the Russian Federation and the Ukraine. The main focus of these programmes has been to evaluate the influence of technology on society and to identify which technologies are more important for the (sustained) development of the country.

The process has also been used by a number of major companies, most obviously Shell, who developed some of the key scenario planning methodology, but also Electricité de France, Daimler-Chrysler, Elf, Allied Irish Banks, Amoco Oil Company, Datar, CRA Australia and Pacific Gas & Electric. Berkhout and Hertin's paper (this issue) also includes a list of initiatives where their particular scenario model is being used in foresight-related contexts.

More recently, the technique has started to become popular as a tool for development in the developing countries. For example:

2 In fact, the United Kingdom has had two rounds of foresight, both very technology-oriented. The first one took place in 1994–95 following a major review of government science, engineering and technology policy. A new round of foresight began on 1 April 1999.

- The United Nations Industrial Development Organisation (UNIDO) is supporting (with additional bilateral support from Italy and Spain) foresighting initiatives in ten countries in South America, all currently at different stages. Brazil, Uruguay and Venezuela are in group 1, currently evaluating results and moving into dissemination. Mexico, Bolivia, Colombia, Chile and Cuba are in group 2, working on implementation. Guatemala, Costa Rica, Panama and Peru are in group 3, compiling inventory and developing scenarios,
- UNIDO is also supporting the early stages of foresighting initiatives in Austria (for the second time), Croatia, the Czech Republic, Hungary, Slovakia, Slovenia, Russia, Ukraine and possibly the Baltic States. A UNIDO expert group meeting of the Regional Programme on Technology Foresight for Central and Eastern Europe and the Newly Independent States, on 8–19 June 2001, concluded that:

  > Technology Foresight programmes should be instrumental in providing assistance to economies in transition that would lead to more sustainable and innovative development aimed at fostering economic, environmental and social benefits at national and regional levels . . . [We encourage] governments to establish Technology Foresight programmes based on wide participation of stakeholders (government, business, R&D centres and civil society) and identified needs of society; [we ask] international organisations, including UNIDO, to formulate programmes at regional level in co-operation with the countries in the region, so as to support the national initiatives on technology foresight.[3]

- Currently, the governments of Jamaica, Trinidad and Tobago, and Belize are in the early stages of planning foresighting initiatives to map out development plans.
- The Commonwealth Secretariat in conjunction with the South African government is supporting initiatives to begin foresighting for development programmes that will eventually include all the Southern African Development Community (SADC) member states (Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe).
- The European Union (EU) is supporting national foresighting exercises in EU accession countries to evaluate the effect future membership will have on these countries as well as to scope the activities necessary for preparing the national economies and political contexts for membership.

These programmes are oriented mostly to technology identification and promotion as well as to sustainable development. These inherently large and complex issues are good examples of the context in which foresighting is generally best applied.

Suitable contexts for foresighting

As a rule, foresighting is particularly useful in situations where the past or present is unlikely to be a guide for the future; in particular where:

- The problem is complex.
- There is a high probability of significant change.
- The dominant trends may not be favourable and must therefore be analysed.
- The time-horizon is relatively long.

Forecasting, in contrast, remains suitable for use in contexts where the past is likely to continue to be a reasonably reliable guide for the future; in particular, where:

3 www.unido.org/en/doc/4219

- No major changes are anticipated.
- The problem to be studied is relatively simple and can (ideally) be optimised with use of numerical techniques.
- There is relative certainty about the current trends, their interaction with the system and their relative significance.
- Existing interpretations of the future are coherent and similar to each other.
- The time-horizon is relatively short.

What makes foresighting for development different?

The main differences from traditional planning methods can be summarised as follows. First, foresighting is a social process. In this, it is iterative and deliberative. It serves to help people make sense of the future. It is not, therefore, a tool for technical optimisation; there is room for social deliberation and a choice of possible futures. It is possible, for example, that some people would prefer a lower rate of economic growth if that were perceived to be necessary in order to achieve other social goals. For this reason, the process is often seen as being as important as the outcome. There are also side-effects that are important, such as the development of knowledge networks, a wider and/or better understanding of the national situation, and the development of common visions. These relatively intangible benefits, in particular the emergence of new knowledge networks, are often seen as the most significant outcomes of the exercise.

Second, this suggests that foresighting is a creative rather than a purely analytical process. A conventional forecasting approach will ask questions such as 'What is the one most likely future?' A foresighting exercise, by contrast, will ask questions such as 'Which futures are possible, desirable, disastrous or feasible?' This has the effect of moving the debate from a passive into an active process. The country or firm concerned is no longer a mere respondent to the predicted changes but is an active agent in the shaping of possible futures, one of which will be realised.

Third, foresighting is therefore a participatory, inclusive process rather than an expert method. Partly for this reason, foresighting typically relies on several different methods. As indicated earlier, it is also a continuous process. This combination means that foresighting typically involves the maintenance of four distinct activities:

- The continuous development, refinement and adaptation of the scenarios
- The use and interpretation of the scenarios in new plans and programmes
- The implementation of existing plans and programmes
- The maintenance and evolution of the knowledge networks

Finally, as a result of the emphasis on the inclusive, deliberative process it is usually easier to generate sufficient motivation for any necessary change and to implement future action, because those people implementing the ideas will usually be involved in making the decisions that are to be implemented.

Limitations of foresighting

All planning procedures are imperfect. As a social process, there are also some particular limitations to foresighting, including:

- The *Zeitgeist* problem. The group dynamics can themselves affect the outcome of the deliberative process. This means that different foresighting efforts can have similar results, as different groups focus on the same small range of currently dominant social and cultural themes.
- The 'opacity of context' problem. This is common in technology foresighting, where participants can become very focused on particular aspects of technology but omit to fully evaluate

the social, economic and political implications of the associated technology change. This has been a problem, for example, with the roll-out of genetically modified (GM) organisms.

- The 'event evaluation' problem. As Skumanich and Silbernagel (1997) have pointed out, people tend to overestimate the likelihood of low-probability events and underestimate the probability of very probable events. There is an equal tendency to distort the representativeness of events, essentially by focusing on striking but basically irrelevant details, which is liable to undermine the viability and usefulness of future scenarios.

The foresight process is more laborious and so is often more costly and takes longer than conventional planning. However, given the propensity of traditional forecasting and planning to fail in uncertain times, the additional delay and cost can be justified if it results in a more durable development plan.

The role of foresighting in development planning and implementation

The problems of the under-developing countries are deep, tangled and complex. Foresighting cannot, by itself, solve every problem. Other factors must also be addressed. A number of recent studies have highlighted the role of factors such as good governance, sensible macroeconomic and regulatory policies, investment in education and research capacity, and an innovative, entrepreneurial private sector. These all have an important role to play in encouraging technological dynamism and investment and the associated processes of industrialisation, economic diversification and growth, and movement into higher-value products and services.

Foresighting can make an important contribution to this process, however, by clarifying a country's position with regard to strengths, weaknesses, threats, challenges and opportunities, by focusing attention on the longer-term issues, and in securing a sufficient level of commitment from stakeholders to enable the necessary processes of reform, restructuring, transformation and change. Stakeholders are usually much more committed to a plan that they actually helped to design, which is why the foresighting for development approach emphasises the deliberative and participatory nature of the process.

The starting point in a foresight-based formulation of a long-term strategic plan for national development will generally lie in an assessment of internal and external factors, the internal factors with regard to internal strengths and weaknesses, the external factors with regard to the changing nature of global markets and other critical factors in the external environment. This would normally include a review of new and emerging technologies in conjunction with an analysis of the current restructuring of key sectors of the global economy including all relevant stakeholders in order to be able to anticipate key market opportunities. That would then provide the basis for a plan to insert a given company or country into this process by building a new role as a market supplier (and possibly market maker) in a high-growth, high-value sector. This would allow a company or country to develop a first-mover advantage and then to translate that into a long-term strategic position within the market.

These market opportunities could, with good management, be used to demand-pull a process of economic restructuring, provide the economic impetus to support a widening skill base, attract and retain human and financial capital and make a decisive move down the value chain, thereby escaping from low-growth, low-margin markets. Diversification into ancillary opportunities in related markets can then be used to fuel a long-term process of growth and development and the construction of increasingly knowledge-based business–industrial divisions

or clusters, thus supporting a wider transition to a skill-based economy. Foresighting can be used throughout this process to stimulate, guide and lock in the transition.

Participation of stakeholders and industrial sectors is necessary in the deliberative stages. It is also desirable, as it makes implementation and translation of the ideas into concrete development trajectories significantly easier; as stated, commitment to jointly developed visions and action plans is generally stronger as stakeholders are usually much more committed to a plan that they actually helped to design. This is of particular relevance for the creation and continuation of innovation clusters, which typically span the traditional boundaries of separate industry sectors, academia, the public sector, development agencies and key companies up and down the value chain.

Overview of this special issue

The papers selected for this special issue reflect three of the underlying themes outlined above in this introduction:

- Technology is a fundamental driver of economic development and, if put into the appropriate socioeconomic context, holds the promise of significant and sustained economic and ultimately truly sustainable development.
- Planning as a function to secure or at least to promote a (set of) desirable future(s) is fairly universal, so experience from the private sector can be generalised and used to inform and improve the quality of planning in the public sector.
- Foresighting is a deliberative and participatory process that originated in scenario planning but which has nowadays a much broader and more diverse application. Increasing complexity and the growing difficulty of predicting the behaviour of complex interdependent systems (such as the economy of a nation undergoing liberalisation) militate against the exclusive use of traditional planning tools such as forecasting.

These points are reviewed in the first two papers, both of which relate to the first UK foresighting exercise. Berkhout and Hertin competently outline the development and use of the scenarios that underlie the UK (technology) foresighting exercise, whereas Eames and Skea expand the scenarios towards cultural theory, which helps to explain the popularity (and thus significance for sustainable development) of the use of scenarios.

Verbeiren, Heselmans, Berloznik and Doutrelepont discuss a problem that often bedevils foresighting studies: how do we set priorities? In providing an interesting, socially defined approach, they also introduce and review the Belgian foresighting study. Van de Kerkhof, Hisschemöller and Spanjersberg provide a similarly interesting and insightful review of a Dutch foresighting project that also provided an innovative approach to iterative foresighting methods.

Presley and Meade's largely conceptual paper bridges the previous four papers of this issue, which deal with public policy and decision-makers, and the next two, which focus on industrial applications of scenario planning in the wider sense. They apply complex systems theory (in particular an evolution from Checkland's 1981 soft systems methodology) to planning in an innovative and interesting manner.

Truffer, Metzner and Hoogma provide a very useful insight into technology innovation and the role of scenario planning in this regard. Applying these planning tools to business strategy and the technology choices regarding the electrification of cars, they provide valuable lessons for a wide variety of applications on the socioeconomic and political context of long-term planning as well as the scope for departures from the combustion engine.

Moving further up the value chain, Dewberry and Sherwin apply deliberative

processes and foresighting ideas to design-for-environment problems. In doing so, they bridge the divide between technology innovation and future planning. The case studies they provide, like those of the previous authors, also aptly demonstrate the wide application and sustainable development potential of foresighting.

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