

Sustaining long-term R&D strategies



It's hard to stick to long-term plans when the short term is demanding all your attention

This article looks at some of the strategies that are being applied to sustain long-term R&D strategies in companies large and small during this economic crisis. Many companies are using some form of scenario planning to understand the likely future context of their businesses, so that they can understand if their research directions fit with likely future opportunities. Some academics recommend developing a systemic view of

innovation in order to be able to marshal the huge amount of information such efforts can create. In practice, many companies are already adapting their current research strategies while trying to sustain their long-term vision. Some large companies have decided to innovate against trends revealed by scenario planning, as a basis for mid-term research projects. Meanwhile small companies are trying to be as flexible as possible in order to sustain their research vision.

There's a natural tension in research and development (R&D) between the timescales involved in finding, nurturing and delivering true breakthroughs, and a company's desire for immediate profits to satisfy annual or quarterly targets. Many large companies that have run corporate R&D organisations for years, and used them to nurture outstanding breakthroughs such as the transistor or the graphical user interface, have restructured or ended such activities. Instead they have relied upon a patchwork quilt of relationships with academic and public research organisations, mergers with other technology companies or acquisitions of start-ups, to feed their innovation pipelines. The problem has become more difficult during this economic crisis, during which management attention has turned away from finding mould-breaking innovation towards simple survival. It's a rare organisation that can sustain a vision for long-term R&D if core sales have fallen by tens of percent in a year.

Nonetheless, a business still expects that its R&D organisations will take care of the future while the rest of the company deals with the here and now. So what tools are available to help companies sustain their long-term R&D vision, even during the depths of an economic crisis? One of the most useful things is for companies to understand the context in which their businesses will be operating in future as a way of reassuring themselves that their current R&D is flowing towards markets and opportunities that are likely to appear in the mid-term.

Delegates at a recent EIRMA round table meeting discussed these issues, with Michael Taylor, an energy analyst at the International Energy Agency, providing a detailed insight into perhaps the most important way in which the context for R&D will change in the mid to long term future: the necessity to control and perhaps reduce global warming that is being caused by, among other things, carbon dioxide (CO₂) emissions created by human activity. The IEA's analysis suggests that the global economy will grow fourfold between now and 2050 and that the growth could approach tenfold in developing countries such as China and India. This promises economic benefits and a huge improvement in people's standards of living, but also involves much greater use of energy with the related likely increased emission of greenhouse gases. The IEA's estimates suggest that oil demand could rise 70% by 2050, if the way that people consume energy remains the same as it is today, and that this would lead to a 130% rise in CO₂ emissions.

Scenario planning

The IEA's scenario planning to look at how the global economy needs to change, given this potential growth, if CO₂ levels are to remain at current levels in 2050, or to be halved by that date. In one scenario, in which CO₂ emissions are kept at current levels, the IEA estimates that an extra \$17 trillion will have to be invested in the energy sector between now and 2050, or around \$400 billion (0.4% of global GDP) per year. In a second scenario, which sees CO₂ emissions being reduced by between 50 and 85% of current levels by 2050, the extra investment in the energy sector alone is \$45 trillion by 2050 or about \$1.1 trillion (1.1% of GDP) per year. If you believe that global governments will set and enforce targets for reducing CO₂ emissions in the mid term, then the IEA's scenarios indicate the scale of the problem, and the potential opportunity for the fruits of well thought-out long-term R&D.

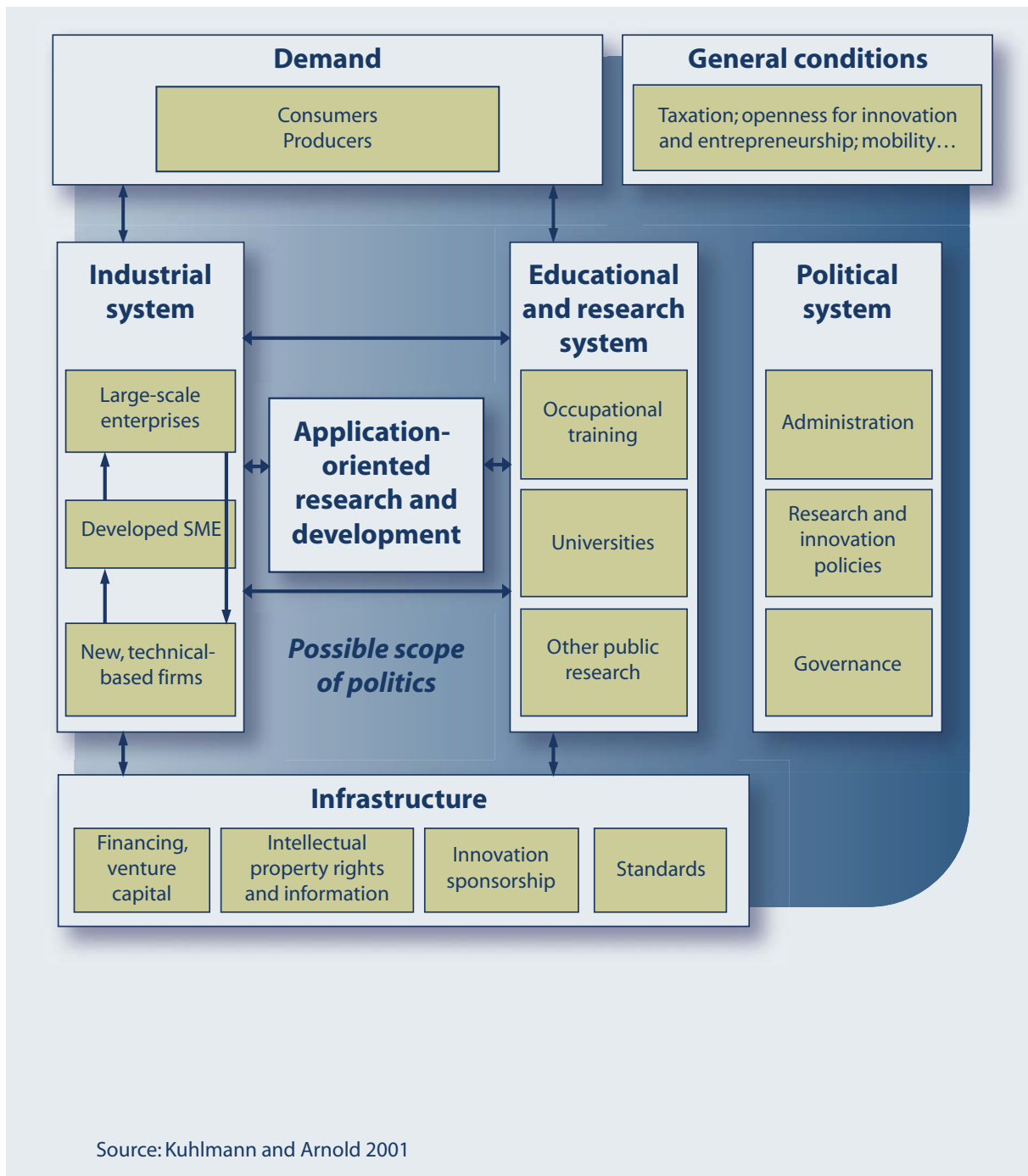
This sort of scenario planning can also be useful when it is more narrowly focused. Luke Georghiou, associate dean of the Manchester Institute of Innovation Research at Manchester Business School, told the conference that most foresight work takes place within the so-called STEEP framework, looking at social, technological, economic, environmental and political trends. The idea is to highlight the way each of these factors could transform the context in which a business or even government will operate in future. Horizon scanning techniques, which systematically examine potential future problems, threats and opportunities, as well as trends that may be at the margins of current thinking and planning, are also gaining popularity. Such efforts can bring out a number of forms of information about the future, such as trends, for example the convergence of computing and communications; drivers, such as increasing requirements to recycle; wild cards, also known as shocks or surprises, such as the terrorist attacks of 11 September 2001; and weak signals, early signs of potential changes that may become significant (such as analyses made in the mid-1980s that the Soviet Union would be unable to afford its arms race with the US and so was likely to collapse).

The UK government has a Horizon Scanning Centre which has just released what it calls its Sigma Scan. Evidence of the Future study, a horizon-scanning effort based on 2000 documents and 300 interviews designed to challenge assumptions. Results are presented in 250 structured documents and are available online in a searchable format categorised under a version of the STEEP protocol, divided into categories such as economics, environment, politics, science and technology, and society. The ambition to provide insights into possible futures means that the socio-economic analysis is quite broad, covering topics such as crime, demographics, religion, the workplace, security and international relations. It is worth noting that although socioeconomic factors can change the context for technological innovation, the reverse is also true.

Systemic approaches

Harald Hiessel, deputy director of the Fraunhofer Institute for Systems and Innovation Research, sees the issues brought up by the IEA analysis and by the SigmaScan study as creating a backdrop for the development of long-term R&D strategies. Other inputs include emerging technologies, such as nanoscale engineering, and innovation that happens at the boundaries between disciplines. He highlights the importance of combined technical and non-technical innovations, such as the combination of Apple's iPod music player and its iTunes music store.

Hiessel brings a third theme into play in his analysis, the importance of the innovation system within which innovators are working. This system includes all the factors that can influence innovation, such as regulation, policymakers, infrastructure services, and the creation of demand. He also points out that the appropriate styles of innovation vary with the maturity of the technology. Bringing all these things together, Hiessel believes that one of the most important things in maintaining a long-term R&D strategy is to take a systemic view of both the goal of innovation and of the process of innovation. And that takes discipline.



Adapting strategies

Philips Research appears to be applying such discipline to its innovation strategy during this financial crisis. John Bell, director of strategy and partnerships for Philips Research, said that Philips regards innovation as the way to get through the crisis. The company's normal innovation process consists of gathering deep insight into people's needs and aspirations, transforming those insights into innovation, using open innovation where possible, and sticking with an ethos of 'learning fast and failing cheap'.

The company has decided to stick to its original innovation plan, but focus it more tightly on customer insights and redirect investment towards a number of innovation themes. It is also trying to expand its venturing activity as a way of getting more innovation to market more quickly, as well as increasing its use of open innovation to find the partners it needs to act more quickly. One encouraging sign for researchers at Philips is that investment in its riskiest research is now discussed at board level, and that the company's CEO chairs this new innovation board, bringing an understanding of the challenges of sustaining a long-term R&D strategy right to the heart of the company's management.

Energy company Total is also trying to focus its efforts in the development of new energy sources, and set up an R&D division to look at the topic in October 2007. Total will focus on solar, biomass and clean coal technologies, and supporting technologies for energy storage in solar energy and CO2 capture for clean coal. There are synergies between the new energies division and other parts of Total's R&D effort, for example between research into solar energy and some of the work done on chemicals in the wider company. The new energies division also interacts with a new corporate venture capital activity. The research model is network based, with partnerships with universities and research centres, some of which are expected to develop into joint research teams.

Gilles Cochevelou, vice president of R&D for new energies at Total, underlined the challenge of his role when he said that the company's long-term strategy for solar energy is not yet clear, but the company couldn't wait until 2030 to decide whether or not it wants to be involved in solar energy in one way or another. "We have to be there in the long-term and these new technologies, where light is transformed into electricity, are the most technological part of the value chain. We do not know if in 2030 we will be in the same value chain, or installing solar panel panels throughout the world."

Innovating against trends

SAP Research, the global technology research unit of business software provider SAP, has been using horizon-scanning techniques to understand key trends that could affect their current markets and create new opportunities for the company. According to Thomas Windeka, vice president of SAP Research, the company is already involved in some quite sophisticated open innovation. It works with leading universities, partners, customers and internal product groups to develop promising ideas and prototypes into market-ready software. Customers are involved early in what are called Lighthouse Projects, and dedicated living labs demonstrate technological research in real-world settings.

Widenka talked about the work his research team had done based around trends it had identified as relevant to its markets: the 'Internet of things', and the 'Internet of services'. The Internet of things envisages a world in which many if not all objects can be tracked by or connected to the Internet. Think of the antitheft tag in a garment in a clothes store, but think of it also carrying information about the garment, where it is in the world and a way to communicate the information to the Internet. SAP Research has been using this technology to develop a global brand protection service, which enables legitimate parties along a value chain, such as brand owners, distributors and retailers, to distinguish real products from fakes and to detect illegal parallel trading of stolen goods in the value chain.

The Internet of services idea suggests that many of the services that we use today will move onto the Internet where they will be much easier to implement, consume and trade. Although we have seen this sort of thinking already, for example with Internet banking and online shopping, the Internet of services takes the whole concept much further. SAP has won funding from the German Federal Ministry of Economics and Technology to take part in MEREGIO, the minimum emission region project in Karlsruhe and Stuttgart which aims to use information and communication technologies (ICT) to minimise carbon emissions.

The project has three key components: an online energy marketplace for electronic trading between producers, users and intermediaries to coordinate supply and demand; a sophisticated energy infrastructure; and ICT that links the infrastructure to the marketplace and controls it depending on the market situation at the moment. In practical terms this means a pilot project with a thousand participants in the Karlsruhe and Stuttgart areas. Smart meters with broadband connections will be installed at 800 consumer sites, 100 generation sites and 100 energy storage centres. Meters will be used to detect the state of the grid and if any bottlenecks are detected, the system will automatically create new price signals that are sent to customers to manage their consumption. The marketplace will also offer the possibility of trading products such as reactive power, which will enable the efficient usage of the existing generation units to minimise losses in the network.

Sustaining small businesses

In both of these cases SAP Research has applied horizon scanning to establish a key trend and innovated against it in projects that may bring benefits over the longer term. Some companies don't have that luxury. Jouko Savolainen, managing director of drug development company Fennopharma, is steering his company and its research through a difficult time for both start-ups and the biotechnology industry.

Savolainen says that funding for biotechnology start-ups is the worst it has been since 2002, with no initial public offerings being brought to market since November 2007. Venture capitalists are short of money and are reserving the funds they do have to sustain the companies in their portfolios. He believes that about 300 public companies have less than 12 months of cash in the bank, and around 120 public companies have less than six months of cash. The question, then, is how to maintain a long-term R&D direction and competence if the short term is such a struggle.

His answer is to apply the classic techniques used by any business or sector suffering from a lack of finance. Concentrate on projects that create short-term value, move pet projects out of the business into academia, and try to reduce costs without hurting progress on core projects. Think carefully about outsourcing and use it to reduce costs. Be prepared to be creative with business models, adapting your aims when necessary. Look for business models that offer complimentary strategic competences, technologies and know-how, which give you access to new territories or help you share a risk.

In terms of managing the business, Savolainen suggests surrounding yourself with people who complement your knowledge, networks and competitive intelligence. Consider combining your skills or assets with other biotechnology companies to put you in a better position to create breakthrough technologies. And recognise that partnering may be the only realistic funding option at the moment, so choose them carefully and then commit to them fully.

Links

EIRMA round table meeting

<http://tinyurl.com/ltsroundtable>

International Energy Agency

<http://www.iea.org/>

Manchester Institute of Innovation Research

<http://www.mbs.ac.uk/research/innovation/>

UK government Horizon Scanning Centre

<http://tinyurl.com/forescan>

SigmaScan study

<http://tinyurl.com/sigmascan>

Searchable SigmaScan results

<http://www.sigmascan.org/Live/>

Fraunhofer Institute for Systems and Innovation Research

<http://tinyurl.com/fraunisi>

Philips Research

<http://www.research.philips.com/>

Total

<http://tinyurl.com/totalen>

New energy sources research
<http://tinyurl.com/future-energy>

SAP Research
<http://www.sap.com/about/company/research/index.epx>

MEREGIO project
<http://tinyurl.com/meregio>

Fennopharma
<http://www.fennopharma.fi/>



eIQ Action Points – Title

- **Start by developing the widest possible understanding of the future context of your business – such as the impact of global warming or water shortages**
- **Use foresight techniques to narrow that vision so it is more specific to your industry**
- **Use the STEEP approach as a reminder to explore the full range of social, technological, economic, environmental and political trends that could be relevant**
- **Create a systemic approach to innovation to help marshal the enormous breadth of inputs into information that you can act upon**
- **To avoid abandoning a long-term R&D strategy, try to focus it more tightly on themes where your lab or company has a unique advantage**
- **Start innovating around key future themes as soon as you can, so that the business can see the potential value of your work as soon as possible**
- **If funding is tight, be prepared to adapt the business in any way in order to maintain your research direction and the key people who underpin it**