

Technology Management

Quarterly newsletter of the Centre for Technology Management (CTM)

February 2005

Singapore goes for growth

Singapore industry is booming with GDP and productivity rising. Here we look at two ways in which the country is encouraging local companies to grow and flourish.

Researchers help industry roadmap the future...

As part of the drive to help small and medium-sized enterprises to grow, the Singapore Agency for Science Technology and Research (A*STAR) launched an Operation and Technology Roadmapping (OTR) programme.

The roadmapping exercises are based on the Centre for Technology Management's *T-Plan* guide. They are being carried out by the Singapore Research Institutes (RI's) and so far some 50 companies have participated.

The objectives are two-fold. The first is to enable the RI's to understand what industry is looking for in the future and hence adapt their research programmes to be more in-tune with industry requirements. The second objective is to make the local companies aware of the facilities and expertise that the RI's have available to support the companies.

The OTR program includes a formal company review process called the operation and technology assessment. This helps to make the facilitator aware of the company's current position. The focus of the roadmaps differs from the normal CTM process. Due to the size and type of the companies in Singapore,



the roadmapping has been focused on the future of the entire organisation. A key advantage of running the programme at the RI's is that various researchers can be brought into the technology workshop to advise on where a particular technology is moving. This has proved very popular with the companies. The OTR program was initially launched in the manufacturing industry but has now expanded into all sectors.

To support the introduction of roadmapping in Singapore, Dr Rob Phaal went over to run an initial training course for 20 people. Another 60 people have since been trained to support the process. Besides the industrial roadmap, a number of internal research group roadmaps have been created using the process. For further information please email Dr Chris Holmes:

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Singapore – the 'Biopolis of Asia'?

For the past 40 years, Singapore has achieved an average annual GDP growth of 8.4%, thanks to its ability to renew its manufacturing base and increase productivity year on year.

Biotechnology has been earmarked as the next sector that will sustain the country's economic growth. Singapore's vision is to develop itself as the 'Biopolis of Asia' where companies will locate their research, development, production and headquarter activities, allowing Singapore to capture activities across the biomedical science value chain.

The main principle of the country's strategy is to identify a growing sector and then to focus its efforts on building the key pillars needed to support it – identified as research,

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Exploiting the UK's science and technology

David Connell,
co-founder of TTP
Ventures, argues that the
UK could learn from
the success of the
US Small Business
Innovation Research
(SBIR) Program

The 2004 Science Policy Review underscored just how committed the current Government is to the notion of a science and technology based economy. But will it really lead to the strong science and technology-based industries that the UK must develop if we are to remain competitive internationally?

For the reality is that, despite at least 25 years of trying, the UK has singularly failed to turn its entrepreneurial start-ups into companies of the same scale as Cisco, Google or Amgen. And Cambridge, the UK's leading high tech business cluster, has become renowned for growing acquisition fodder for big US companies to buy.

There is an example we can draw from the US of a policy that could be implemented to give better support to science and engineering based companies in their formative years.

The US has long used Federal Government R&D programmes to stimulate and support innovation in the private sector. The lead programme for smaller businesses is the Small Business Innovation Research (SBIR) Program, first introduced in 1982. Under this programme, all major Federal Government agencies are required to put aside 2.5 per cent of their external R&D budgets to fund R&D projects undertaken by small US businesses. The SBIR Program has five important elements:

- Government Agencies aim to act as real, informed customers.
- Proposals are evaluated competitively against published Agency requirements, issued several times a year, according to a predetermined timetable.
- There is a phased approach, so successful projects can receive more funding and companies can be awarded multiple contracts in parallel from different agencies.

- Contracts fund 100% of the costs of each project.
- Companies are encouraged to generate and keep IP.

Around 1,500 firms receive 4,000 contracts each year. Some companies regularly bring in several million dollars from SBIR sources year after year.

Hard and soft strategies

The US SBIR programme recognises the realities of developing early stage, technology-based firms, many of which adopt 'soft' strategies, involving consultancy and contract R&D, before moving on to a 'hard' strategy based around standard products. The soft stage helps them to understand real market needs, try out their technology or expertise with real customers, and build up their resources and management expertise.

Venture capital firms are only really interested in 'hard' companies, or 'soft' companies that are well into the process of moving to a scaleable, product-based strategy. So, supporting technology companies through this early 'soft' phase of development should be a key element of Government enterprise and technology policy. If properly implemented, a US-style SBIR programme could play an important part in this. More important than the money itself, Government customers can help focus development on real needs and act as reference sites for

later customers in the private sector or abroad.

UK public sector budgeting and procurement processes are predominantly designed to ensure profitability and value for money – attributes we would all applaud. However, these same processes are simply not suited to buying development contracts and prototype products from smaller, innovative companies. For example, it took two years of discussions and negotiations before one of the author's investee companies secured Government funding for a new security technology in which the Government was interested. Most other VC's have similar experiences.

In fact, there is no doubt that UK technology companies are being severely disadvantaged compared with their US competitors as a result of these problems.

UK SBIR programme

Over the last 20 years, many people involved in technology exploitation in the UK have highlighted the attraction of the SBIR Program. In 2001 a version of this programme was launched by the DTI, with the title of Small Business Research Initiative (SBRI). Unfortunately it is predominantly a signposting service for existing Government tendering opportunities, and the majority of Government departments do not participate. The Biotechnology and Biological Sciences Research Council is one of the few that does. Currently SBRI is only achieving 4% of the Government's target to facilitate £50m of R&D contracts with SMEs each year.

As a result, I have concluded that an effective US-style SBIR programme will only be implemented in the UK through legislation, as is the case in the US. I am, therefore, collaborating closely with Anne Campbell, MP for Cambridge to achieve this objective through a Private Members Bill in the UK Parliament.

www.ttpventures.com

[www.ttpventures.com/docs/
Filling The Gap.pdf](http://www.ttpventures.com/docs/Filling%20The%20Gap.pdf)

Managing products around the globe

Product innovation is an increasingly distributed process involving webs of geographically dispersed players in a variety of value chain configurations. Although this creates new opportunities for innovation it also produces new challenges for co-ordination of the process.

CTM's recently completed MaRDI research project (Managing Rapid Distributed Innovation) explored this phenomenon through case studies of products developed in conjunction with product design consultancies and contract manufacturers.

Opportunity

The cases show how companies, both large and small, have been able to marshal external service providers to support rapid product innovation in ways which would not otherwise have been available. In particular, the growth of the contract manufacturing sector has effectively lowered barriers

to entry for smaller entrepreneurial firms such as Sendo as well as larger firms such as Microsoft.

Value capture

One of the challenges of distributed innovation is resolving the question of value capture and power throughout the value chain. It can easily happen that value is captured disproportionately and the organiser of the chain may not be the main beneficiary.

www.ifm.eng.cam.ac.uk/ctm/research



Technology intelligence

CTM's project on technology intelligence has recently completed its first phase, resulting in a workshop process to help establish Technology Intelligence systems in companies and an accompanying framework illustrating the key constructs, processes, and competencies. This work has identified a number of important priorities associated with developing, implementing and sustaining an effective system:

- build on existing routines and systems rather than create something from scratch
- human intelligence gathering networks are key and should not be rigidly systematised
- IT solutions are only part of the solution to intelligence gathering – people and organisational processes play a major role

The project has been extended following significant company interest and enthusiastic take-up of outputs from the work.

www.ifm.eng.cam.ac.uk/ctm/research

Industrialists and academics meet to discuss current high-tech challenges

A group of 16 European senior technology managers and academics travelled to France in January to discuss the key concerns facing high-tech industry today. The occasion was the first European Institute for Technology and Innovation Management (EITIM) Senior Management Forum, held in Sofia Antipolis. Industries represented were aerospace, automotive, food processing, utilities and infrastructure, medical equipment, electronic and electrical engineering.

The format of the meeting encouraged frank exploration of important topical issues and many participants brought current challenges for the Forum to consider. The three days were structured around the themes of the EITIM book *Bringing technology and innovation into the boardroom*, and EITIM academic members gave presentations on these issues from their recent research. Topics covered were:

- *Organising for key technologies*, Thomas Durand, École Central



- *Linking business strategies to IP strategies*, Ove Granstrand, Chalmers
- *Future technology: assessment, planning and valuation* David Probert, Cambridge
- *Developing concepts for breakthrough products*, Cornelius Herstatt, TU Hamburg
- *Structured creativity*, Hugo Tschirky, Swiss Federal Institute of Technology

Participants agreed they had gained substantial benefits from the Forum and it will now become an annual event. The opportunity for 'clinic' style sessions on real issues proved to be particularly valuable and this aspect will be developed at future meetings, with the help of the EITIM group of senior industrial advisors.

www.eitim.org

Technology management research at Cambridge

- Good design practice
- New product introduction collaboration
- Strategic technology management
- R&D project selection
- Software sourcing in manufacturing
- Product planning
- Enhancing creativity in new product development
- Technology management: a process approach
- Technology selection
- Technology evolution in hi-tech firms
- Innovation management in hi-tech firms
- Technology management in software production
- Technology scanning and intelligence
- Strategic make-or-buy
- Industrial make-or-buy decisions
- Sustainability and knowledge management
- Technology valuation
- Technology foresight

Hello to...

Jamal Ibrahim has joined CTM as a Research Associate to work on projects associated with the IfM's Innovative Manufacturing Research Centre (IMRC). He is an R&D manufacturing engineer who has completed post-graduate study at Loughborough University and Laser Optical Engineering Ltd.

Letizia Mortara also joins us as a Research Associate as part of the IMRC. She is currently completing her PhD in Materials Science at Cranfield University and has a background as a chemical and process engineer.

and goodbye to...

Noordin Shehabuddeen has left CTM and moved to Liverpool to take up a practitioner role, helping to grow the University's industry network. He will be working in business development, promoting knowledge and technology transfer between industry and academia, focusing particularly on the topic of innovation.

Scott Wilson is now engaged to be married and has moved to the US where he is working for Deloitte's innovation consultancy in New York.

Singapore – the 'Biopolis of Asia'?

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early-stage funding and specialised infrastructure. The strategy is implemented by establishing world-class research institutions and specialised research infrastructure and by funding early-stage businesses through a government supported body. The driving force behind this initiative is Singapore's Agency for Science, Technology and Research and the Singapore Economic Development Board.

Although it may be too early to assess how successful Singapore's approach is, it is already evident that it has created significant impact on the biomedical science sector in terms of the growth in the number of start-ups, the increasing presence of foreign pharmaceutical companies in Singapore and the growth in manufacturing output of the sector.

Several questions remain. Will the approach adopted by Singapore, which is heavily funded by the government, be sustainable? Can Singapore compete successfully for talent and resources with its neighbours and other global players? Do the companies that are now being incubated in Singapore operate on sound business models for long-term value generation?

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Diary

www.ifm.eng.cam.ac.uk/ctm/events

Mar

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| 8 | <i>Technology roadmapping</i> | One-day course
London |
| 17 | <i>Software sourcing for products</i> | Evening workshop
Cambridge |

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| 4-5 | <i>Better product design</i> | Two-day course
Cambridge |
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Sep

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| 28-29 | <i>Gaining better value from technology</i> | 11th annual CTM Symposium
Cambridge |
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