

Future State of Science, Technology and Innovation in NZ

A Scenario Approach

Policy Scenarios

Three policy scenarios have been described for science, technology and innovation in New Zealand. These scenarios are not mutually exclusive but are used to highlight different strategic foci.

Strategic Focus 1 – Technology

A technology focus would emphasise:

- Increase in the production of new science and technology
- Increase private sector investment in R,S&T
- Improve science quality
- Establish priorities for public sector investment in R,S&T that meets national strategic priorities
- Choose investment portfolios of science that collectively provide international competitive advantage in that niche, or collectively will meet New Zealand's unique technical challenges such as in managing New Zealand's environment
- Choose the appropriate range of investment from basic to commercial science
- Establish R,S&T personnel and facility capability in key strategic areas
- Establish world class groups of scientists in institutions
- Monitor the performance of science contracts to ensure the science has been completed on time to quality standards.
- Encourage strong linkages between scientists, science agencies and science disciplines.
- Develop the pathway to foster the transfer and uptake of new knowledge

Strategic Focus 2 – People

A people focus would emphasise:

- Innovators – whether they be entrepreneurs, intrapreneurs, or project champions who make new ideas happen. The ideas could be of economic, environmental or social significance
- Improve the abilities and experiences of innovators.
- Provide education in innovation that fosters skills, experience, and attitudes to making new ideas happen
- Improve management to create organisation cultures that foster intrapreneurship
- Provide mentors and advisors experienced in business development and innovation

- Develop scientists and technologists with innovation attitudes, skills and experience
- Create a national culture that fosters and supports innovative spirit
- Foster project teams
- Develop collaborative processes between researchers, disciplines and/or research institutions
- Develop collaboration between all parties in the innovation process – scientists, engineers, marketers, etc.
- Develop domestic and global networks, alliances and collaborative processes between companies, CRIs, universities, government and individuals.
- Provide support for new company development that links several small companies around an innovation
- Develop active processes for working with the 25% of the New Zealand workforce who are currently working overseas
- Attract key skills into New Zealand
- Co-locate groups of people with skills
- Foster incubators and virtual incubators for innovation
- Develop industry clusters and regions of excellence
- Create systems that respond to the drumbeat of innovators
- Create incentives for innovators – these are not just financial but include issues of control, flexibility, commitment to ideas, personal development, challenges, and recognition.

Strategic Focus 3 – Systems

A systems focus would emphasise:

- Provision of finance for research, development and commercialisation, including business angels and the venture capital market
- Ensure a stable, business friendly economy and level playing field
- Taxation and legislation for R&D
- Improved market access
- Systems to acquire, store and disseminate useful information to innovators
- Processes for measuring performance of government investment in R,S&T
- Streamline processes for allocating government funds to R,S&T
- Establish appropriate incentives for CRIs and universities
- Processes for assuring accountability and transparency in the funding process
- Improving intellectual property rights acquisition and management
- Develop the level of ICT and electronic connectedness in New Zealand
- Improve project management skills and systems

Scenarios for 2007

Four people have been described in the year 2007. The scenarios below describe how they have been affected by FRST policy over the last five years. Each person has three scenarios by assuming three different FRST policies based on the foci described above. Of course FRST policy will inevitably be a mix of these three foci, however the purpose of this exercise is to help think more clearly about the impact of different policies.

Mary at AgResearch

Mary is an experienced scientist employed at AgResearch.

Strategic Focus 1 – Technology

The funding round is coming up again. Life is frantic as Mary seeks to complete writing the publication from the work already funded and prepare for the next round. Mary is part of a bid for further funding for exciting developments in gene mapping technology. It's a great day because Professor Bob Jackson has agreed to be part of the team. His reputation and publication record should help the project win, as well as suggesting links to the research group at the University. Mary is now writing the justification on how this project links closely with other projects to provide New Zealand with a competitive advantage in this aspect of biotechnology.

The funding application needs to allow sufficient funds to attend two major conferences in biotechnology in the United States. This will be a great way to meet colleagues working in related areas overseas.

Strategic Focus 2 – People

Mary thought the meeting seemed to be going well. Industry representatives, the Meat New Zealand staff and AgResearch were negotiating over the next funding round for biotechnology research. Meat New Zealand had agreed to provide \$10million in research funding which FRST matched with another \$10million. Mary had wanted more of the research to be strategic but she appreciated that the industry wanted a more applied focus, and since they allocated the funding she was happy to oblige.

She knew all the people at the meeting and the issues being faced by the industry. The FRST scholarship she won had enabled her to have a one-year secondment with Meat New Zealand so she could work directly with the industry. Mary thought she would use those relationships now to encourage one of the big firms present to establish an industry trial.

Strategic Focus 3 - Systems

Life seemed to be a never-ending process of convincing people that she was doing the right thing and on time. She hurried the report hoping the information was convincing. "Too much time spent on this report," Mary thought, "and the research won't be on time."

Mary's biotechnology work was a great candidate for patent protection. She was thankful that IPONZ had the world's fastest turnaround time for applications, although the time, cost and effort involved seemed to be interminable. Does AgResearch really have the muscle to defend this patent?

Peter – Linkz Ltd

Peter had burst out of Tait Electronics to set up his own business Linkz Ltd with three of his former colleagues. Tait Electronics had rejected his ideas of extending his project to create wireless electronics for creating secure intranets. They explained that they were already fully committed on other developments and that this one was outside their core expertise. Like so many entrepreneurially minded people, Peter wanted to make his ideas happen and the freedom to run his own business.

Strategic Focus 1 – Technology

Peter visited Canterbury University to get support for his new venture. The scientists seemed very knowledgeable and provided him with some of their publications but were otherwise disinterested in his venture.

His next visit was to IRL in Wellington. They had their own developments in wireless intranets but using different technology. They implied that his development was a low cost solution that was probably more suitable for firms with less than 150 intranet linkages. The IRL solution was more sophisticated and could be applied to larger firms. IRL were genuinely interested but were committed to their own technical developments.

Strategic Focus 2 – People

Tait Electronics had offered Peter a great deal. He could continue to use their development and test equipment and they would take a small share in his business. They had been keen to invest more fully but their new venture fund was already committed.

The idea had come while working with Canterbury University staff on a related project. The academics were keen to continue working with him to develop some of the generic technology so long as they could attract funding. Peter wanted to produce a specific product with its own IP, but he also wanted more advanced generic technology as part of his package. A meeting was held with FRST to see if they would agree to fund the generics with the IP going to Canterbury University. Linkz Ltd couldn't afford to put money in but they would pilot test the generics in their systems. FRST also suggested Peter seek funding through BTG.

Peter's new business was really a collection of five businesses. He had found companies who each agreed to be part of the manufacturing chain. One company supplied the electronics, another the plastic casing, another the metal housing, another the distribution system. They all put their own capital in to develop their part of the product. The government had provided mentor and financial help with setting up these strategic alliances.

Strategic Focus 3 – Systems

Peter gave a wry grin to his wife. "Well, its do or die, we're up to our eyeballs." Linkz Ltd had taken advantage of the new policies to foster Unit Trusts in high technology New Zealand ventures. It was an excellent way of being able to borrow from the New Zealand public without the need for an expensive prospectus.

Peter had spent weeks working through the myriad of information he had found to help make his business go. He had met helpful and not-so-helpful people offering him one service or another. Bamboozled by information and help, he wondered if he should just have taken a deep breath and launched straight into his business.

Bridget – University science staff

Bridget has just been appointed as a junior lecturer in the Chemistry Department and expects to complete her PhD in the next six months. She has been working closely with her professor on chemical noses in particular ways of assessing the level of food spoilage.

Strategic Focus 1 – Technology

The Department is determined to become a world-leading centre in chemical noses. They have received considerable funding support from FRST because it is of strategic importance in quality assurance for New Zealand's food industry. The hunt has been on worldwide to attract suitably experienced scientists, as well as to grow their own graduates such as Bridget.

Bridget showed her professor the Guinness Book of Records entry that says the company with the fastest growing sales in the world was an Australian firm that developed an electronic sensor for smelling body odour that retails for \$100. Her professor commented that their technology could probably do a similar job for about a tenth of the price but it was outside the strategic scope of interest to FRST.

Bridget feels her involvement in this project will provide her with the experience, publications and mana to build her academic career.

Strategic Focus 2 – People

Bridget was one of the new breed appointed to the Chemistry Department. She had completed the new Post Graduate Diploma in Innovation following her undergraduate science degree. They had been thrown in at the deep end to develop and market a new product. She and her team had chosen the chemical nose for body odour. The idea had come from her classmates when they grilled her over her project choice.

FRST and the University company had provided her team with some seed capital based on their feasibility analysis. She had then negotiated with a cosmetics firm to package and market the product through their firm, in return for a share of the profit and a close relationship with the Chemistry Department. The project had lurched from one crisis to another, but the team overcame them as they gained new insights from course material and colleagues struggling with similar challenges. In the end the project made enough profit to pay their university fees and to partly repay their backers. In time the full amount is likely to be paid back. However with the experience gained, Bridget is confident she can develop a much better product that more closely matches the way customers want to use it. It was this experience that encouraged the university to appoint her so long as she was enrolled for her PhD.

Strategic Focus 3 – Systems

It was a relief to get the project accepted by the University company. They said they would appoint one of their staff as a project manager to commercialise the chemical nose, which meant she would now be free to explore new chemical noses. Of course they would probably want to contract her to tidy up the chemistry and to find a way to miniaturise the process.

The project manager was one of these commerce types, with several projects on the go. He said it would take him a few months to get the business plan done. She guessed that is what it took to make projects happen but suspected he had little real interest in the chemical noses project. Still, she certainly did not want to be bothered with all the hassles of commercialising the project and knew she lacked the skills.

Rahman – Southland Regional Council water conservation expert

Rahman is a scientist with experience in water conservation in India. He was attracted to the Southland job because of the challenges posed by the growth of dairying. Thirty farms require as much water as a small city, and make as much effluent.

Strategic Focus 1 – Technology

Rahman attended the International Water Quality Conference in Christchurch organised by Canterbury University. Present were some of the world experts on managing sustainable water use. Many of the presenters were from New Zealand universities and CRIs who presented the findings from their FRST funded research work. Rahman envied the time these scientists had to take such accurate measurements with precise research designs. His work seemed to be more rough and ready as the need arose. He thought there might a couple of ideas that he could take back to help with Southland's water problems.

Strategic Focus 2 – People

It was two years since he attended the New Zealand Employment Road Show in India. They had mainly come to find good communications IT recruits but they also expressed a need for some other skills. His wife agreed to make the move because the New Zealand Government promised that all the paperwork and approvals would be fast tracked and an interim furnished home would be organised on their arrival. He had to admit it had all seemed remarkably easy.

Today Rahman chaired the Water Conservation Research Fund. Half of their money came from FRST and the rest had been pieced together from Regional Councils, Fonterra, Ministry for the Environment, and Acclimatisation Societies. As an Industry Research Consortia their job was to decide on which proposals to fund. It was a very different perspective being a decision maker rather than an applicant. The research was definitely more useful for people like him, and other councils were finding it easier to pick up and use the research. He worried though if the interests of the people present, and their focus on immediate problems captured their judgement.

Strategic Focus 3 – Systems

Rahman looked at his diary - another meeting in Wellington with the Strategic Water Management Group initiated by the Ministry for the Environment. Others there would be FRST, MoRST, Industry New Zealand, MED, two university academics, environmental lobby groups, a dairy company rep and him. It seemed he was the only one actually fixing the water problem, but he guessed that was why they wanted him at these meetings. A paper was going to be written by Ministry for the Environment on what needs to be done for sustainable water use.

His email reminded him to check the latest on the water quality research website. The software enabled him to enter in the research he wanted done and to rank the importance of the work to his organisation and to New Zealand in general. The system had been first trialed with the Mussel Industry and had made it much easier for FRST to determine the best areas for their investment.

Implication for Indicators

Technology Focus

Have a high quantity and quality of knowledge of strategic value to New Zealand.

Feedback indicators

- No of publications
- No of citations
- Gross revenue from sale of research, technology, or royalties

Concurrent indicators

- E-questionnaire on progress
- Review funding allocation by exception eg. when circumstances have changed, new opportunities have been made evident by the research, key people have left etc. Can be initiated by either party.

Feedforward indicators

- Allocation process that assures the right choice of research investment
- Managerial process and accountability regime that assures good decision making

People Focus

Have a constant demand for new venturing drawing on science and technology stimulated by having the people, experience, networks and innovation culture.

Feedback indicators

- No of innovations (first use of a new technology)
- Change in the number of experienced innovators (people engaged in getting technology adopted in the last two years)
- Co funding of projects with potential users.

Concurrent indicators

- E-questionnaire or phone contact to discuss needs of key players

Feedforward indicators

- Cross institution, cross discipline or provider/user applications for funds
- Applications with experienced innovators on the team
- Decisions made by consortium of scientists and users
- Number graduated from innovation education programmes
- Participation in networks aimed at innovation

Systems Focus

Scientists and innovators can efficiently and effectively access finance, information and support for their projects.

Feedback indicators

- Time taken from application to decision
- No of projects that met deadlines in full to A1 standard

Concurrent indicators

- E-questionnaire on progress of contracts

Feedforward indicators

- Rapid decision making system
- Simple criteria like percent of co funding
- Treatment of strategic alliance companies in tax and accounting law.