

A Typology of the Ideal Future State of R,S&T in NZ

Issues	Ideal Future State	Indicator	Usefulness
Culture	<ul style="list-style-type: none"> •Continuous innovation in the private sector •Rising capacity for continuous innovation in the private sector •Strong private sector demand for R,S&T and knowledge •High skills for implementing knowledge in the private sector •Private sector internal seed venture capital funds •Private sector management systems that foster innovation 	<ul style="list-style-type: none"> •Innovation index Eg Σ(private R&D investment as % of GDP, % of co-funding of public sector R&D, % of innovators to total project team funded by FRST, % of FRST investments leading to codified IP in last year) set to 100 for 2002. •Case study analysis assessing social rates of return •Massachusetts indicators of innovation are: innovation capacity, new company creation, company closings, business churn, patent generation, top technology patent areas, R&D expenditure (scoreboard not index) •Progressive Policy Institute State New Economy Index uses five factors – share of jobs in high-tech industries, share of scientists and engineers in the workforce, patents generated relative to workforce size, industry R&D as a share of GDP, venture capital as a share of GDP •Private sector purchase of R&D 	<p>*AKIC</p> <p>EAKI A</p> <p>EAK</p> <p>EAK</p>
People	<ul style="list-style-type: none"> •More experienced entrepreneurs •More experienced medium to high tech entrepreneurs •More experienced intrapreneurs •More experienced medium to high tech intrapreneurs •More skilled managers in fostering innovative organisations •More experienced venture capitalists & financiers of med/high tech •More skilled scientists •More scientists experienced in innovation •More private sector scientists 	<ul style="list-style-type: none"> •Doubling in the number of staff in RS&T organisations experienced in successful innovation. •New S&E graduates (% of 20-29 years age class) •Pop with tertiary education (% of 25-64 age classes) •Participation in life-long learning (% of 25-64 age classes) •Employment in medium-high and hi-tech manufacturing (% of total workforce) •Employment in high-tech services (% of total workforce) •Rising no. of people in business, environment and RS&T sectors who took a critical role in the first adoption of a technology or process that is new to the world, NZ or the industry in the last 2 years 	<p>*EAKIC</p> <p>E</p> <p>E</p> <p>E</p> <p>EA</p> <p>EA</p> <p>*EAKIC</p>
Resources	<ul style="list-style-type: none"> •Sustained (or increased) public sector investment in R,S&T •Increased private sector investment in R,S&T •Increased venture capital investment •Full range of scientific personnel to meet NZ's needs •Full range of scientific equipment to meet NZ's needs 	<ul style="list-style-type: none"> •Medium levels of private sector investment in RS&T to match or exceed Australia's levels of 0.68% of GDP private sector investment in R&D. •Public R&D expenditures (GOVERD + HERD) (% of GDP) •Innovation expenditures (% of all turnover in manufacturing) 	<p>*EAKIC</p> <p>EA</p> <p>AKI</p> <p>EA</p>

Usefulness of Indicator

E Easy to measure **A** Accurately defines the issue under study **K** Key issue to be addressed

I Likely to impact future behaviour **C** Candidate for the one, big, hairy, scary indicator ***** Recommended

	<ul style="list-style-type: none"> •Reduced duplication of human and technical resources 	<ul style="list-style-type: none"> •High tech venture capital investment (% of GDP) •Capital raised on parallel markets plus by new firms on main markets as a % of GDP •Total R&D spending •Massachusetts Innov Capacity index based on relative shares of high-tech jobs, scientists and engineers in the workforce, no of patents generated, industry R&D and VC investment •Venture capital \$ investments in the last 5 years 	<p>E EA E E</p>
Systems	<ul style="list-style-type: none"> •Fosters adoption and diffusion of R,S&T •Rapid decision making •Minimal cost of compliance •Accurately invests in most promising R,S&T or people •Assures quality of R,S&T •Assures likelihood high returns on investment •Capital market supports informed investment decision in R,S&T 	<ul style="list-style-type: none"> •Reduce the time from application for funds from FRST to decision by 40%. •Increase the % of projects that met deadlines in full to A1 standard by 10% •Case study of tangible and intangible cost to applicant for crown R&D funds 	<p>*EAKI EAI *AKI</p>
Linkages	<ul style="list-style-type: none"> •Increased linkages between NZ scientists •Increased international connectedness with scientists •Increased linkages between science disciplines •Increase linkages between science agencies •Increased linkages between public and private sectors •Increase med/high tech soft business networks •Increased med/high tech strategic alliances •Increased connectedness with international high tech markets 	<ul style="list-style-type: none"> •Routine collaboration in science with an [25%] increase in joint research project collaborations across organisations. •70% of research for industry programs receive significant industry co-funding •Strengthening of global networks reflected in substantial foreign direct investment in NZ research, including [? Percent] co-funding of FRST programs. •Strong linkages and networks between science providers and users with most FRST projects having users fully engaged at the outset. •SMEs involved in innovation cooperation •Percentage of investment that is cofunded 	<p>*EAKI *EAKIC *EAI *EAKI AK AKI</p>
Flows	<ul style="list-style-type: none"> •Increased readiness for knowledge acquisition in firms •Increase in knowledge flows •Increase in knowledge investment •Increased adoption of new technologies (NZ and international) •Increased diffusion of innovations •Increased capture of the benefits of innovation by NZ firms •Improved access to codified knowledge 	<ul style="list-style-type: none"> •Home internet access (% of all households) •Internet host sites per 1000 residents •Business use of the internet •Evaluations of education system •No of patent searches 	<p>E E E AKI E</p>
Economy	<ul style="list-style-type: none"> •More firms large enough to successfully export •Capital investment, people skills, and policy actions that support the 	<ul style="list-style-type: none"> •Increase proportion of firms with more than 4 staff from 14% to match or exceed Australia's levels of 19%. 	<p>*EAK</p>

Usefulness of Indicator

E Easy to measure **A** Accurately defines the issue under study **K** Key issue to be addressed

I Likely to impact future behaviour **C** Candidate for the one, big, hairy, scary indicator ***** Recommended

	<ul style="list-style-type: none"> growth of knowledge industries with rising foreign import demand •Competitive pressures in the economy •Rising levels of international competitiveness •Open economy •Stable economy 	<ul style="list-style-type: none"> •Share of ICT markets as % of GDP •Share of value added manufacturing in high tech sectors •New company creation •Company closings 	EK AK E E
R,S&T	<ul style="list-style-type: none"> •World class RS&T capability •Technology portfolios that may lead to NZ competitive advantage •Technology portfolios that match NZ's needs •Technology range of strategic, applied and commercial science 	<ul style="list-style-type: none"> •International publications 	E
Universities	<ul style="list-style-type: none"> •More output/outcome focussed research in universities •More demand led R,S&T •More useful R,S&T for NZ •Closer linkages with business and environment sectors •Improved return on investment from university research •Less cross subsidisation from teaching into research •Easier science user access to university research staff and facilities •Graduates more skilled at innovation •Graduates match areas of shortfall in the science/innovation system 	<ul style="list-style-type: none"> •University R&D income from non-government sources •University R&D profit from non government sources •University collaborations •Cross university student competition in innovation 	*EAKI EAI EAK EKI
CRIs & RAs	<ul style="list-style-type: none"> •More demand led R,S&T •More useful R,S&T for NZ •Closer linkages with business and environment sectors •Improved return on investment •Easier science user access to CRIs •Increased role as hub of industry clusters 	<ul style="list-style-type: none"> •CRI profits •CRI gross sales excluding govt •CRI collaborations •CRI ROI 	EA *EAKI EAK EA
FRST/MRST	<ul style="list-style-type: none"> •More cost effective role in managing crown policies & investment •Strong linkages with science and innovation sectors 	<ul style="list-style-type: none"> •No of products, processes and users that have been implemented by users per \$1million of FRST investment within 3 years 	*AKIC
Govt	<ul style="list-style-type: none"> •More innovative public sector •Increased use of government as a major consumer to raise demand for domestic innovations (first use of an idea) 	<ul style="list-style-type: none"> •20% increase in Government as first purchaser of NZ innovations (first use of an idea) •Government innovation index (have several that could be used) 	*EAKI *AKI
Output	<ul style="list-style-type: none"> •More codified IP •More knowhow •More innovative organisations •More NZ licences to codified IP •More agreements and alliances 	<ul style="list-style-type: none"> •Exceed benchmark outputs of codified IP •EPO high tech patent applications (per million pop) •USPTO high tech patent applications (per million pop) •Patents issued per 1000 residents •SMEs innovating in-house (% of manufacturing SMEs) •'New to market' products (% of sales by manufacturing firms) •No of breakthrough products or processing in preceding three 	E *EK EK E AK AK A

Usefulness of Indicator

E Easy to measure **A** Accurately defines the issue under study **K** Key issue to be addressed

I Likely to impact future behaviour **C** Candidate for the one, big, hairy, scary indicator * **R** Recommended

		years that have the potential for the firm to be internationally competitive.	
Outcome	<ul style="list-style-type: none"> •Increased export growth •Increased med to high tech export growth •Higher standard of living •Improved quality of life 	<ul style="list-style-type: none"> •Reference country average level of medium to high technology manufacturing exports rising from a current level of 18% to 48% •NZ to become ecologically sustainable by MoE's indicators •Wages per worker 	*AK *AK EK
Social Equity	<ul style="list-style-type: none"> •Improved Maori and Pacific Island socio-economic level •Regional development 	<ul style="list-style-type: none"> •Target group (eg Maori, Pacific Island, iwi, acute region) socio-economic indicators rise from 80% to 90% of the NZ average income •Increase the no of people in target groups who took a critical role in the adoption of a technology or process that is new to the world, NZ, region, industry or firm in the last year by 40% •Increase in % of Maori and Pacific Island owned firms •Ecological footprint (the acreage required for the average NZer) 	EK AK E AK

Usefulness of Indicator

E Easy to measure **A** Accurately defines the issue under study **K** Key issue to be addressed

I Likely to impact future behaviour **C** Candidate for the one, big, hairy, scary indicator * **R** Recommended