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28th April 2008

Review of the National Innovation System - Submission

Secretariat to the Expert Panel
Review of the National Innovation System
Department of Innovation, Industry, Science and Research
GPO Box 9839
CANBERRA ACT 2601

Attention: Dr. Terry Cutler, Chairman
Email: innovationreview@innovation.gov.au

Dear Sir,

Re: Individual Submission from Mr John Russell Owner & Managing Director of Russell Mineral Equipment P/L.

Russell Mineral Equipment (RME) is a technology company. We prosper through innovation across every facet of our business.

RME personnel identify opportunities (problems) in the mining and mineral processing industries, invent solutions for those problems, then design and manufacture the subsequent mechanical, electrical, electronic, hydraulic and pneumatic systems necessary to solve those problems.

RME's personnel comfortably ride this 'second industrial revolution' wave, *computerisation*, which is as significant as the transition from animal power to steam. We see into the future by modelling and proving solutions in this virtual world, before any physical manufacturing. Increasingly, embedded 'computers' control and monitor these systems and solutions.

One measure of RME's technical and commercial success is our Award history including:

2007 Australian Exporter of the Year – Regional
2001 Australian Exporter of the Year – Regional

A complete list of Awards is attached as Appendix A.



In addition to RME's achievements, I have been awarded:

- 2001 Centenary Medal for service to industry
- 2007 Canadian Mineral Processors Art McPherson Medal for significant contribution to the world's mineral processing industry.

RME - 2001 Exporter of the Year - Regional

Submissions

I have contributed to this 'Review of the National Innovation System' through the following avenues:

- QLD State Government's 'Commercialisation & Technology/ Knowledge Diffusion Discussion Forum' (2nd April 2008) contributing verbally to its written response undertaken by the Science Strategy Department of Tourism, Regional Development & Industry;
- participation in another submission from a small group of executives in the Mining and Technology Services (MTS) sector;
- a specific submission to the Business Council of Australia (BCA), as recommended by the Australian Institute for Commercialisation (AIC) detailing RME's long experience in seeking collaboration with a wide range of Research Organisations (RO's). Also, a copy has been sent directly to Mary O'Kane, who is chairing a sub-review into collaboration between industry and the research sector;
- this personal submission.



RME - 2007 Australian Exporter of the Year - Regional

I believe innovators, inventors, entrepreneurs, gifted managers and leaders are born, not made. As a Nation, we must not handicap them into the future with poor standards of education and the yoke of a subtle, National, inferiority complex with respect to our abilities to master advanced technologies and commerce. In other words, we must reduce the attrition of those born with the ability to succeed.

I believe successful implementation of the ideas, detailed in these submissions will, over one generation, help provide a far stronger foundation from which our young innovators, inventors, entrepreneurs, gifted managers and leaders will launch themselves. This new breed of Australians will be armed with core skills, infused with a sense of purpose and without the cultural handicap of a 200 year 'cargo cult' legacy. These innovators will build themselves wonderful vocations across the full spectrum of social and economic activity, fuelled by irritation, even anger, at the status quo.

Their capacities will leverage their own enterprises or those of their fortunate employers. They will generate critical mass and global market dominance in a host of advanced technology fields such as mining, medicine and biotechnology.

Preparation then exposure then observation then irritation, then inspiration, then action;

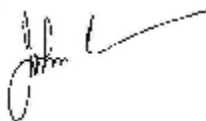
this is the path of **INNOVATION**.

Too few have experienced it. Far too few are armed adequately to act and to win.

And to win, we must fight. Each Anzac Day we are reminded of our forefathers. Failure was not an option for them and it cannot be for us. Freedom is not free.

This submission contains my hopes for a different Australia by 2050. Thank you for the opportunity.

Yours faithfully,



JOHN RUSSELL
For RUSSELL MINERAL EQUIPMENT PTY LTD



AUSTRALIANS – GOOD AT SPORT, POOR AT TECHNOLOGY & COMMERCE. WHY?

Have you ever watched young kids playing competitive soccer? They all run about kicking furiously, hopefully to each other and toward their goal.

But the difference between winning and losing this ‘serious’ event is the inclusion of a goal kicker in the side, an individual with the instinct and confidence to deliver when it matters. That one player in eleven makes the difference to the final score.

Australians love a good game and, when we consider it important, we become globally competitive. In cricket, football and even the Olympics, we are amazingly successful for a country of only 21 million people.

But for reasons both cultural and historic, we see ourselves in the ‘junior league’ in, arguably, the most competitive games of all, advanced technology and commerce of global scale and significance.

And why should we be otherwise. The only reward for winning this ‘commercial world cup’ is a high standard of living for our country’s citizens. But we have that already..... and then there’s the weather!

And it is true. Right now, we do have it all.

Unfortunately, our current comfort disguises a serious, longer term risk.

Australia’s present situation is, to continue the sporting metaphor, like an underperforming football club which was bequeathed a vast fortune in land. While this club doesn’t win any games, never makes the league tables and has no aspirations to do so, it has the best clubhouse and facilities, all funded by the progressive development of the real-estate assets. If at times the club management is disinclined to develop, they simply sell bare land. In Australia, we are selling off our God-given mineral wealth for cash today but we are not training our team, our people, to be competitive as the bequeathed, unearned income, runs out.

As this happens, our best potential young players will increasingly leave our ‘club’ and join others, overseas, where there are better prospects for being part of a winning team. Indeed one million, better-than-average Australians currently work overseas. We can only hope they bring back enhanced skills, one day.

And so to our current ‘Technology Team Australia’.

Our world class research ‘backs’ are constantly ‘winning possession’ by inventing great new ideas and breakthrough science but our under-performing commercial ‘forwards’ fumble and lose possession of potential products and services, emerging from our hard won intellectual property (IP).

On the rare occasion we do maintain possession (of IP), we lack the goal scorers, those individual team players with the instinct and confidence to deliver a vital goal and create whole new knowledge based industries.

In Australia today, we have the means to create a truly competitive world cup team but we must focus on actually joining this advanced international game and, once we do, work on retaining possession of the ball and scoring goals. Minister Carr notes that while Australia represents only 0.3% of the world’s population, we produce 3% of the world’s scientific papers. However, we rank last of 26 OECD countries in research collaboration between industry and universities; great ‘backs’, weak ‘forwards’ and too few ‘goal kickers’.

Our overseas competitors are large, experienced, aggressive and vigilant, on the lookout for the ‘loose ball’, the unguarded intellectual property. A political cartoon from the Bob Hawke era (attached as Appendix B) remains accurate and relevant. In this global technology/commercialisation arena, we are ‘gentle, koala bear players’ facing tough, aggressive and experienced opportunists. We must develop a game strategy and tactics which play to our strengths, our intellectual nimbleness and flexibility, forced upon us by our smaller scale. This is one of our great advantages.



We must also find the courage to examine our cultural roots and understand this fundamental lack of entrepreneurial confidence which holds Australians back from building new technology enterprises, undermining our future beyond a 'farm and quarry' economy. Once addressing and identifying this National fault, and I use the word 'fault' quite deliberately, we can work toward correcting it and win the world cup, in perpetuity. The Lucky Country will make its own future luck.

To deny this characteristic, as a significant National weakness, is to deny subsequent generations a future standard-of-living, comparable to our own today.

No other first world society is so dependant upon the sale of resources. Worse, we add little or no value beyond extraction.

If I seem alarmed, it is because I am. I have a strong sense of the time lag between action and outcome, especially when attempting to mobilize a whole country and it's culture.

Australia must act now while the new Government is fresh. The opportunity to create and publish a new, visionary 100 year plan for Australia was lost in 2001, our celebration of Federation. Instead, we had parties and fireworks. Perhaps we were well managed by the previous Federal Government but not well led in some respects.

The Rudd Government is obviously aware of this National lack of direction, materialised in the "Review of the National Innovation System", the "2020 Summit" and other initiatives.

I believe there are four urgent and fundamental actions required by the combined efforts of the State and Federal governments. I have also provided comment on certain taxation and incentive programs:

1. Culture Adjustment #1 – 'Advance Australia' Promotion

A long-lasting (ten to fifteen year) multi-media program promoting the technological and other business successes by Australians (there are many) as a mechanism for diluting and hopefully eliminating our residual and persistent technology/business inferiority complex and cargo-cult mentality where we presume the purchasing of advanced technologies from North America, Europe and Japan. (This on-shore and off-shore media saturation approach worked very well for Northern Ireland in the early 90's. I understand this program helped grow an entire, new advanced-technology economy);

2. Intellectual Property (IP) Control and Retention for the National Interest

Australian's must work to secure our IP through commercialisation education, aimed squarely at the scientists and their commercial managers in both the public and private research sectors ie. those who create and 'handle' IP. They have duties to themselves, their employers, their publicly funded institutions and their country to maximise long term value in order to create meaningful new vocations in the technology sector. These people can no longer be complacent, hiding behind the simple excuse of 'no Australian interest'. They must find and secure Australian interest despite initial setbacks and disappointments. Sources of IP leakage can be found in Appendix C.

3. Primary and High School Education

Australia urgently needs a strong, national educational process where Mathematics, Science and language are core competencies complimented by commercial training and the arts (for lateral thinking and perspective).

The standard of teaching in Australia is spiralling downward, a long term consequence of the poor image of the teaching profession combined with a much more difficult social and teaching environment (broken homes and other social problems). A recent 'Australian' newspaper (9th April 2008) supports this concern (copy attached as Appendix D), recognition of the problem by the Deputy Prime Minister and Education Minister, Ms. Julia Gillard.



A series of suitable examinations for teachers would soon reveal that a significant number of current Science, Mathematics and English teaching staff would 'fail to matriculate' under the earlier, university-set examination processes. This poor standard is pitifully inadequate for the task at hand; training our youth in preparation for global competitiveness.

The 'institution assessment' exam (Q-SAT in Queensland) could be retained to help level the playing field for good students in remote areas but the National Universities must regain control of the core syllabus. Perhaps the members of the Australian Vice-Chancellors Committee (AVCC) or its replacement body could be held personally responsible for this vital task. Currently, universities have no control regarding the quality of incoming students. The first year of technology related degree courses is often 'remedial'.

Most school students need a framework on which to build all subsequent, life-long learning. The current 'self directed learning' philosophy (teach yourself) does little to harm most first tier students (who will succeed despite any system) but disadvantages every other group. The second and third tier students suffer the most and achieve a fraction of their potential, denied the discipline of a sound educational framework founded upon teacher competence and a sound syllabus. I don't pretend to know how to solve this problem, but we must. Teacher assessment and remedial education for teachers may prove mandatory. Alternatively, an IT based program, 'starring' the best teachers in Australia, could be developed to train current teachers and augment the classroom experience.

Also, life is an exam. We must build 'exam fitness' into each student by re-introducing the equivalent of 'scholarship' (Grade 8), Junior (Grade 10) and Senior (Grade 12) examinations, set by the external university system. The current 'soft' process gently leads high school students along a non-threatening path until the career defining Grade 12, Q-SAT and OP results. This is a cruel and misleading process for many students and unproductive in view of Australia's innovation aspirations.

Finally, the current system is also destructive with respect to socialisation and the promotion of life-long friendships, initiated at school. In Grade 12, each student has to 'beat his or her friends' in order to achieve the maximum OP Score from the ration allocated to that school. The natural, mutual support between students has suffered, sacrificed to the OP university entrance competition.

In stark contrast is the old, external, examination system where the examination-setting University was the 'common enemy' and mutual co-operation between students (friends), a natural process. Potential life-long friendships, formed in early years, blossomed.

What damage has this current system wrought on our society over the last two or three decades?

University

Why are so many people now going to University?

Why are so many of these students relatively illiterate and innumerate after + 12 years of 'schooling'?

And, how have these people achieved status as 'customer' needing 'customer satisfaction' ie. passing courses and 'achieving' qualifications.

University education, at some institutions, is simply the tertiary stage of the spluttering educational rocket, one which does not propel these new 'professionals' into useful orbit.

It is time the professional bodies stand firm, reclaim their ground and demand professional-grade qualifications and abilities before admission.

4. Culture Adjustment #2

- reward technologists

Managers don't create great technologies, great technologists do, albeit operating in a supporting environment.



No-one can manage invention to be an 'on-demand' outcome. We create fertile environments where innovation blossoms and grows through innovative people working individually or in teams.

The easiest technology business to manage is a profitable one, won through possessing the best products and services in the market.

At RME, we have clear, parallel career paths; one for managers and one for technologists. Our Chief Engineer is not the Engineering Manager. No-one reports directly to him. He undertakes difficult projects personally, assists Senior Engineers as required and mentors graduates. He is paid \$xxx,xxx per year to remain a technologist, double the current Engineering Manager's salary. This package includes significant (internal to RME) royalty streams from some of his more exceptional inventions.

At a recent Queensland Government meeting an attendee made a derisive remark regarding Professor. Ian Frazer's personal wealth. While poets may produce their best when miserable, I believe great scientists produce their best work, freed from day to day money worries. This comment revealed the 'tall poppy' syndrome is alive and well. Remuneration incentives through royalty streams are effective. Inventors usually invent many things in their career. Reward it and encourage it.

Comments on taxation and incentive programs

Reinstate taxation incentives such as the 150% R&D tax concession but with tighter controls. Abuse by a few 'innovative' accountants undermined this fine program for all legitimate R&D driven companies.

Consider taxation incentives for exporters, especially if those tax savings are directed towards export development or R&D. (If an export dollar is worth \$3 or \$4 to the Australian economy, why not reward the sources of those export dollars?)

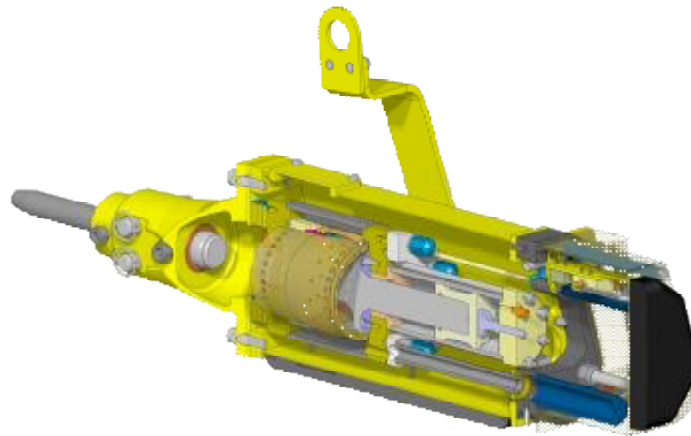
Abolish State Government payroll tax. As firms grow, average performance per head drops. The concept of taxing extra employment is ill considered. Extra company tax in lieu of payroll tax would be more acceptable.

The earlier Federal Government 'Start' grants and the more recent 'Commercial Ready' grants appear to target start-up companies with 'blue sky' ideas. RME enjoyed a significant Start Grant for a blue sky idea when we were much smaller (although already an Australian Export Award winner) but has had less success in attracting a Commercial Ready Grant, needed to put a new product (a billion dollar / year market competitor) into production, following very successful field trials of a pre-production prototype. RME would not object to the Government taking an equity position in this and other projects, ideally with a sunset clause which would allow us to buy out that equity with some multiple of the Government's investment. I would be less keen to sacrifice equity to the venture capital market. Venture capitalists usually exit in three to five years and the new partner may not match RME's culture nor RME's commitment to retaining Australian ownership.

Indeed, is there an argument for the Australian Federal Government or the State Governments, serving as equity partners, for selected projects. Apart from a few large Australian resource companies, only Governments have the scale and influence to compete with entrenched Western multinational companies or large Chinese companies which are all, ultimately, 'state' owned.



A typical RME Mill Relining Machine



An RME Thunderbolt recoilless hammer



APPENDIX A – LIST OF AWARDS

2007 Australian Exporter of the Year Award – Regional

2007 The Premier of Queensland’s Export Award – Regional

2007 Engineers Australia Engineering Excellence Awards (Finalist)

2007 Engineers Australia Engineering Excellence Awards (QLD)

2007 The Canadian Mineral Processors’ Art MacPherson Award

2005 Premier of Queensland Export Awards, Small to Medium Manufacturer

2005 Southern Queensland Exporter of the Year

2005 Southern Queensland Small to Medium Manufacturer Award

2004 Engineers Australia, WBS Screen

2001 Australian Exporter of the Year, Regional Exporter of the Year

2001 Premier of Queensland Export Awards, Regional Exporter of the Year

2001 Southern Queensland Export Awards, Exporter of the Year

2001 Southern Queensland Export Awards, Large Manufacturer

2000 Premier of Queensland Export Awards, Small to Medium Manufacturer

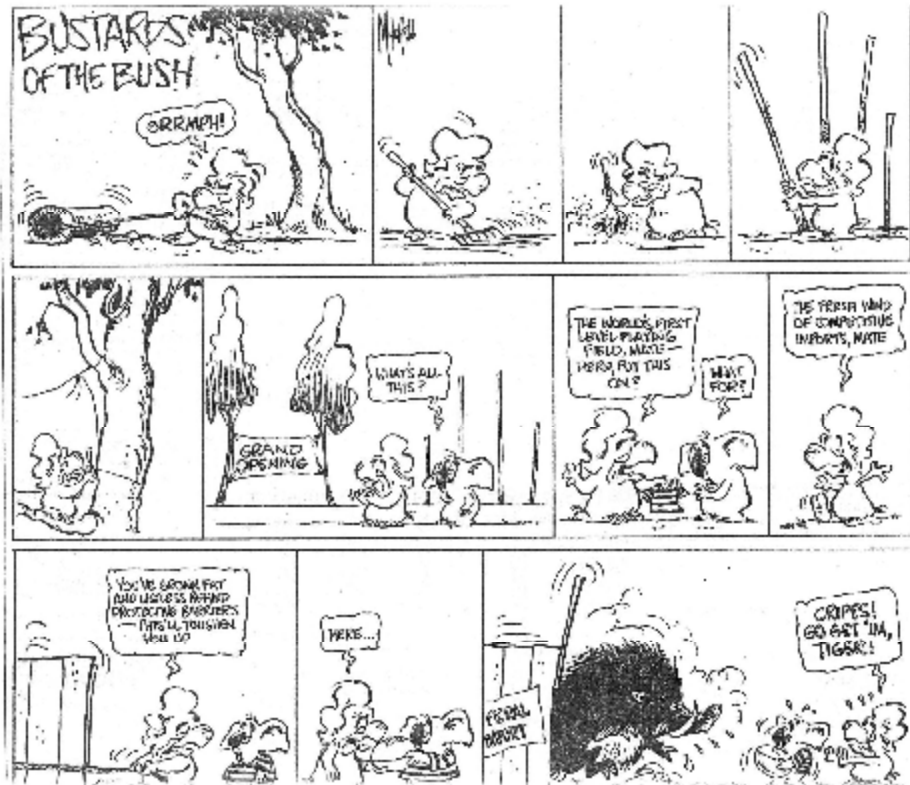
1997 BHP Steel Award, THUNDERBOLT

1995 Engineers Australia Excellence Award, QAL Descaling Machine

1994 Engineers Australia Excellence Award, Mill Relining Machines

APPENDIX B

A Political Cartoon from former Prime Minister Bob Hawke's era





APPENDIX C

Routes for losing Australian Intellectual Property (IP)

- Academic publications (before patenting)
- Foreign funding of Australian Research Organisations (RO's) where (say) a 1% contribution from a foreign firm provides access to 100% of the RO's activities;
- Private business sales to foreign firm (along with all IP)
- Theft (copying) - 'See you in court' response by large Western corporations copying Small to Medium Enterprise (SME) IP or widespread, national, cultural immorality regarding copying
- Patent affordability (SME's)
- Patent process knowledge and practices (SME's and RO's)
- Scale (insufficient investment capital to commercialise IP in Australia?)
(The funds are probably here in the form of superannuation pools, but investment managers are risk averse with respect to technology)
- Presumption (industry and Government researchers presume foreign companies are 'better at R&D commercialisation')
- Foreign Government policy and legislation – must build 'at home', not in Australia eg. Bushmaster Armoured Car for the US military
- Government (Federal and State) policy and actions eg. sale of Barrier Reef 'genetic biosphere' to foreign drug companies by QLD Government (for a laboratory at Griffith University to do the work!)

Maths courses a minus: Gillard

Patricia Karvelas
Political correspondent

STUDENTS are being put off studying maths because teachers do not have enough expertise to teach it, courses are too dense, and there is not enough information about career opportunities.

Education Minister Julia Gillard said the results of a disturbing new study were not surprising given that a quarter of junior secondary maths teachers had not completed one year of university study in the subject.

The report, titled *Maths? Why Not?*, prepared by the Australian Association of Mathematics Teachers and the University of New England with funding of \$57,400 from the federal Government, was released yesterday.

It highlights key factors that deter students from studying higher-level maths in senior secondary years, including negative experiences of junior secondary maths, poor perceptions of their own ability, and lack of understanding of career options in the field.

The report finds a key factor in deterring students is the number of secondary teachers who are teaching maths even though it is outside their training and expertise, making it difficult to engage students in a potentially demanding subject.

The report found syllabus and curriculum frameworks contained so much content they did not leave sufficient time for the consolidation of understanding and knowledge.

And the heavy student workloads associated with higher-level maths courses also deterred students.

The report was critical of teaching and learning practices that did not adequately support the learning of mathematics from primary school through to secondary school.

"Pedagogical approaches do not engage students because teachers are often required to teach outside their area of expertise," it says.

Another problem is that subject choices are based more on their mark potential for university tertiary entrance scores than on their preparation for tertiary study.

The report found university information lacked clarity or was

ambiguous about the prerequisites needed to undertake mathematics-rich courses.

Career advice gave students an incomplete picture of the options from maths, the study found.

Ms Gillard said that to ensure the nation's productivity and competitiveness in the global knowledge economy, the anti-maths trend must be reversed.

"We must ensure an interest in maths is inspired in our youth who will provide the skills vital for our nation's future wellbeing," she said.

"To encourage more people to study maths at university, from 2009 the Rudd Government will halve the HECS fees for new maths students while they are studying and then halve the HECS repayments of maths graduates if they take up work in a relevant maths occupation, particularly teaching."

She said the new National Curriculum Board would play a key role in responding to the report's finding that overcrowded maths curriculums hindered school students in learning maths.

AUSTRALIAN 9.4.08

Stop Press

The University of Southern Queensland (USQ) is considering reducing Mathematic lecturers from nine to four due to lack of demand.

21.4.2008

Mathematics, quite literally, lies at the core of computerisation. Which, in turn, drives this second industrial revolution. Computerisation expands human capacity in every sense. If we lose competency in maths we lose the capacity to compete in any innovation worth considering (even social issues which require statistics for insights).