

Andrew Cleland
Chief Executive
PO Box 12 241
Wellington
policy@ipenz.org.nz
www.ipenz.org.nz

STABLE FUNDING ENVIRONMENT – MOVING INTO PHASE 2

SUBMISSION TO THE FOUNDATION FOR RESEARCH SCIENCE AND TECHNOLOGY
13 MAY 2008

BACKGROUND TO IPENZ

The Institution of Professional Engineers New Zealand (IPENZ) is the lead national professional body representing the engineering profession in New Zealand. It has approximately 10,000 Members, including a cross-section from engineering students to practising engineers to senior Members in positions of responsibility in business. IPENZ is non-aligned and seeks to contribute to the community in matters of national interest giving a learned view on important issues, independent of any commercial interest.

EXECUTIVE SUMMARY

IPENZ thanks the Foundation for Research, Science and Technology (FRST) for the opportunity to comment on *Stable Funding Environment, Moving into Phase 2*, which we generally support.

However, we do have some concerns regarding the proposed criteria, which we consider may not sufficiently accommodate market-driven economic development research. Our overriding concern is that the proposed methodology for determining more stable funding does not recognise the different success measures for different types of research.

We also question whether it is appropriate that the New Economy Research Fund (NERF) is evaluated in this way.

We have attached (as Appendix 1) our submission made to Ministry of Research, Science and Technology in February 2006 when the new system was being established as many of the comments we made then remain relevant today.

We are happy to meet to further discuss the issues considered in his submission.

SUBMISSION

As IPENZ is not involved as a recipient of research funds, we are not in the position to comment on the technical detail of much of what is proposed from a procedural

viewpoint. Hence we will restrict our comments to high level matters, particularly whether the proposed changes will bring about beneficial change for the research and development (R&D) sector, but more importantly for meeting New Zealand's objectives.

In general, we support the concept of stabilised funding as an important factor in maximising the benefit New Zealand gets from research. As we indicated in 2006, we consider that negotiated investment is a good system for:

- environmental research in Crown research institutes (CRIs) and dedicated research centres (for example, research associations, some specialised university-based research centres), and
- economic security research in CRIs and dedicated research centres

In 2006 we stated that this is *not* a good system for:

- economic development research, and
- research conducted by general academic staff in universities

Our rationale was based on the question of how success would be measured. The research objectives for the first two categories above can be decided at a national level (for example, through a nationally consulted and agreed upon research road map to address issues of environmental consequence or to overcome hurdles to maintain market access for primary produce from a particular sector), and a review can reasonably determine progress towards them.

Since 2006, our view in regard to economic development has shifted to some extent. We accept that for supplier-driven industries (essentially those based on New Zealand-grown biological materials) it is possible to reach an agreed national plan for economic development, although we are concerned that companies that compete in the marketplace do not co-operate on product development-related research. Hence there is a risk that stable funding would end up addressing second tier rather than the most pressing economic development issues because the companies would not bring areas in which they foresaw economic advantage to the industry-wide discussions.

However, for market-driven export industries there is no industry structure, and it is hard to define what the most valuable research actually is. One can envisage that stable funding might be used to develop technology platforms from which a variety of commercial products can be developed, but how does one determine whether the right platform has been developed?

We are of the view that the right measurement of research quality for market-driven economic development is the suitability of the research to be picked up and applied by the private sector. The ultimate success measure is its fitness for purpose in terms of allowing a New Zealand-based company to develop and take a saleable product to international markets. This cannot be determined by a technical review of the research programme.

Further, the sorts of companies that engage in market-driven economic development do not co-operate as industries. They will have key partner companies offering complementary services, but they are highly focused companies, with eyes on the market. Their success often relies on their strong focus on R&D linked to market opportunities.

For research intended to support and develop these types of companies, in our view it is almost impossible to measure success other than through two proxies:

- private sector co-investment, and

- personnel transfer to the private sector

We understand the system is still not intended to apply to research conducted by general academic staff in universities, and support this.

Our overriding concern with the discussion document is that the methodology for determining more stable funding does not recognise the different success measures for different types of research.

In broad terms, we do not see a problem for environmental research, economic security research, or supplier-driven economic development research to operate within the proposed framework. “Step 1 – is there a strategy?” can reasonably be answered for our major primary produce industries, and the environmental problems that research is intended to overcome can be agreed. Similarly, “Step 2 - does the strategy warrant a platform?” is also a reasonable question to ask. We would expect that these screens will ensure that only really worthwhile research comes through.

One residual concern is to ensure that there is not what can be loosely called “entrenchment”. For example, a well-performing programme may be continued, but slowly lose priority from a national viewpoint compared to others. Will this be detected and funding stopped? Stopping stably-funded projects may prove to be the hardest thing to do.

Steps 3, 4 and 5 are much more operational and we have not commented on them.

In terms of research for market-driven economic development, we consider that the proposed criteria in Steps 1 and 2 are inappropriate. The criterion in Step 1 surely has to be “is the programme attracting and likely to attract increasing co-investment from private sector partners?” As written at present, a strategy is required to meet the first criterion on page 12. If there is a sector plan it is probably from Government officials or from observers of the sector rather than those holding capital investments in the sector, and in our view such plans are not particularly valid. Market-led economic development would almost certainly fail to meet the criteria on page 12, and so they need revision along the lines we suggest.

If a market-driven economic development opportunity does in fact pass Stage 1, then we also question the criteria in Step 2. They assume a high level of organisation which is not particularly likely to be in place for rapidly changing market-driven economic development. The important questions are whether the co-investment and personnel transfer is of sufficient scale to warrant a platform with long-term funding, and whether the complementary strengths of different research providers have been brought together to maximise the private sector co-investment.

We also seriously question why New Economy Research Funding (NERF) is being considered in this way. NERF is aimed at the relatively unstructured sunrise industries, and again the questions and criteria in Steps 1 and 2 seem quite inappropriate. In our view it would be better to exclude NERF, and to shift promising projects from NERF to Research for Industry as they attract significant co-investment.

Application of the proposed methodology will end up with more favoured treatment for the biological supplier-driven industries, and less favoured treatment for market-driven physical technologies. This will only worsen an already existing problem. Market-driven physical technologies in the NERF space cannot possibly meet the criterion at the second stage.

We are left with the unfortunate conclusion that the proposed system will inadvertently favour the biological sector and act against badly needed research stability in physical

technologies. This is because of the fundamentally different supplier- and market-driven approaches.

We strongly recommend that the criteria be widened to allow research for market-led economic development to be fairly considered against research for the supplier-driven industries. This will mean accepting criteria that focused on capturing private sector commitment to take the research to market, rather than what technical work is carried out.

CONCLUSION

In conclusion we have some concerns regarding the proposed criteria, which we consider may not sufficiently accommodate market-driven economic development research. Our overriding concern is that the proposed methodology for determining more stable funding does not recognise the different success measures for different types of research.

We also question whether it is appropriate that the New Economy Research Fund (NERF) is evaluated in this way.

**A More Stable Funding Environment
- Sector engagement paper
Submission to MoRST**

13 February 2006

Background to IPENZ

The Institution of Professional Engineers New Zealand (IPENZ) is a membership-based organisation representing nearly 10,000 professional engineers of all disciplines. IPENZ Members work in a wide range of sectors including consultancy, construction, industry, utilities, local and central government. IPENZ is non-aligned and seeks to contribute to the community in matters of national interest giving a learned view on important issues, independent of any commercial interest.

IPENZ has previously published public policy papers related to the issues raised here, namely *“Growing Smarty”* and *“Prosperity through Productivity”*. These discussion documents analysed the measures necessary to return New Zealand to the top half of the OECD, including restructuring the education and research sectors. The conclusions reached in those papers, which were extensively peer-reviewed amongst our membership, form the basis of the response presented here.

Overview

Whilst we support the intent of establishing a more stable funding environment, we are concerned that the proposed actions are not appropriate and may actually be detrimental. The main points we make are:

1. The primary cause of instability is a poorly constructed market place without clear market signals;
2. The system is too concerned with process and not achievement of desired end points. Key performance indicators must be based on ends;
3. Technical review can assist in some circumstances but would be detrimental in others;
4. The governance difference between Crown research institutes and Universities offers the greatest opportunity – differentiated performance measures are needed.

1. Need to take different actions in distinct quadrants of activity

The goal of making our research system to better meet national needs is commendable and cannot be argued with. We submit that there are four distinct areas (quadrants) in which correct policy actions differ substantially:

- University, economic goal (UEC)
- CRI and RA, economic goal (CEC)
- University, environmental goal (UEV)
- CRI and RA, environmental goal (CEV)

Some of the mechanisms proposed in the sector engagement paper would have some beneficial effects in some of these quadrants, but in other quadrants the same measure would be inappropriate.

The paper as presented takes insufficient cognisance of the key differences between Universities and CRIs, and the different needs for managing programmes to achieve economic and environmental research goals.

Our concerns are immediately highlighted by the diagram on the first page. Emphasis on “science quality and track record” are inappropriate to the economic goal, but have some validity for the environmental goal, they are more relevant to Universities, and less relevant to CRIs and RAs. The “proven areas with long-term potential or sector need” is appropriate to the environmental goal in CRIs but not the economic goal in either type of establishment. The concept that the long term economic “interests” of a sector may not correspond to their present needs or their present opportunity horizon is not sufficiently considered. The role of the research provider to provide long-term vision to an end-user community is vitally important – the research provider needs to recognise this as part of their role and be rewarded for it.

2. Too great consideration of process improvements leads to drift away from desired outcomes

The research system (which is much greater than science and therefore MoRST should not continue to perpetuate that misleading shorthand), is only a means to an end and not an end in itself. Since the major reform of the early 1990s Government has been trying to address process issues in the means (the research system). In our view, its efforts focussing on the means are limiting meaningful headway to achieving the end, envisaged as an economy in which intellectual capital has grown so substantially that our labour productivity has returned to first world standards.

In our view, the research system as a whole continues to drift the wrong way, becoming increasingly disconnected from industry. As we have predicted, the way that the PBRF has impacted (and will continue to impact) is driving the focus of University-based researchers away from industry and technology transfer. Recent refinements to the rules of the Fund will barely change this. As a result science, technology and engineering education will become more academic, so graduates will progressively be seen as less suitable by industry. There are wider consequences which we outline below.

3. Need to recognise and use variable governance structures

Provided the proposals in the paper were properly applied to the right context, some would have a positive effect, but if applied in the wrong quadrant a negative impact could result. For example, the technical review process is unlikely to identify projects with the best long-term economic outcomes.

Now that CRIs have to compete in the same pool as Universities, they are exhibiting all the characteristics of student-less Universities (and New Zealand does not need a research University as the CRIs are evolving to that already). This is a waste of their different governance structure. It is no surprise that IRL is in trouble – it took over the old technology transfer units of DSIR like AIDD and SIDD and had to wipe these out as they could not be funded in a competitive environment, but then has too little other capability left to be stable.

In short, the system is still headed away from achieving the desired end economic results because all the forces that impact on the individual researcher are acting to widen the gap between the private sector and the staff in publicly-owned institutions.

4. Instability results when chief executives cannot manage and markets do not operate

The stated driver for the paper we are asked to comment on is to increase stability in the research-providing organisations and take down transaction cost which can only be applauded. What is completely lacking in the paper is any suggestion of how it will better deliver the “ends” more effectively. In general well-constructed and fair markets with clear rules that are applied consistently are the most proven method of improving delivery of service providers. Poorly structured markets where the criteria are not clear, and the rules applied inconsistently perform badly by creating uncertainty. The contestable (market) processes of the FRST have historically been criticised for lack of clarity of their market signals, i.e. the results are not predictable. Lack of clear market signals in contestable funds is probably the greatest cause of instability.

Alternatively, it could be argued that the primary reason for instability is that the funding system 1990-2005 has not allowed Chief Executives of research providers to manage – decisions that ideally would be made by the Chief Executive have been taken centrally and imposed on the Chief Executive, and this is the fundamental problem. Your paper suggests that the funding system is being asked to take on too much of the role of employers to nurture and build new employees. For example, it tries to take on the role of employers to nurture and build new employees (called new entrants in your paper).

We accept that there are core capability issues, but question why the research provider sector thinks that the markets do not deliver best solutions and seeks protectionism rather than more sophisticated and clear signalling to the players in the market. If we are short of particular skills in an area of engineering a commercial organisation will pay the price needed to import them – for example, we had no capability when we did “Think Big” in the 1980s. We paid a fair international market price and introduced the skills. Our Universities teach across a broad range of disciplines and maintain skills accordingly. Given New Zealand’s open immigration policy why do we have to “store” surplus and unwanted capacity elsewhere – we can pay the price internationally when we need it. With clear market signals, and without external interference, chief executives have no trouble in achieving stability for their workforce in otherwise turbulent sectors. The case for usurping market forces in research labour markets has never been adequately made.

5. Collaboration has low correlation with achievement of ends

The level of collaboration should not be used as a criterion for evaluating research. There is a view in the research community that collaboration is “good” and competition “bad”, yet in the commercial space the reverse is known to be true. In fact, collaboration

across a sector is investigated by the Commerce Commission as undesirable, monopolistic behaviour. In a market environment organisations with complementary strengths will work together if there are benefits – collaboration that justifies the considerable costs. Other sectors work perfectly well with no collaboration at all. Regardless of collaboration or not, the market eliminates weak performers. Collaboration should therefore not be prescribed as a success factor, but allowed to happen - or not - as is appropriate to the situation.

6. Measurement of research quality is process- and not end-driven

The paper also makes a tacit assumption that research quality can be judged by peers. This is a very restrictive and process-oriented viewpoint. Peer review tends to be heavily weighed towards the quality of the research process. The view of other researchers about the usefulness of an outcome may be at complete variance with the view of potential end-users. Outside the University sector, our public-funded research is intended to be spent purposefully to achieve national goals. High quality research is that which achieves the endpoint, even if does not have process elegance. Thus, in the context of the CEV and CEC quadrants, quality must be measured at endpoint, and for the economic goal endpoint measurement is how the private sector perceives the value of the output.

7. KPIs of success for CRIs and universities

As we have stated on many occasions in designing a research provision system one needs to start at the endpoint and work back to how to get it. From an economic viewpoint the end point requires a technically literate workforce in the private sector, many of whom are R&D workers and senior managers and providers of private capital prepared to invest their funds in innovation. In the environmental area it requires clarity of the issues we wish addressed as a nation, and an effective system for delivery the research needed to achieve these goals.

The system can then be designed to achieve these endpoints. As a nation we appear to have decided through introduction of programmes such as the PBRF, CoREs and the way Marsden is going that the Universities are places where research excellence is measured largely by peer review. The PBRF KPIs of co-funding and postgraduate completions attract much less funding than peer review of research quality.

Some hard decisions need to be made about the purpose and role of CRIs. This must be made different to the purpose and role of a University (which they have evolved to mirror by the way they are funded), otherwise we should close the CRIs.

CRIs should exist and be measured differently to universities. Their most appropriate measures of research are fitness for purpose (in both economic and environmental goals), co-investment and building private sector capability.

8. An alternative research system design

We strongly recommend consideration of a different research system design based on the following:

5. The environmental money is split into a long-term contracted part and a projects part.
6. Only organisations with CRI-like governance (CRIs, RAs, perhaps some University-based dedicated research centres) can compete by tender for long-term funds in the long-term contracted part. These long-term projects are subject to technical review and occasional re-tendering.
7. The funds in the environmental projects part are open for bids from all providers
8. The social (health) part could be treated similarly to environmental with some project funding and some long-term programmes with technical review.
9. Investment in databases etc is either by periodic tender, or by a grant determined by applying a “reasonable cost” model.
10. The economic goal money is split into several parts:
 - a bulk-funded part to CRI-like organisations allocated according to performance in personnel transfer and industry co-funding
 - a project-based part for new ideas (the NERF space). There might be technical reviews to decide on extension of the more promising of such projects rather than rebidding
 - a project part (Technology NZ) which only organisations not getting the bulk-fund grants can access with industry partners
11. The knowledge goal part (Marsden) is kept as project funding – in the extreme it might be closed off to become University only.
12. If necessary (and it should not be) a base grant to CRIs (we would suggest that this be there initially but phased out as the KPIs for the bulk grant are refined and tuned). If needed it might be based on a very high level KPI like the volume of peer-reviewed publication

Note that this makes the system for CRIs rather akin to the PBRF – in the PBRF the funding is determined by co-funding, post-graduate completions (people transfer) and the sum of the institutional quality scores. The latter is more sophisticated than a simple publication count, but as the core funding for CRIs from the publication volume would be a small proportion of total funding more expensive measurement cannot be justified.

If, as in the tertiary sector, each CRI has a charter/profile which defines its area of activity then the system can be bounded to ensure that CRIs maintain a distinct character.

Responses to your specific questions

If we then turn to building a stable funding environment, there are clearly four major quadrants in which different approaches are needed to ensure that chief executives can manage stable businesses whilst ensuring that the end goals are achieved:

- University, economic goal (UEC)
- CRI and RA, economic goal (CEC)
- University, environmental goal (UEV)
- CRI and RA, environmental goal (CEV)

We will address the questions in your paper in relation to these four quadrants.

1. Other mechanisms

As previously pointed out, the other mechanism is bulk funding against KPIs such as personnel transfer and industry co-funding (curiously both are measured in the PBRF and a grant determined from it, but not in the CRIs where it would be much more effective).

2. Technical review – the right questions.

The concept of technical review makes excellent sense in the CEV quadrant but not in the other three. In fact, it would be a particularly unsuitable in the UEC space which needs no such measure at all and in the CEC space where bulk funding against KPIs is much more suitable. It might be applied in the UEV space for a particular research centre.

3. Description of technical review

In the CEV space the criteria needs to be cut down – the sole item being measured is progress towards an outcome that is a national environmental goal; the remainder of the material is superfluous. Tests should be conducted against process to the end, outcome sought, or with process proxies, but not a combination. It is also important not to confuse the environmental measurement with economic indicators such as co-funding.

4. Who leads technical review

There needs to be a predominance of people who can look at the extent of advancement towards achieving the “end”. A smaller proportion of those whose expertise is in process excellence would be appropriate.

5. Technical Review – helping form collaboration

As previously demonstrated, collaboration is an inappropriate criterion for technical review. The salient issue for collaboration is that of how successful bidders for long-term projects are selected. If the process was by tender, in a market world after tenders are in, the purchaser negotiates part-delivery from more than one tenderer if there appears to be benefits. There are no apparent reasons why the research provision market should be different.

6. Technical review – what programmes

Only programmes that address our national environmental research plan. Otherwise their effectiveness cannot be judged.

7. Technical review – unintended consequences

Unintended consequences would only arise if used in the wrong place – we have discussed this matter above.

8. Technical review – coping with disinvestment

This problem would not occur if the chief executive had sufficient flexibility to run their organisation in a business-like manner. For example, in the engineering sector when a contract is transferred from provider A to B, A makes staff redundant and the best of them are immediately re-employed by B. This is a sound market process that ensures professionals work in their particular area of expertise rather than for particular employers. There are no reasons why this process would not work in the research sector.

9. Technical review – end user engagement

In the CEV space end user engagement is required to determine the outcome sought from the research programme. End users can also do part of the measurement of the progress.

In the CEC space end user engagement is directly measured through co-investment and private sector employment of research workers so no direct involvement is needed.

These sorts of mechanism are not appropriate to the UEV and UEC space.

10. Backbone science

As previously indicated, backbone items might be tendered every few years or a cost model developed and applied. As stated above, if the tender moves from A to B there would be healthy market-led actions that ensure continuity.

11. What organisations

Only those with CRI-like governance, purposes and roles as outlined above.

12. Transition

This should be designed by first deciding what the system should look like in the future, and then determining the transition process that will lead to that outcome. This will probably result in gradual change. A useful approach may be that undertaken by the PBRF when the full new measurement system was applied to only 10 per cent of the money in the first round.

13. Risks, Threats etc.

We consider the greatest risks to be:

- Confining improvements to those that can be implemented under the existing framework rather than developing a more appropriate structure
- Concentrating discussions on process issues than focusing on achieving the end outcomes
- Continuing to usurp the role of chief executives of provider organisations and consequently moving away from a more appropriate market based model.