Submission to Parliament of Australia House of Representative Standing Committee on Science and Innovation

Inquiry into pathways to technological innovation

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Scope

This submission addresses several of the references for your Inquiry:

- Pathways to commercialisation
- Skills and business knowledge
- Factors determining success
- Strategies in other countries that may be of instruction to Australia.

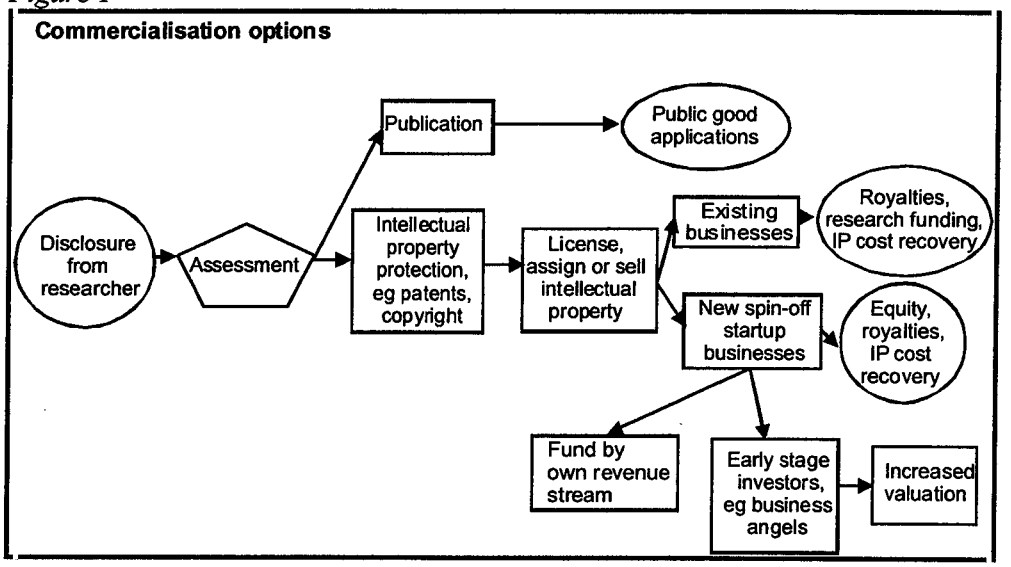
The focus to our submission will be the exploitation of new knowledge and technologies generated by universities and other public research providers. However it also has relevance for the exploitation of new technologies and products developed by private sector organisations.

Pathways to commercialisation

Innovation is about the exploitation of new knowledge to create wealth; it is not just about something new. The process of commercialisation of new knowledge or new technologies leading to technological innovation can be illustrated as a decision tree (Figure 1) with three key decision points:

- *disclosure* that is the identification of a potential commercial opportunity,
- *assessment* of that opportunity to decide whether the intellectual property involved is worth protecting by whatever means (copyright, user licences, patents, plant breeders' rights etc.),
- *licensing*: the decision whether to licence for a royalty stream or through a strategic alliance with an existing company or whether to spin off a new venture.

Figure 1



In the USA in FY 2000, 92 per cent of new technology licences from universities were with existing companies. This parallels the high proportion of gross R&D investment (GERD) that comes from business, 72 per cent in the USA. In Australia this percentage has been 43 to 45 per cent in recent years. This correlates to a low level of technology absorptive capacity. In Australia (as in the UK) there is a much stronger case to foster the generation of viable new spin-off ventures. The literature (Degroof and Roberts, 2003) shows the importance of high levels of selectivity, planning and access to resources before the new venture is let loose by the research provider parent. These factors will be discussed in more detail under the reference *Factors determining success.*

Licensing to existing companies can generate positive cash flow through a royalty stream quite quickly, but the evidence in the overseas literature and from a survey of spin-offs from Cooperative Research Centres in Australia (CRCA, 2002) has shown that there is the potential to generate much larger cash amounts from the ultimate sale of equity in a spin-off while still having perhaps a smaller royalty stream.

The European experience shows what can be achieved. A medium sized regional Dutch university, the University of Twente at Enschede, documented in 1999 the generation—with varying degrees of university and government and European Union support—of a large number of start-ups and spin-offs, producing significant new employment:

> TOP – PROGRAM *[of the Dutch Institute for Knowledge Intensive Entrepreneurship, NIKOS]*
>
> The University of Twente wants to be surrounded by as many companies as possible, which are active on her fields of knowledge. One of the ways to reach that goal is to stimulate people via TOP to set up their own companies.
>
> In total, 437 companies have sprung from the UT, 219 of which have been under the TOP scheme. Of the total number of companies, 68% are still in business. The survival rate for TOP companies is 75%, and for non-TOP companies this is 61%.
>
> An extrapolation of the study data shows that 297 companies offer employment opportunities to 3,134 people. The TOP companies expect to have quadrupled in size three years from now. The remaining UT spin-off companies forecast 20% growth in personnel over the same period. The average founder/employee ratio is 1:5.3 (van der Meer and van Tilburg, 1999).

Similar outcomes have been documented in earlier studies at Chalmers University in Sweden and elsewhere in the European Union ((McQueen and Wallmark, 1984; Wallmark and Torkel, 1997; Edinburgh Research and Innovation, 2003; van der Meer and van Tilburg, 1999; van der Sijde et al., 2002; OECD, 1996).

Australian outcomes

While the exit strategy for most spin-offs in Australia will be a trade sale rather than a stock market initial public offering (IPO), the technology and product development and where relevant the initial manufacturing stage will be retained in Australia and the proceeds of the trade sale will help to finance ongoing research and commercialisation activities by the parent research provider.

CSIRO appears to have particular problems in generating unleashed spin-off ventures. A Chief of Division gets immediate recognition against his external earnings budget for royalties from IP licences to existing companies, while there is usually a long wait before the proceeds from a sale of the equity in a spin-off are received. There is evidence of a reluctance to let a spin-off go and run itself as a commercial entity. A high proportion of the spin-offs claimed by CSIRO are the offspring of CRCs in which CSIRO is involved.

Recommendations:

1. *Commercialisation policy settings should provide support with the emphasis on generating viable spin-off companies as the preferred commercialisation channel.*
2. *CSIRO practices in authorising and managing new spin-off ventures should be reviewed and the possibility of setting up a separate Trust with a commercial board to own the equity in and supervise the operations of CSIRO spin-off companies.*

Skills and business knowledge

The Committee may wish to support the initiative of the Australian Institute of Commercialisation in running *boot camps* for academic researchers to increase their ability to find commercial opportunities arising from their research. The literature however draws attention to the danger of turning good researchers into poor entrepreneurs. A recent consultancy for the Department of Education, Science and Training (Yencken and Ralston, 2005) has concluded that the most effective incentive to academic researchers to commercialise their research outcomes and to make available the required opportunity assessment, intellectual property assessment and deal making skills has been the deployment of the right type of business development people close by the researchers, that is in the faculties and research centres.

Factors determining success

A university's commercialisation performance can be measured using a small number of key performance indicators: number of disclosures, number of IP licences negotiated, number of spin-off companies or generated and commercialisation earnings (royalties, equity sales and possibly also research contracts) per million dollars of research expenditure by the university.

The literature and recent Australian research (Yencken, 2005) have shown the five most important factors in determining such success to be:

1. Commitment of the *university governing body* and senior management to research commercialisation giving proper recognition of individual researcher commercialisation performance (alongside teaching research and administration) in award and promotion systems and providing adequate resources to its technology transfer and commercialisation group, whether an internal office or an external company owned by the university.

2. Perceived fairness of arrangements for *sharing of commercialisation earnings* and trust that management will implement these transparently: The normal shares in Australia include a third to the inventor researcher(s), a third to faculty or research centre in recognition of the contributions and increased load on others than the inventors. The DEST consultancy mentioned earlier suggested that this sharing was a classical Hertzberg hygiene factor—it had to be available but increasing the inventor share was unlikely to increase his commercialisation commitment and might in fact lead to greater emphasis on licensing to existing companies for a quick royalty return rather than to generating a spin-off and having to wait for the proceeds of the sale of the equity, however much greater.
3. Availability of *business development support* close by from business development people deployed in a spoke mode into the faculties and schools: this requires people who are both respected by the academic researchers, usually because they have a doctorate or other research experience, and are competent and experienced in the commercial aspects of new technology exploitation—including technology assessment, IP protection, market and competitor analysis and deal making.
4. Access to *finance and other resources* for IP protection, technology development (including, proof of concept and working prototypes) —an investor will expect technology that works—and market opportunity assessment (market and competitor research, business plan development).
5. The level and quality of *selectivity* relating to opportunities identified, business *planning* and *resources* applied *before* the new venture is let go by its university parent.

These five factors are equally critical whether the commercialisation is through a licence to an existing company or involves a new spin-off venture.

In a recent set of case studies of university and other spin-offs, all the spin-offs generated by CRCs, now with commercial Boards, and CSIRO, but only one of the university derived spin-offs showed a level of selectivity, planning and resourcing comparable to descriptions in the literature of *corporate* spin-offs generated by large companies. The analysis showed that the ideal would be that all spin-offs received this level of planning and support *before incorporation* and being set free from their parent

The extent to which a given university can satisfactorily deliver commercialisation performance is strongly correlated with that university's research expenditure. This relationship is shown in Figures 2 and 3. The outlier is the University of Queensland which satisfies the initial four factors and in most cases the fifth. Monash University also follows a spoke model for the deployment of business development people. Case studies of these two universities are included in the DEST consultancy report (Yencken and Ralston, 2005).

Figure 2 Rate of commercial opportunity disclosures and research expenditure

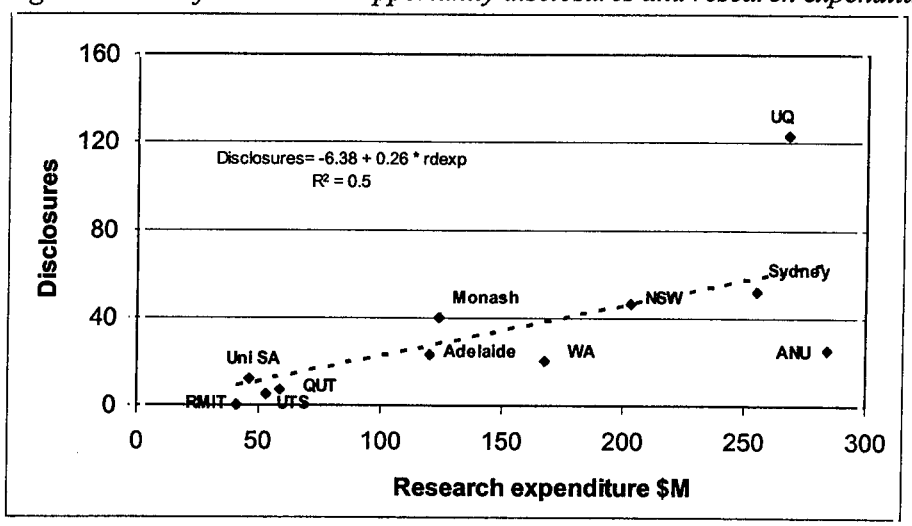
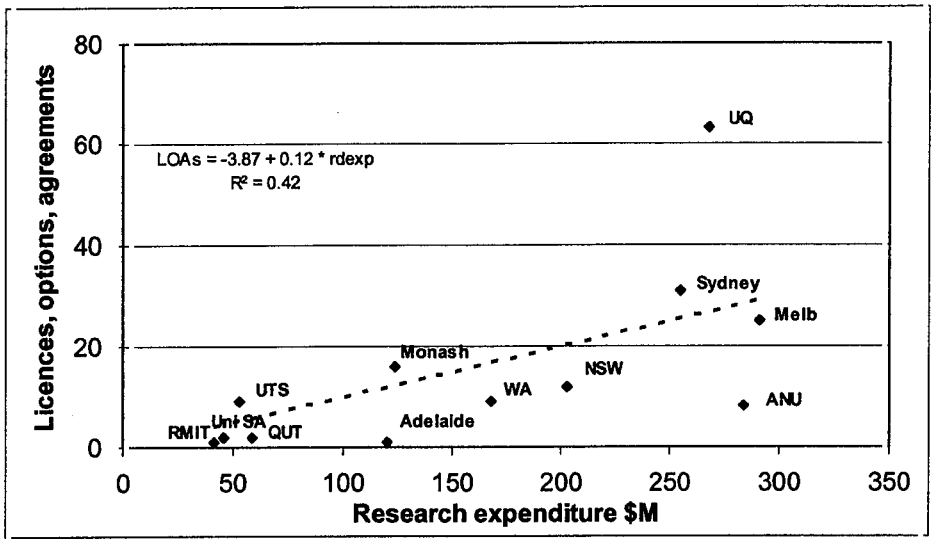


Figure 3 Licences, options and agreements negotiated and research expenditure



Source: Yencken and Ralston, 2005.

The comments earlier have related to the early establishment phase of a commercialisation event. The ongoing success or failure thereafter will relate first to people and management, second to the quality of the market opportunity and third to ease of access to initial business angel and later venture capital finance.

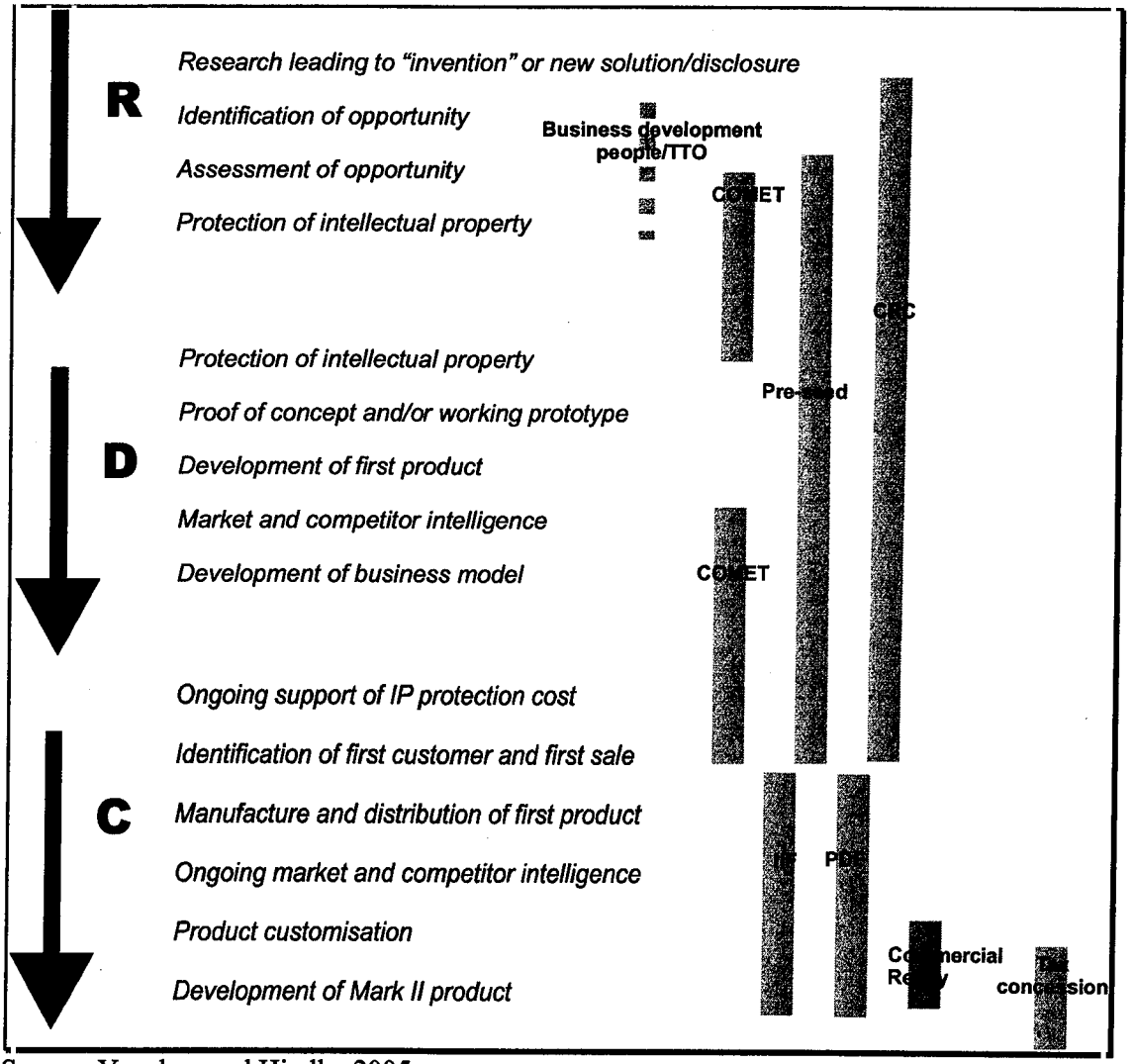
Strategies in other countries that may be of instruction to Australia.

Under this final reference, the available Commonwealth government initiatives and programs have been reviewed having regard to the commercialisation process involving entrepreneurship and new venture creation.

The diagram in Figure 4 below indicates where Commonwealth Government programs provide financial support for new ventures, such as spin-offs. The solid vertical bars show the coverage of the selected Commonwealth programs which can provide support to new ventures, but only once they have been incorporated. The broken vertical bar indicates where cover is provided by research provider business development people or other, mainly Australian Institute of Commercialisation or State government, programs. These are however primarily focused on training and consultancy type support and do not contribute to early stage finance needs. The findings of a recent Australian Institute of Commercialisation survey for DITR are relevant here (AIC, 2004).

> From the results of this survey the existence of a gap in funding at the very early stage is verified by 87% of investors and 88% of clients. Respondents believe there is a demand for finance below $2.0M that is unmet by the current financial market. From comments provided by respondents, this is not necessarily only the result of a lack of available funding being available for specific equity investment, but also comprise a combination of several other issues.

Figure 4 The innovation framework.



Source: Yencken and Hindle, 2005.

The question of assessing and who assumes the risk related to commercialisation activities is important. The entrepreneur traditionally risks his own money and that of his partners. Business development people in universities assume risk at the early stage of a commercialisation event that will be carried by the university or other parent organisation—not by themselves. Except for CRCs, the programs selected show a big gap in government program financial support for the initial high risk phases of opportunity identification and assessment and for initial IP protection—essentially the entrepreneurship or act of new entry phase. Universities particularly have difficulty in financing the early commercialisation stages. Finance is required both before and after incorporation of spin-off ventures for technology development leading to proof of concept, working prototypes and generally 'technology that works', IP protection, market and the preliminary business planning to determine whether the new venture might be viable and justify the creation of a new incorporated entity. The high cost of initial IP protection can be a heavy burden on universities and a deterrent to commercialisation of research outcomes (Larkins, 2002). For universities and other public research agencies, support in this entrepreneurial phase is usually provided by business development staff in technology transfer offices or deployed close to groups of researchers, usually funded out of other research provider funds. In some States there have been a few instances of such business development people being funded by State governments for limited periods—for example, in Victoria at RMIT and Deakin Universities.

For new ventures which have been started by individual entrepreneur(s) or spin-offs by staff or students with no parent research provider IP or equity, the available sources of financial support for their early stage development (particularly if not yet incorporated) again lie outside the ambit of the DITR programs considered in this paper. Some of them have access to incubator programs such as the Commonwealth Government *Building on IT strengths* (BITS) Incubator Centres program. They also have access to State government initiatives such as the Victorian Government Technology Commercialisation Program (TCP)—now succeeded by the *Building Innovative Businesses Program*—under which selected consultants were subsidised as TCP Partners to provide intensive management assistance, internationally focused market support and access to private sector equity".

From the analysis it is clear that AusIndustry's programs *seem* to be working well and meeting genuinely entrepreneurial objectives *if they are considered solely within the context of the financial and innovation framework* for incorporated entities. However the program suite can be seen to be working poorly from the perspective of the management/start-up and entrepreneurial frameworks. A copy of the full paper (Yencken and Hindle, 2005) has been included.

Overseas initiatives

There have been a number of important initiatives in the UK and Continental Europe closely focussed on early stage support for new ventures and their research provider parents both before and after incorporation. Almost all Australian financial support programs for new ventures require the venture to be incorporated and the Pre Seed fund requires equity to be given away before a reasonable valuation can be obtained.

The overseas initiatives most closely related to the early stage development needs of new technology-based ventures include:

1. a first year in an incubator as an unincorporated new venture—in Sweden called the Start House—to allow time to decide whether or not the venture should be incorporated
2. dedicated access for entrepreneurs to laboratory space and expensive facilities such as biohazard areas and clean rooms (The TOP programme in the Netherlands of the Dutch Institute for Knowledge Intensive Entrepreneurship, NIKOS (<http://www.utwente.nl/top/>) ; the University of Edinburgh)
3. pre-seed finance funding directly to universities under competitive bidding with stringent commercial management requirements to provide early stage support for spin-off ventures (the UK Challenge Funds (http://www.ost.gov.uk/enterprise/knowledge/unichal.htm) and the Scottish Proof of Concept initiative)
4. The UK initiative to provide a third vote (in addition to teaching and research) to finance support for business and the community, Higher Education Reach Out to Business and the Community (HEROBC) (<http://www.hefce.ac.uk/reachout/herocbc.htm>).

Recommendation:

The Committee should explore the desirability and feasibility in Australia of a third block vote alongside teaching and research votes to support commercialisation and technology transfer in universities along the lines of the UK HEROBC initiative.

Attachment

AUTHOR BIOs

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John Yencken originally worked as an industrial research chemist. He has worked as a management consultant since 1966, currently as Principal of Karingal Consultants. Previously he was with PE Consulting Group, WD Scott and Coopers & Lybrand Consultants in Australia.

John was a government appointed member of the Council of the Australian National University from 1966 to 1983. He was Foundation Chair of Anutech Pty Ltd., a University owned company managing technology marketing, patents and consulting services. In 1995 he was invited by the Australian Commonwealth Chief Scientist to chair Third Year Stage Two Review Panels for Cooperative Research Centres. In 1996, 1998 and 2000, John was Co-chair of the Engineering and Physical Sciences Expert Panel in the CRC Program.

John Yencken has completed a PhD candidate at the Australian Graduate School of Entrepreneurship at Swinburne University of Technology, Melbourne, Australia. His research topic was "*The role of spin-off companies in the commercialisation of university and other public sector research outcomes in Australia*".

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Murray is the founder of the Master of Entrepreneurship & Innovation degree at the Australian Graduate School of Entrepreneurship in Swinburne University of Technology, Australia. He is an Emeritus Professor in AGSE since 1998 and currently supervises eight PhD candidates in entrepreneurship & innovation.

In 2000 he was an Appel Award recipient at Price-Babson. In 2001 he received the inaugural Best Entrepreneur Educator award from the Business and Higher Education Round Table in Australia.

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AGSE Entrepreneurship Research Exchange 2005

Title:

Finding and filling the gaps in the Australian governments' innovation and entrepreneurship support spectra.

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Finding and filling the gaps in Australian governments' innovation and entrepreneurship support spectra.

ABSTRACT

A national innovation system is concerned with the full process of converting new knowledge into commercially viable results. Governments are policy-active in trying to create productive national innovation systems. This paper reviews ways of thinking about entrepreneurship as the commercialisation component of Australia's innovation system. The paper explores the impact and relevance of selected existing Australian Commonwealth, and to a lesser extent State government, programs for the commercialisation channels so identified, using four frameworks for the analysis: financial, management/start-up, innovation and entrepreneurial. The analysis indicates program initiatives covering the later development and commercialization phases, but serious gaps in the support available for the entrepreneurship phase involving the act of new entry. This gap is covered by research provider business development people and to a limited extent by incubator and State government initiatives. A critical issue has been and is access to smaller amounts of seed finance. The critical human component is the education of public servants and politicians about the nature and operation of entrepreneurship.

Key words: Entrepreneurship, commercialisation, innovation.

INTRODUCTION

The need for Australia, collectively, to develop a much more entrepreneurial and innovative culture and for government to take an important role in developing the relevant policies and programs, is an 'urgent' idea that literally creaks with age. It has been agreed to in principle by public and private sector leaders and influential opinion shapers for at least 40 years. Two examples will suffice to illustrate the point.

This paper limits its retrospectivity to 1991. In that year a major report, commissioned by government, achieved national prominence in the media, the universities, corporate boardrooms and the corridors of power. The report on Innovation in Australia (Pappas *et al.,* 1991: 1) demonstrated that, in the early 1990's, Australia was the only industrialised country that had not increased its proportion of merchandise exports to GDP in the previous 30 years. Further, this report noted that research and development (R&D) was a significant influence on business performance in generating potential exportable merchandise. However, although business and the Government at the time realised that innovation was more than just R&D, Australia still committed in 1988 some $2.8 billion purely to R&D. At this time, there was an extensive network of business, Government and educational sectors providing resources to this R&D focus.

The consequence of these initiatives, networks and R&D focus at the time of the report had yet to bear tangible fruit to Australia's export market or Australia's national wealth. Pappas and colleagues in their report highlighted many issues. The following were seen as urgent for Australia to increase its innovative strength, global competitiveness and national wealth.

- Australia's private sector expenditure on R&D was low relative to the rest of the world.
- Government funding concentrated away from the critical 'end game' of the innovation process, i.e. commercialisation.
- Government's interpretation of the innovation process was characterised by large 'R', small 'D' and almost negligible 'C' (where 'C' meant 'commercialisation').
- Australian innovation was still biased towards technology 'push' rather than market 'pull'.

While *research, development, commercialisation* and *innovation* received definitional attention, *entrepreneurship* did not.

Given that the Pappas et al. paper indicates that we have known what might be called 'the national entrepreneurial problem' for over a decade, the question to be addressed in this paper is simple:

- Has any progress been made?

In a government context this translates more specifically into the question:

- 'Do Commonwealth government policies and programs do a good job in fostering entrepreneurship and innovation through the creation of New Technology-based Small Firms (NTSF)?'

Objectives

Our principal objectives in a short paper have been to assess and comment on initiatives and programmes in relation to:

1. creation of ventures both from the exploitation of university and other public agency research expenditure and from individual's initiatives
2. economic contribution through local and export wealth creation from technological innovation, whether through new ventures or existing companies,

and

3. to explore how well selected existing government programs fit with the longitudinal development from new knowledge and new opportunity creation to wealth and other community benefit generation and where there may be gaps or imbalances in relation to priorities identified earlier.

The definitional domain

This paper starts with the proposition that there is only a partial overlap between effective technological innovation and entrepreneurship. Entrepreneurship essentially is about the creation of new enterprises, whether or not they are newly incorporated (Lumpkin and Dess, 1996). Technological innovation—Hindle's BIG-I innovation (Hindle, 2002)—is about the creation and exploitation of new knowledge and new technology that hopefully results in wealth creation. Drucker has described entrepreneurship as "the engine of innovation" (Drucker, 2000). However innovation can create wealth without involving the creation of a new venture, that is without entrepreneurship. Equally, entrepreneurship, involving the creation of a new venture, may happen due to entrepreneurial cognition, such as seeing the potential of a new business model that does not derive from technological innovation.

Against this background, governments all over the world—but, as particularly well documented, in OECD countries—have established interventions and provided very significant taxation funded resources both for the generation of new knowledge by research and development and to support its exploitation through technological innovation, whether by existing or newly formed incorporated ventures. At the same time there has long been recognition in the EU that new knowledge based companies can be a key driver of regional economic development. This paper has sought to review the effectiveness and efficiency of Australian Commonwealth and State government programs and interventions in this domain. It starts with a summary of Australia's R&D performance which of course underlies technology development and technological innovation performance.

Australia's innovation performace

Recent research by Gans and Stern (2003) has used the number of patents filed in the USA that originated in Australia as a measure of innovation performance. Using this measure they reported some progress and concluded that:

> Over the past quarter century, both public policy and private sector initiatives from **a classical imitator** to a **second-tier innovator economy**...Australia has **enhanced its commitments** to innovation policy in recent times. So far these investments **have not yet paid** off in terms of establishing Australia as a first-tier innovator nation (p.1).

At the same time, in the area of business expenditure on R&D (BERD), recent European econometric analyses have shown a close relationship between the proportion of BERD to Gross Expenditure on R&D (GERD) and technology absorptive capacity, discussed in a recent paper involving one of the present authors: (Yencken and Gillin, 200). The BERD to GERD ratio has been low by comparison with other OECD countries , but BERD had improved from A$10,417.1 million in 2000-01 to $12, 249.9 million in 2002-03 (Jones, 2004), a real increase of 11 per cent after allowing for inflation (ABS Cat. No.6401.0 Consumer Price Index, Australia). This has however resulted in some small improvement of the BERD/GERD ratio of 0.48. By comparison in FY 2000, the similar ratio for the USA was 0.76 and for the UK 0.66.

Innovation outcomes

The literature identifies two main types of business and wealth creation outcomes from technological innovation:

1. a saleable product, process or service, as defined by the Oslo Manual as the basis for national innovation surveys (OECD, 1997; Haukness, 1999)

This new product or service may come from a new venture established for this end, but it may also come from an existing company that has generated the new technology by its own R&D investment or has licensed the new technology from a university, public research agency or other company that originally created the new knowledge, technology and intellectual property involved. In both types of situations, technology absorptive capacity is involved. The literature has shown this to be closely related to a firm's level of investment in R&D (Yencken, and Gillin, 2003).

2. a technology asset

> Technology asset oriented mode (TA), concerned with the development of technologies which are subsequently commercialised through spinning-out new firms, licensing, joint ventures or other types of alliance... (Stankiewicz, 1994).

This second group of new ventures has been particularly important in Australia. Almost all the pharmacology and biotechnology based ventures fall into this category. Typically their drug related technology will be licensed to a major pharmaceutical company after successful Phase 1 and sometimes Phase 2 clinical trials. They will make money out of the licence earnings but they may never market a product or service in terms of the Oslo Manual definitions.

The underlying models or frameworks appropriate for the exploration of the coverage and effectiveness of government programs and interventions will be quite different.

The Australian entrepreneurship and innovation policy context

Historical perspective

The last 30 years has seen an extraordinary explosion in the level of entrepreneurial venturing, with the United States leading the field and more recently closely followed by the United Kingdom and somewhat differently in continental Europe. Most OECD countries support NTSF generation as a key driver of regional economic development. There is also evidence (Yencken, Cole and Gillin, 2002) that NTSFS almost always have high levels of R&D investment, an important contribution to national technology absorptive capacity.

Where should entrepreneurship policy be put?
Entrepreneurship policy should fall within the context of industry policy. The Industry Commission has identified the following five types of industry policy: tailor-made protection, special industry plans, investment attraction, matching other countries and concentration on fundamentals. (Bill Scales, 'Get the fundamentals right', seminar on Industry Policy reported in CEDA Bulletin, October 1997, p. 1619.) quoted in Emmery (1999).

> For much of the twentieth century industry policy in Australia and the world at large focussed upon the erection of trade barriers. They were seen to have a role in "generating growth, employment, infant industries, foreign exchange earnings and defence industry capability. Trade barriers over time made it easier for Australian companies to survive without innovating, and prevented business and consumers from shifting resources into areas of higher productivity and yield. In essence ongoing trade barriers were not just anti-competitive they were anti-entrepreneurial.

As economies progressed throughout the twentieth century, primary and secondary industries have lost their domination in both economic importance and political influence, particularly in the past thirty years. The service, information and communication sectors have become increasingly important. The rise of the service, information and communication sectors has dramatically altered the course of industry policy. The demise of protection as an industry policy goal has led to a culture favourable to entrepreneurship. The focus has begun to move towards new industries with "*high growth in demand, rapid technological change, new markets, risk of obsolescence, and a strong trade orientation*" (Emmery, 1999). The locus of control for productivity growth and wealth creation internationally has shifted to entrepreneurship and innovation.

One of the features that is evident in a review of Australian government innovation programs is that they have tended to concentrate on Drucker's seventh source of innovation, knowledge based innovation.

> Knowledge-based innovation is the 'super-star' of entrepreneurship. It gets the publicity. It gets the money. It is what people normally mean when they talk of innovation. Of course not all knowledge-based innovations are important. Some are truly trivial...like most 'super-stars' knowledge-based innovation is temperamental, capricious, and hard to manage (Drucker, 1985: 35).

The Economist's 1999 Survey on Innovation in Industry (February 18, 1999) noted

> Governments still tend to view innovation as a pipeline. If public money is stuffed into basic research in universities and national laboratories at one end, they reckon, new technology and commercial applications should pop out of the other.

There have been a number of attempts by Australian Governments to foster R&D spending, though without notable attempts until recently to apply the discipline of entrepreneurial good practice to new technology-based small firm (NTSF) creation.

Where is Australia's entrepreneurship policy currently located?

The short answer should be: 'all over the place.' In the Australian policy literature, specific emphasis on entrepreneurship (in the sense of commercialising new knowledge through business creation or associated means) is both rare and fragmented.

In *Investing for Growth.* the Howard Government's Plan for Australian Industry" (DISR, 1997)), the Commonwealth recognised the key role played by the Department of Industry, Science and Resources (DISR).Now renamed and restructured as the Department of Industry,

Tourism and Resources (DITR), it has a broad portfolio of responsibilities with the following general aims of:

- improving national prosperity and wellbeing
- improving the competitiveness of Australian business
- foster excellence in Australian science, technology and sport
- maximise the national benefits of research and innovation
- increase productivity investment in Australia

These aims were intended to foster economic advantages that continue to strengthen Australia's international competitiveness. DISR was also aiming to strengthen Australia's national system of innovation, but the Science responsibility (including the CRC Program and CSIRO) has now moved to the Department of Education, Science and Training. This was followed in 2003 by the Australian Government's Innovation Report, *Backing Australia's Ability.*

The only references to entrepreneurship in this and other contemporary policy documents was in the National Innovation Awareness Strategy shown in the text box below with the emphasis on encouraging young entrepreneurs. There were no references to entrepreneurship in the DITR Corporate Plan and list of programs also shown in a text box below. There are frequent references to innovation, but the general tenor of the references suggests a meaning closer to invention than to BIG-I innovation wealth creation. The DITR research commercialisation programs have been similarly shown in a later text box.

The Department of Industry, Tourism and Resources

Corporate Plan

The Department has a key role in the formulation of innovation policy and in the delivery of initiatives announced in the statement, *Backing Australia's Ability,* by the Prime Minister.

The Government's industry policy focuses on innovation as one of the key drivers of economic growth. The Department assists industry to be more innovative through a range of programs such as tax incentives and concessions to assist existing and developing industries; it nurtures emerging knowledge based industries;

Support for industry research

As pointed out earlier by Gregory (1993) and later in the Boston Consulting Group (Pappas et al., 1991) study, Australia has a reasonable record in public funding of research and development but a very poor record of business investment in R&D. AusIndustry is the Commonwealth industry support agency. AusIndustry specifically does not target or intend to target start-up businesses with its programs. In addition to this, AusIndustry states that "innovation is 'through research and development".

The key agency for the support of business R&D is the Industrial Research and Development Board. AusIndustry's aims as the Commonwealth Government's central point for business assistance and information, in light of the national objectives shown above, are to support innovation, R&D and commercialisation of that R&D through encouragement of a venture capital industry. These programs are:

- targeted at a particular sector
- designed to assist businesses generally
- address market failures

- remove impediments to competitiveness

***Backing Australia's Ability* Commercialisation Initiatives**

PART 4 – Commercial application of research
PROVIDING CAPITAL FOR COMMERCIALISATION
Innovation Investment Fund
Pooled Development Funds
Venture Capital Limited Partnership
Renewable Energy Equity Fund
RESEARCH TO INVESTMENT READY STAGE
Pre-Seed Fund
Commercialising Emerging Technologies
Biotechnology Innovation Fund
Building Information Technology Strengths
BUILDING LINKAGES TO FACILITATE COMMERCIALISATION 74
Cooperative Research Centres
Australian Government Space Forum
Intellectual Property Awareness
Intellectual Property Protection
ENCOURAGING COMPANIES TO INNOVATE
Innovation Access Program
Information Technology Online
Pharmaceutical Industry Investment Program
New Industries Development Program
Shipbuilding Innovation Scheme
Textiles, Clothing and Footwear Strategic Investment Program
Automotive Competitiveness and Investment Scheme
Energy Effi ciency Best Practice Program
Renewable Energy Commercialisation Program
Source: <http://backingaus.innovation.gov.au> Accessed 20 October 2004

The IR&D Board's objectives are that:

- By 2006, Australia will be a highly competitive location for R&D
- By 2006, Australia will have developed a viable capital market for early stage, technology-based small to medium sized enterprises
- By 2006, Australia will have encouraged the development of a wide range of investor-ready companies with strong technology, superior leadership and managerial skills.
- By 2006, Australia will have a strategic set of internationally successful high-technology industries.

Its programs are summarized in the following text box.

Industry Research and Development (IR&D) Board

Every year, some very clever, even cutting-edge projects come out of assistance programs funded by the Australian Government. These commercial success stories help to boost Australia's international reputation for innovation and smart ideas which, in many cases, only needed a helping hand to get up over the commercialisation hurdle. Their success also sends a clear message to international investors that Australia is serious about capitalising on its world-class research and development.

The Industry Research and Development Board is one of the main bodies helping Australian firms work towards that ideal. It is an independent statutory body that administers specific Australian Government programs to encourage and support innovation in industry.

The Board was established on 1 July 1986, under the *Industry Research and Development Act 1986*. Its mission is to increase the number of successful technology-based enterprises in Australia by supporting their performance and commercialisation of research and technical development...

These programs aim to increase the level of research and development (R&D) activity undertaken in Australian industry and to improve the commercial success of R&D outcomes.

Through its various committees, the Board administers the Government's R&D support programs. The role of the Board, however, encompasses more than just delivering programs. Rather, it is about promoting innovation as a means to secure tangible outcomes for industry and the economy.

R&D Start and the new Commercial Ready program

R&D Start is a competitive, merit based grants and loans program that supports businesses to undertake research and development and its commercialisation. The Australian Government is providing more than $1 billion to 30 June 2011 for the new Commercial Ready program. Commercial Ready forms part of the Backing Australia's Ability - Building our Future through Science and Innovation $5.3 billion package to follow on from the $3 billion Backing Australia's Ability strategy announced in 2001.

R&D Tax Concession is a broad-based, market driven tax concession which allows companies to deduct up to 125% of qualifying expenditure incurred on R&D activities when lodging their corporate tax return. A 175% Premium (Incremental) Tax Concession and R&D Tax Offset are also available in certain circumstances. This program forms part of the Backing Australia's Ability - Building our Future through Science and Innovation $5.3 billion package to follow on from the $3 billion Backing Australia's Ability strategy announced in 2001.

Source: <www.industry.gov.au. Accessed November 2004.

The programs selected for case analysis

The text box below ("Grow Your Small Business") gives short descriptions of the programs available to help small businesses to be more innovative.

Two selection criteria

In selecting the programs for assessment we looked at two factors. The first was that all the programs should come from a single government department. In this way we can eliminate any potential overlap due to political considerations. The second factor was to target programs

that have been described by the Commonwealth themselves as promoting innovation or building entrepreneurial ventures. Using these criteria we have selected a number of programs from within AusIndustry, a division of the DITR. AusIndustry funds a number of programs designed to foster innovation and entrepreneurship in Australia. The programs we have selected for analysis come from AusIndustry's "Venture Capital" and "Innovation Products" streams. The programs are the following:

- Innovation Investment Fund (IIF)
- Pre-seed fund
- Commercial Ready (formerly START) program
- Commercialising Emerging Technologies (COMET)
- Pooled Development Funds (PDF)
- Tax Concession

Brief descriptions of each program and its objectives have been shown in the text box below headed *Grow your small business.* We have also included the Co-operative Research Centres (CRC) Program which *used* to be administered by DITR. Though the administrative arrangements of the CRC programme have changed, it is desirable to consider it as part of a structured portfolio as intended by its AusIndustry progenitors. Importantly, about six hundred SMEs are or have been involved with CRCs.

> The CRC Programme was established in 1990 to improve the effectiveness of Australia's research and development effort. It links researchers with industry to focus R&D efforts on progress towards utilisation and commercialisation. The close interaction between researchers and the users of research is a key feature of the programme. Another feature is industry contribution to CRC education programmes to produce industry-ready graduates.
>
> When all CRCs from the 2002 selection round are established, there will be 69 CRCs operating in 6 sectors: environment, agriculture, information and communications technology, mining, medical science and technology and manufacturing. For more information on each CRC, visit the CRC information page.
>
> Over the past 12 years, participants have committed more than $7 billion (cash and in-kind) to CRCs. This includes $1.8 billion by the Australian Government, $1.8 billion by universities, $1.3 billion by industry and almost $1 billion by CSIRO.
>
> (Source: www.crc.gov.au. Accessed 16 November 2004.)

Grow your small business

AusIndustry provides a range of products designed to assist small businesses to become innovative and internationally competitive.

Commercial Ready

Commercial Ready is a competitive merit-based grant program supporting innovation and its commercialisation. It aims to stimulate greater innovation and productivity growth in the private sector by providing around $200 million per year in competitive grants to small and medium-sized businesses (SMEs) between 2004-05 and 2010-11. It offers industry a single entry point to competitive grants for early-stage commercialisation activities, research and development (R&D) with a high commercial potential, and proof-of-concept activities. **To be the first to receive information about the Commercial Ready program, click here to subscribe to email updates.**

Commercialising Emerging Technologies (COMET) from 13 September 2004

COMET is a competitive, merit based program that supports early-growth stage and spin off companies to successfully commercialise their innovations. This webpage is for customers who are applying for the COMET program from 13 September 2004 onwards.

Pre-seed fund

The Pre-Seed Fund program has established four early-stage venture capital funds to invest in projects or companies spinning out from universities or government agencies. The funds are managed by venture capitalists experienced in research commercialisation and the development of sustainable businesses. These managers will acquire an equity interest in the companies or projects, and will provide management and technical advice to develop the commercial potential of the technology. The maximum investment in any project or company is $1 million. It is expected that the managers will eventually divest their interest in successful projects and companies to later-stage investors.

Innovation Investment Fund (IIF)

Innovation Investment Fund is a Venture capital program that invests in nine private sector venture capital funds to assist small companies in the early stages of development to commercialise the outcomes of Australia's strong research and development capability.

National Australian Technology Showcase (ATS)

Australian Technology Showcase is a national and international campaign designed to promote leading-edge Australian technology and the skills of the companies that produce them.

Pooled Development Funds (PDF) Program

The PDF Program is designed to increase the supply of equity capital for growing Australian small and medium-sized enterprises (SMEs). PDFs are private sector investment companies established under the PDF Act which raise capital from investors and use it to invest in Australian companies.

R&D Tax Concession

R&D Tax Concession is a broad-based, market driven tax concession which allows companies to deduct up to 125% of qualifying expenditure incurred on R&D activities when lodging their corporate tax return. A 175% Premium (Incremental) Tax Concession and R&D Tax Offset are also available in certain circumstances. This program forms part of the Backing Australia's Ability - Building our Future through Science and Innovation $5.3 billion package to follow on from the $3 billion Backing Australia's Ability strategy announced in 2001.

Multiple theoretical frameworks and assessment criteria

Predicate: Definitions and Specific Focus of the Study

This paper will assess some of the current programs and frameworks independently and against each other in their contribution to the various phases of development of the processes of entrepreneurship and innovation with specific focus upon just one possible output of the entrepreneurial-innovation process: the generation of New Technology Small Firms (NTSFs). Let us re-emphasise that we do not regard creation of NTSF's as the only or even the best outcome of the many possible outcomes that the entrepreneurship-innovation process can produce (see Shane and Venkataraman, 2000, Hindle 2004). This paper focuses on the NTSF because of its measurement and illustrative benefits as a unit of analysis. With our eye on the creation (and non-creation) of NTSFs associated with policies directly designed to foster them, we apply a multiple-framework analysis. Our principal analytical aim is to seek to develop a clear picture of how Commonwealth government initiatives are helping to foster entrepreneurship. Despite its limitations, the NTSF focus provides good evidence for dispassionate judgment.

The early stage elements of entrepreneurship as the act of new entry are shown in Figure 1.

Commercialisation options

The various decision points in the early stages of the entrepreneurial process of commercialisation of a new idea or new knowledge are illustrated in Figure 1. The figure shows two differing processes. The first relates to spin-off companies where there is an ongoing relationship (IP and/or equity) with the research provider parent and the second to entrepreneurial new ventures established by students or other individuals. This latter group of ventures are strongly supported in the European Union as important generators of regional employment and economic growth.

First Analytical Framework: the Financial Perspective

Most government programs provide financial assistance and therefore, a financial framework is used to define where businesses are in the growth cycle. The stages in this framework refer to the type/amount of capital sought at each stage of the model:

Finance/resource source	*Finance application*
Research provider/researcher	Idea: new knowledge, new solutions to problems
Technology transfer office/specialist, consultants, mentors	Identification and assessment of the opportunity
Pre-seed fund	Technology development, proof of concept, working prototype
Seed fund	Competitor and market intelligence, business model, IP protection, incorporation (legal and accountancy)
Angel	Start-up capital to develop first product and first customer
Early expansion capital	Support marketing, manufacturing and distribution and Mark II and customised product development, recruitment of CEO.
Expansion/development capital	Expansion of operating business
Mezzanine debt	Expansion of operating business and preparation for IPO trade sale or other liquidity event.

For a few companies, the ability to generate sales revenue almost immediately will avoid the need to dilute equity to obtain the resources needed. For technology asset companies

(Stankiewitz, 1994), the marketable outcome is usually a licence rather than the actual supply of a product, process or service. The pattern of finance resource application may differ. Typical these are the new ventures developing new drugs. Their mezzanine finance needs relate to the need for clinical trials rather than to defining and refining manufacturing and distribution activities. These will in time be undertaken by the licensee.

In this framework, the selected government programs will be assessed against their ability to provide financial assistance.

The Second Analytical Framework: A Management/Start-Up Perspective

A number of scholars have sought to identify the various phases. For the analysis here we have used the framework developed by Stevenson et al. (1999). They defined six phases in the life of a business venture. These phases (figure 1) are based around a management/start-up view of a new venture. There are often not dealt with in a linear fashion and, in practice, entrepreneurs deal with the first three phases simultaneously. The six stages are outlined below.

- Assessing, screening and protecting the opportunity
- developing the initial business concept
- assessing the required resources
- acquiring the necessary resources
- managing and developing the growing business
- harvest.

In this framework, the selected programs will be assessed on their ability to provide assistance from a management perspective.

Third Analytical Framework: the Innovation Perspective

Innovation is "the commercialisation of an invention or idea". The paper by Pappas et al. (1991) described a model for innovation which we have elected to use as our framework. A diagrammatic representation of the model is shown in Figure 2. One of the most important aspects raised by the Pappas paper is the importance of distinguishing between an invention or idea and an innovation. In the broadest possible terms it is not an innovation until someone is prepared to pay for it. All innovation is done within a market context. The innovation process is divided into three phases.

- *Research* (R), which also includes entrepreneurial activities
    - Identification of a commercial opportunity
    - Assessment of the opportunity
    - Protection of intellectual property
- *Development* (D) which also includes entrepreneurial processes ("E")
    - Invention of product/service/process/solution
    - Develop product/prototype.
    - Conduct field trials/pre-launch evaluation,
    - Assessment
    - Determination of market/customer requirements.
    - Competitor intelligence
    - Protection of intellectual property
- *Commercialisation* (C)
    - Ongoing support of IP protection
    - Identification of first customer and first sale
    - Manufacture and distribution of first product/service/process
    - Ongoing market and competitor intelligence
    - Product customisation

- Development of Mark II product/service.

In this framework, the selected programs will be assessed on their ability to further innovation.

Fourth Analytical Framework: An Entrepreneurial Perspective

The Global Entrepreneurship Monitor (GEM) is a global research program studying the relationship between entrepreneurship and economic growth. Australia has been an annual GEM participant since the year 2000 (see Hindle and Rushworth, 2004). GEM proposes a model of entrepreneurship in the context of economic growth. We have elected to use this model to provide our entrepreneurial perspective for two reasons.

The model (taken from the GEM 2003 Executive report) has variables that segment into five major groups.

- social, cultural and political context
- general national and entrepreneurial framework conditions
- entrepreneurial opportunity and capacity
- business dynamics
- economic growth.

Given that these major groups cover a great deal of ground we have elected to concentrate on two areas with in the model, namely those of entrepreneurial framework conditions and entrepreneurial opportunity and capacity. The specific areas within these are

1. Entrepreneurial framework conditions
- Availability of financial resources for new firms
- Government programs designed to support start-ups
- Education and training for entrepreneurship
- Effectiveness of technology transfer mechanisms
- Access to professional support services.

2. Entrepreneurial opportunity and capacity
- Existence and perception of market opportunities
- Capacity of individuals to start new ventures
- Skills individuals have to pursue entrepreneurial activities.

In this framework we will assess the selected programs for their ability to deliver in the areas outlined above.

Synthesis: A Multiple Framework Critique of Policy and Programmes

This assessment compares various Commonwealth programs against the multiple frameworks described in the previous section.

Financial Framework Perspective

Superficially, the financial framework perspective – represented as the traditional logistical growth curve (or "S" curve – seems to indicate reasonably comprehensive policy coverage of the field. Figure 4 indicates the support that the selected programs supply assessed against this framework. In the framework nearly all the selected programs provide support. The CRC program is directed at cooperation in research, but as such it generates spin-off ventures and provides pre-seed and other initial support before the new venture is parted from its parent (Yencken, 2005). The tax deduction (125 per cent plus) provides support at all levels as does R&D Start with the exception of the founder stage. However, in practice the tax concession is really only effective for companies that have sufficient earnings to pay company tax. We would also assess that R&D Start really only benefits companies from the Start-up stage onwards. The resources needed to apply for the scheme are beyond most new technology-

based Small Firms (NTSF). The Pre-seed, IIF and PDF programs fit very well onto this model, but all involve significant dilution of equity.

The findings of a recent Australian Institute of Commercialisation survey for DITR are relevant here (AIC, 2004).

> From the results of this survey the existence of a gap in funding at the very early stage is verified by 87% of investors and 88% of clients. Respondents believe there is a demand for finance below $2.0M that is unmet by the current financial market. From comments provided by respondents, this is not necessarily only the result of a lack of available funding being available for specific equity investment, but also comprise a combination of several other issues.

Management/Start-Up Framework Perspective

Table 1 summarises the stages and needs in the Management/Start-up framework where support is provided (or not) by the selected programs in our study.

Table 1 Management/start-up framework perspective

Stage	*Pre-seed*	*IIF*	*PDF*	*COMET*	*CRC*	*Commercial Ready*	*Tax concession*
Requirement to be incorporated	YES	YES	YES	YES	NO	YES	YES
Assessing the opportunity	NO	NO	NO	NO	NO	NO	NO
Protecting the intellectual property	YES	YES	NO	YES	YES	NO	NO
Developing the business concept	YES	NO	NO	YES	YES	NO	NO
Assessing the required resources	YES	YES	NO	YES	YES	NO	NO
Acquiring the required resources	YES	YES	YES	YES	YES	NO	NO
Managing and developing the growing business	NO	YES	YES	NO	NO	YES	YES
Harvest	NO	YES	YES	NO	NO	NO	NO

Source: Present authors.

The program that clearly shines here is COMET. This is a relatively new program introduced by AusIndustry in November 1999. It has been directed at very early stage ventures and is the only program to evaluate the potential of the applicant with regard to their perceived entrepreneurial abilities. This analysis is confirmed by the recent review of the COMET program

> COMET was substantially expanded under *Backing Australia's Ability* and again under *Backing Australia's Ability – Building Our Future through Science and Innovation.*

> A 2002 survey of firms assisted by COMET showed that the program was very successful in encouraging entrepreneurs and enabling firms to achieve their business goals. The network of business advisers is a unique and valuable feature of COMET, and leads to long-term and beneficial changes to firm behaviour. The Australian Government is providing a further $100 million over the next seven years to continue and expand the highly successful Commercialising Emerging Technologies (COMET) program. (Source: <http://www.industry.gov.au/content/itrinternet/cmscontent.cfm?objectID=5483ACCB-97CA-1838-61B239AE0868E468. Accessed November 2004).

The venture capital programs, IIF and PDF assist in the resource side of a developing business. They would be helpful in providing capital and assisting with the formation of the management team for example. However, the research based programs and Commercial Ready do not really help when viewed from this framework. This is because although they are about innovation, they are much more directed at the *invention* side of innovation and not the commercialisation.

> The Pre-Seed Fund program has established four early-stage venture capital funds to invest in projects or companies spinning out from universities or government agencies. The funds are managed by venture capitalists experienced in research commercialisation and the development of sustainable businesses.

Pre-seed finance is essentially needed to reduce risk, whether it be technology, IP or market risk. Most start-up NTSFs are reluctant to give away equity at the pre-seed stage, because of the high level of risks that lead to low valuations. It is too early to assess the effectiveness of this fund in providing pre-seed finance. Its initial weakness is that to obtain access to such finance, the venture has to be incorporated and has to dilute its equity. In these aspects it differs from similar UK initiatives, such as the Challenge fund that flow to the university and are managed by the university. Recent Australian case studies of university spin-offs have shown that the larger research profile Australian universities have established their own, usually small, internal pre-seed funds, often drawing on past commercialization earnings as the source of finance (reference needed) (Yencken and Ralston, Forthcoming).

Innovation Framework Perspectives

Figure 5 below indicates where the selected programs provide support in this framework. The solid vertical bars show the coverage of the selected Commonwealth programs. The broken vertical bar indicates where cover is provided by research provider business development people or other, mainly Australian Institute of Commercialisation or State government, programs. These are however primarily focused on training and consultancy type support and do not contribute to early stage finance needs.

CRCs with commercially experienced Chairs and Board members—and now more focussed on generating economic benefit—can and do cover both the "R" and the "D" stages and even the start of the "C" stage, including the technology development and opportunity identification and assessment activities, and IP protection For new ventures that are not generated out of CRCs, the Pre-seed Fund is the only program of the ones selected that helps to fund the technology development stage of "D", that includes proof of concept and working prototype development. Other research by one of the authors (Yencken and Gillin, 2004) has shown that CRC spin-off companies generally are not set loose without considerable planning and initial resources. COMET operates in parallel on the commercial aspects of opportunity assessment (competitor and market intelligence, business model and to amore limited extent IP protection).

IIF and PDF are clearly focused on the later "C" market development stages. For biotechnology and other companies developing new drugs, this source of funding is needed to finance Phase 1 clinical trials. Commercial Ready (the successor to START) supports both applied research in new ventures and applied research leading to innovations by established companies. Tax concessions are clearly only effective for established companies that have taxable profit streams.

Except for CRCs, the programs selected show a big gap in support for the initial phases of opportunity identification and assessment and for initial IP protection—essentially the entrepreneurship or act of new entry phase (Figure 2 and Lumpkin and Dess, 1996). The high cost of initial IP protection can be a heavy burden on universities and a deterrent to commercialisation of research outcomes (Larkins, 2002). For universities and other public research agencies, support in this entrepreneurial phase is usually provided by business development staff in technology transfer offices or deployed close to groups of researchers, usually funded out of other research provider funds. In some States there have been a few instances of such business development people being funded by State governments for limited periods—for example, in Victoria at RMIT and Deakin Universities.

For new ventures which have been started by individual entrepreneur(s) or spin-offs by staff or students with no parent research provider IP or equity, the available sources of financial support again lie outside the ambit of the DITR programs considered in this paper. Some of them have access to incubator programs such as the Commonwealth Government *Building on IT strengths* (BITS) Incubator Centres program. They also have access to State government initiatives such as the Victorian Government Technology Commercialisation Program (TCP)—now succeeded by the *Building Innovative Businesses Program*—under which selected consultants were subsidised as TCP Partners to provide intensive management assistance, internationally focused market support and access to private sector equity" (Scitech, 2002: 247). However history has shown the lack of success in Australia of external consultants finding IP based opportunities in universities.

> Few TCP Partners set out to specifically address the commercialisation of public sector research and their limited attempts were relatively unsuccessful in generating technology opportunities from public sector R&D (DIIRD, 2004: 10).

GEM Framework perspective

Table 2 summarises support provided by the selected programs against the GEM framework perspective.

Again the program that shines here is COMET, and undoubtedly because of its focus on the entrepreneur as well as the project. It could be argued that Pre-seed Fund, IIF and PDF's also assess the quality of the entrepreneur, however, this is in the whole context of a venture. The founder may actually not be part of the management team. The IIF and PDF's also fulfill some of the framework criteria in that they provide financial assistance directed at start-up companies. The so-called "innovation" products that are primarily directed to R&D promotion (Commercial Ready and the tax concession) provide support for established entities but very little assistance in the entrepreneurship act of new entry stage under this entrepreneurial framework. Many (but not all) of the CRCs are also strong contributors to these criteria (CRCA, 2002).

Table 2 GEM framework perspective

Criteria	*Pre-seed*	*IIF*	*PDF*	*COMET*	*CRC*	*Commercial Ready*	*Tax concession*
Availability of financial resources for new firms	YES	YES	YES	YES	NO	YES	YES
Government programs designed to support start-ups	YES	YES	YES	YES	NO	NO	NO
Education and training for entrepreneurship	NO	NO	NO	YES	NO	NO	NO
Effective technology transfer mechanisms	NO	?	?	YES	YES	NO	NO
Access to professional support services	?	YES	YES	YES	YES	NO	NO
Existence and perception of market opportunities	?	NO	NO	YES	YES	NO	NO
Capacity of individuals to start new ventures	NO	NO	NO	YES	NO	NO	NO
Skills individuals have to pursue entrepreneurial activities	?	NO	NO	YES	?	NO	NO

Interesting to note is the criterion of "Existence and perception of market opportunities". A recent article by one of the authors (Hindle, 2004) provides research-based guidelines for SME practitioners seeking to manage the process of opportunity, discovery, evaluation and exploitation. There is no Australian government program that specifically helps in this area. The ability to identify market opportunities is of fundamental importance to the creation of new ventures and entrepreneurship. In universities and other public research agencies, the trigger that leads to an identification of a commercial opportunity is almost always internal to the parent organisation (Yencken and Gillin, 2003). The critical resource is the technology transfer office and its business development people. Attempts in Australia to subsidise outside consultants to identify such opportunities have not been successful.

Do Current Programs Adequately Foster Entrepreneurship?

Governments are failing to foster entrepreneurship

The multiple framework approach now permits a return to the primary question:

'Do federal government policies and programs do a good job in fostering entrepreneurship?' The short answer is no.

From the analysis it is clear that AusIndustry's programs *seem* to be working well and meeting genuinely entrepreneurial objectives *if they are considered solely within the context of the financial and innovation frameworks.* However the program suite can be seen to be working poorly from the perspective of the management/start-up and entrepreneurial frameworks.

The case analysis of this paper identifies clear gaps in Australia's current regime of federal government entrepreneurship support programs (Table 3).

Table3 The gaps in the program suite

Gap	Framework
Existence and perception of market opportunities	Entrepreneurial
Screening and assessing opportunities	Management/Start-up
Protecting intellectual property	Management/start-up
Financial support for founders of new ventures, including small amounts of pre-seed finance	Financial
Determine market/customer requirements and competitor intelligence	Innovation
Limitation access to incorporated entities only	Entrepreneurial
Championing of individuals	All

Summary: the dominant conceptual problem is technology push versus market pull

This single phrase succinctly summarises the generic problem with Government policy in fostering entrepreneurship. Australia is the land of inventors, the great Aussie battlers who are able to solve most problems using some combination of fencing wire and hay bind. We also have a long tradition of world class research, especially in medicine. Australia is also a land rich in natural resources and as such we have been able to provide ourselves with a comfortable standard of living. These factors have generated a society that prides itself on its ingenuity, but is not always able to capture the potential commercial gains that may flow from these endeavours.

This history colours the way in which we tackle national policy relating to entrepreneurship and fostering new ventures. We are strong exponents of "Technology Push". The programs we have studied all operate on this premise. Something has been invented, whether through the endeavours of a lone maverick or a multi-institution coordinated research project. Then money is found to move this to the development stage, and then finally capital is sought to commercialise the whole thing and take it to the market. Too often too little attention is paid to actually finding out if anybody is actually interested to purchase it.

What Australia lacks is the ability to systematically identify opportunities related to the market and harness our inventive power to develop businesses capitalising on these opportunities. We are so focussed on products that we ignore the other real drivers of new venture development, people and the market. The only programs that have addressed this problem have been COMET and more recently CRCs. It takes a more holistic approach to dealing with new venture opportunities, but it does not provide any help with screening for opportunities. Again, the implicit assumption is that someone will come along with a product that they are looking to move to market.

There is no doubt that Australian governments are well motivated towards the creation of entrepreneurship policy. However, through no fault of their own, Australian public servants (and their political masters) charged with creating and implementing entrepreneurship policy, do not have sufficient direct experience in the practical field of business creation or the academic field of entrepreneurship: a field rich in research, literature and theory to which Australian policy makers seem largely oblivious. One attempt (Hindle and Rushworth, 2002) to provide a practical primer for public servants charged with entrepreneurship policy was promoted on the Queensland Government's website for about 18 months but now seems to have been dropped. It would be highly desirable for public servants involved in the area of entrepreneurship policy to become formally acquainted with the literature of the field to a much greater extent than has occurred in the past or is prevalent at the moment. Our multi-framework critique of Australian entrepreneurship and innovation policy indicates a lack of specific understanding of the field and numerous gaps that simply do not need to exist if a

more systematic and comprehensive understanding of existing knowledge were more widely spread among policy makers.

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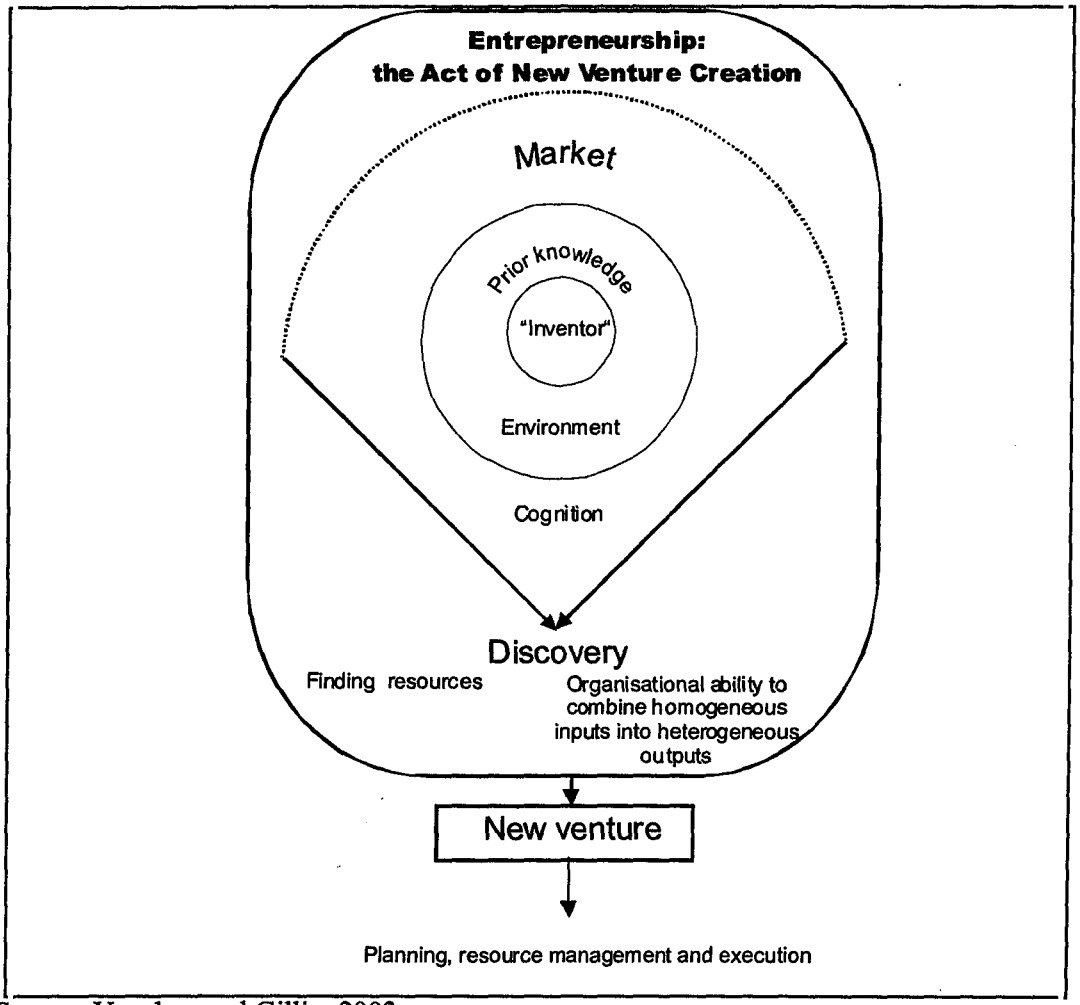
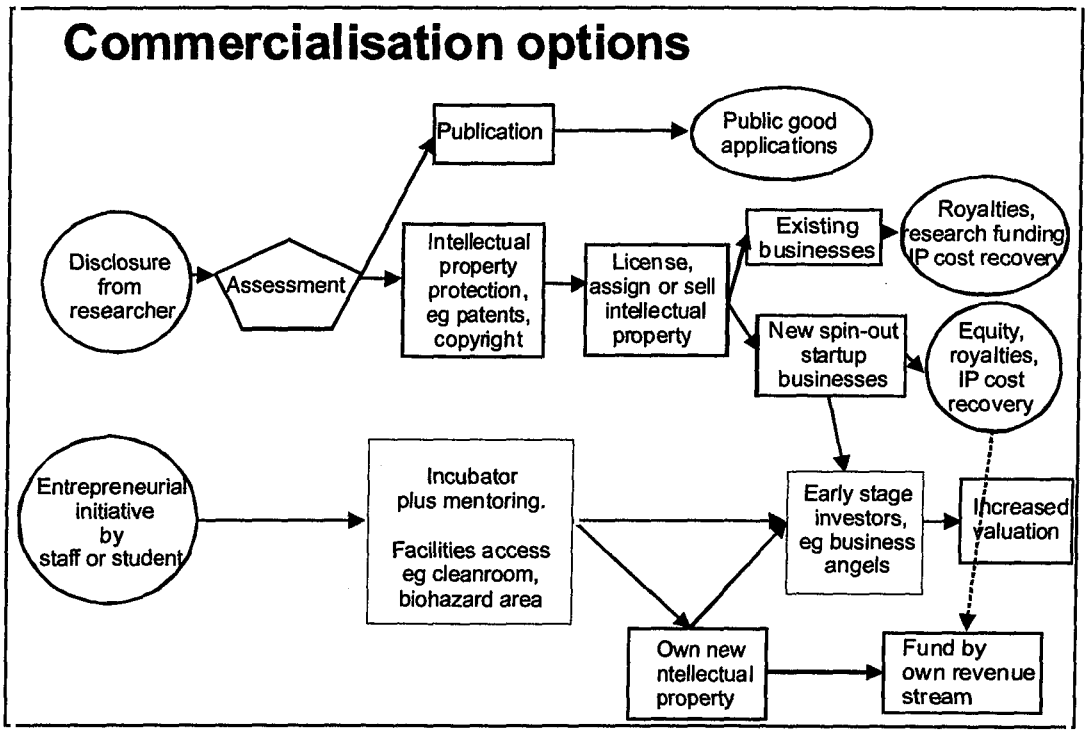
Figure 1



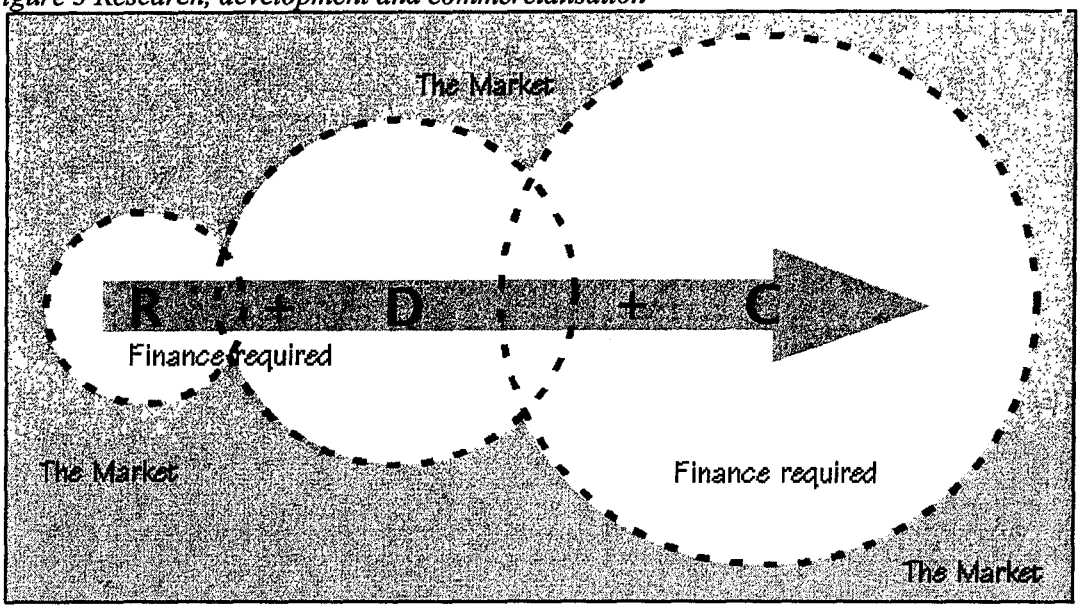
Source: Yencken and Gillin, 2003.

Figure 2.



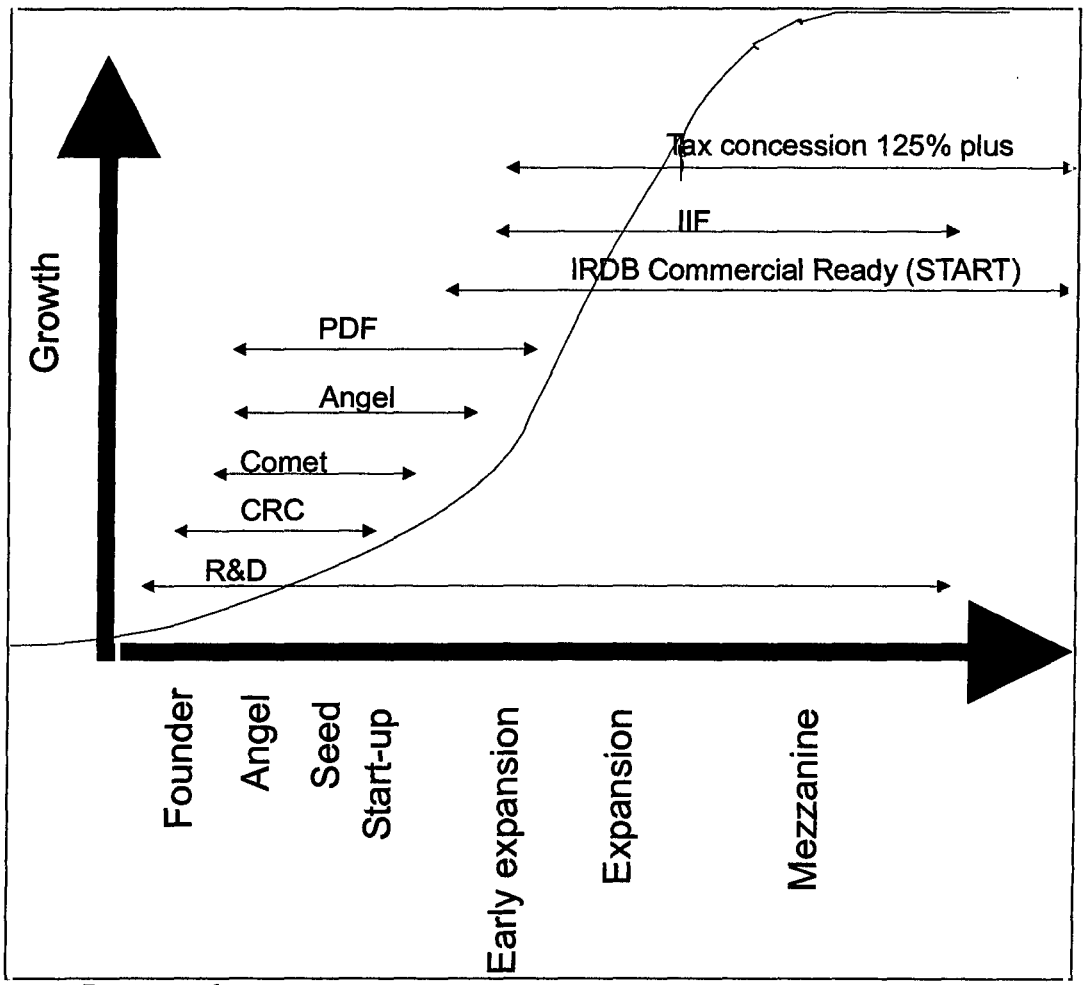
Source: Yenckena nd Gillin, 2004

Figure 3 Research, development and commercialisation



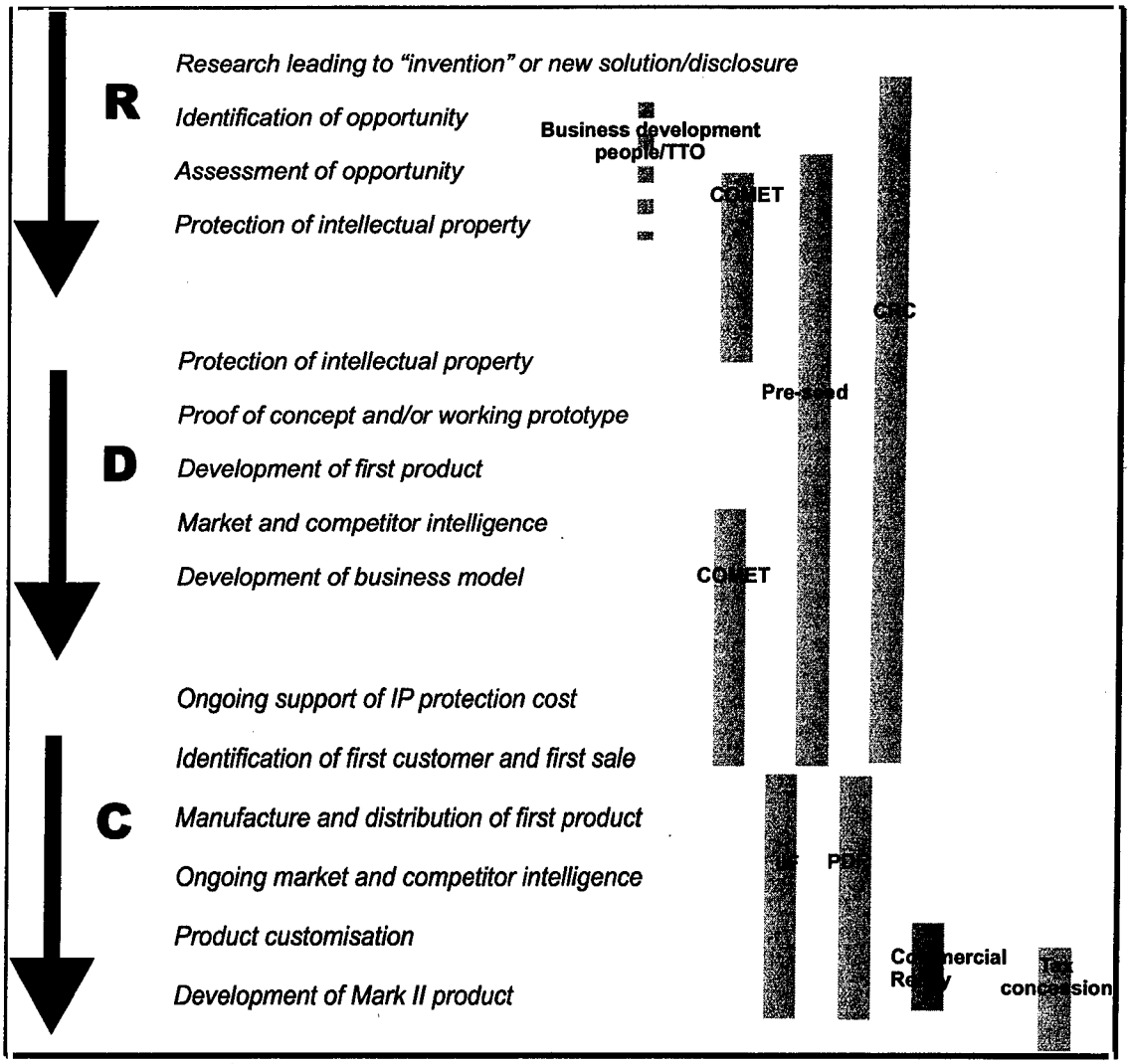
Source: Pappas et al., 1991

Figure 4



*4*Source: Present authors.

Figure 5 The innovation framework.



Source: Present authors