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SCIENCE & INNOVATION



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Innovation • Improvement

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30 March 2005

To: The Secretary, House of Representatives Standing Committee on Science and Innovation
scin.reps@aph.gov.au

Subject: Submission – Pathways to Technological Innovation

My colleagues at the Great Southern Development Commission in Albany, WA have asked me to submit comments to your inquiry based on our experience with technology innovation in the USA and most recently in Western Australia. Our Australian experience spans approximately two years during which we worked to establish a new high technology enterprise in Western Australia. This has brought us into working contact with State and Commonwealth agencies, various investment funding sources, and a great many companies and individuals. Our experience may therefore be helpful as you address the questions of innovation barriers in Australia.

Summary

- The absence of “seed capital” to finance the earliest stages of technology innovation and demonstration up to the “prototype stage” creates a huge barrier to technology innovation. Young entrepreneurs lacking substantial personal resources need not apply.
- Government programs do not address the absence of seed capital. As an example, the AusIndustry Commercial Ready program broadens the scope of support compared to the previous R & D Start program to include “start-up” companies. But in actual fact, we have found that senior Commercial Ready program managers do not have an appetite for start-up businesses, and proposals submitted from start-up firms seeking R and D funding are hitting a wall. Similarly, the government sponsored Innovation Investment Funds (IIF) designed specifically to support early stage companies are in fact limited, through the policies of their venture capital managers, to those firms that have already removed the technology development risk from the table, preferably using the entrepreneur’s internal resources.
- We have found a general lack of respect for, or attribution of value to the intellectual property, ideas, and know-how brought to the table by the technology entrepreneur. Only “hard assets” are respected in spite of the demonstrated fact that new technology ideas, converted to products, have been shown to create enormous value.
- Immigration policies block the admission of educated, highly experienced technology professionals that seek to live in Australia and add to the intellectual resources and general ferment of new ideas that are essential to developing technology innovations.
- Modern technology companies are hindered because Australia is a decade behind other countries in rolling out true broadband telecommunications capability. ADSL does not qualify as true broadband.
- Much more aggressive government programs will be required to create the environment of technology innovation that is taken for granted elsewhere. Once the culture of entrepreneurship and innovation are firmly rooted, well funded, and respected, we believe that an explosion of innovation will emerge from Australian SMEs and yet-to-be-launched start-up firms. The ideas, capability, and motivation exist. But the ground is as yet insufficiently fertile for the possibilities to be realized.

Background

My personal background includes training in engineering at the University of California and Stanford University, and thirty-five years in Silicon Valley in engineering and eventually management of small and medium sized technology companies active in a variety of industry segments. That experience included conceptualizing a new business idea, researching markets and technology, developing a business plan and raising venture capital funding so that I have first hand familiarity with the processes involved. I am also listed as inventor or co-inventor on about a dozen U.S. patents, and been embroiled in corporate technology and intellectual property lawsuits.

After arriving in Western Australia, I met with other Americans and Australians having aviation and technology backgrounds. We formulated a team around an idea based on our experience with military and commercial technology and systems. We knew we could create a highly effective system of peacetime, civilian maritime surveillance that would greatly enhance Coastwatch capabilities while dramatically reducing operating costs. Such technology could address global markets creating major export opportunities for Australia.

We spent the next year discussing issues with Coastwatch via presentations in Canberra, and conducting a comprehensive technology review including systems-level analysis based on our experience with military satellite operations. We completed system-level design and sub-system definition and capabilities analysis, and followed with a comprehensive economic analysis. The key to our work was a high level systems analysis of the problem which led to a configuration combining existing low cost "off the shelf" technical components coupled together with advanced software and sophisticated signal processing of sensor data. A one page attachment briefly summarizes the features and benefits of the system which we call **CANOPY** ©.

This analysis showed that we could provide persistent broad area surveillance at about one tenth the costs of the current large, manned Coastwatch aircraft. Coastwatch was enthusiastic, but being limited to purchase of proven technologies, asked us to return when we had an operational prototype suitable for test and evaluation purposes.

We set off to raise the money required to design and develop such a prototype system since the cost involved exceeded our personal financial capabilities. Work up to this point has been financed entirely out-of-pocket.

The search for funding has consumed a year, and exposed us to the unique features and barriers for innovation present in Australia. I will briefly summarize our findings based on our experience in the points below.

Innovative Technology Business Financing and Nomenclature

Our experience is that many of the barriers to creating new innovative businesses arise from lack of "early stage" funding, a problem studied by Barnett and Mazzarol, an excellent resource in this area.¹ There are different development stages for new technology companies when funding support is needed. Here are definitions copied from the Australian Venture Capital Association Limited (AVCAL) web site² with my comments inserted in italics:

"Seed Stage"

"The venture is at the idea stage or may be in the process of being organised and needs finance for research and development. **This is usually funded by the entrepreneur's own resources.**"
[Emphasis added. At this point, no "prototype" exists and much development work remains. Venture Capitalists in the United States would call this "Start-Up stage."]

"Early Stage"

"The company is in the process of being set up *[the technology already being developed]* or may have been in business for a short time. Such firms have not yet sold their product commercially and have no track record. Investee [sic] companies have completed the product development stage and require funds to initiate commercial manufacturing and sales." *[In Australia, this stage is called "Start-Up stage." Most technology innovation has been completed.]*

"Expansion/Development Stage"

The company is now established and requires capital for growth and expansion. The company may or may not have made a profit at this stage. This is a period of rapid growth and the company will usually require several rounds of capital injection as it achieves the milestones set in the business plan." *[Limited technological innovation occurs in this stage.]*

¹ "Creating an Effective Venture Capital Environment in Western Australia – Guidelines for Government, Industry and Universities – A discussion Paper," 2002, by Russell Barnett, Tim Mazzarol who can be reached at russell@ventureconsultants.com.au or mazzarol@ecel.uwa.edu.au.

² <http://www.avcal.com.au/html/venture/whatis.jsp>

“Management Buyout (MBO)”

“These are funds provided to enable a current operating management and investors to acquire an existing product or business from a public or private company”. *[The objective of this step is NOT technology innovation, but rather financial restructuring.]*

“Management Buy-in (MBI)”

“These are funds provided to enable a manager or group of managers from outside the company to buy in to the company.” *[As above, the objective of this step is NOT technology innovation, but financial restructuring.]*

These divisions, created by the Australian Venture Capital industry, are extremely revealing. Note that *technology innovation* (research and development, the translation of new ideas into hardware/software that lays the groundwork for subsequent commercial products) *occurs primarily in the “Seed Stage.” The inference is that Australian Venture Capital assiduously avoids the “seed stage” (what we call a business “start-up” in the United States) favouring instead investment in stages with little or no technological innovation intended.*

We found this prejudice to be the case over the last year. Even Investment Innovation Funds (IIF) chartered and funded in large part by the Government and operated by venture capital firms avoid seed stage investments. **If the entrepreneur has not removed the technical risk from the deal, the IIF (and other venture capital funds) will shun the funding request.**

This means that the entrepreneur must use his own internal resources or arrange a “friends and relatives” financing to convert the concept to a “prototype” that is preferably far enough along that customers can evaluate the product. Australian venture capitalists also prefer that the entrepreneur arrive at their door step not only with an operating prototype completed but also with purchase orders from customers.

The subsequent venture capital financing that is then proposed frequently has the effect of washing early stage investors out of their equity position even though early stage investors have borne the risk of technology innovation. We are aware of venture capital proposals at this stage that would give the venture capital investor 80-90% ownership of the company as it proceeds, negating any financial incentive for either entrepreneur or seed stage investor.

In the paper of Barnett and Mazzarol noted previously, the authors provide a good explanation for the lack of seed stage enthusiasm by Australian venture capital firms:

At least four factors have been identified as contributing to the scarcity of early stage formal venture capital investment:

➤ First, early stage venture investment presents the investor with a significantly disproportionate risk-reward profile. This is the result of the difficulties associated with measuring what are typically immature or highly fragmented markets, the long lead time to commercialisation and investment harvest, the risks associated with accelerated technology obsolescence and the fact that early stage ventures invariably lack the necessary resources to capitalise on their opportunity.

➤ Second, later stage venture capital funds have historically outperformed early stage venture capital funds in terms of both size of returns and security of returns. The only exception has been in the United States during the 1990s, where the ‘Silicon Valley Phenomena’ resulted in quantum and accelerated early stage venture capital fund returns. However, this was arguably a unique experience and not likely to be replicated in Western Australia.

➤ Third, early stage venture investing frequently requires ongoing investment such that the early stage investor is not excessively diluted by subsequent rounds of financing or by decreasing valuations.

➤ Finally, early stage venture investment typically involves small investment amounts and intensive investment management. This changes the economics and dynamics of funds management considerably. First, it means that the fund is small and because management fees are based on a percentage of funds under management and governed by industry standards, management remuneration is less attractive. This means that it is difficult to attract quality management to early stage funds and because raising investment funds is contingent on the management’s reputation, it is difficult to actually raise the fund. Second, because early stage investments require intensive management, a larger number of investment executives are required and thus the fund’s costs are significantly higher.

We conclude that Australian Venture Capital is not an engine for technology innovation. It will only help to carry an already-demonstrated innovation forward to the market place once the true innovation required in the seed stage is completed and the associated risk ameliorated by others.

Lacking resources, the technical entrepreneur must approach "business angel investors" for early stage financing. However, such "angels" will generally require that the entrepreneur demonstrate "commitment" by mortgaging their house or assume some other form of extreme personal financial risk in order to obtain the necessary funding. Many decline for obvious reasons. Evidently the contribution of all the previously developed intellectual property and ideas and all new intellectual property that will be created is taken at **zero value** by such investors. In the U. S. my experience (and that of others) is that sophisticated investors recognize that **the ideas and intellectual property are the CORE assets of a technology business and the primary source of value creation, and should be recognized by the investor as a highly valuable contribution by the entrepreneur and his team.** We see this attitude to be entirely lacking in Western Australia, and can not comment about other states.

The lack of early stage financing for new ideas therefore means that young technology entrepreneurs lacking substantial internal financial resources need not apply for membership. Only technology that can be demonstrated with very limited financial resources (e.g. creating new software on your own time) can advance to prototype stage. Technologies requiring more expensive prototype development are shut out. Unfortunately, "cheap and simple" products are less and less possible in a world of increasing technological complexity. Thus in Australia new technology ideas and products must come primarily through industrial pipelines, but these large companies are frequently filled with "abominable no men" unwilling to take risks at the corporate level. The risk adverse character of large Australian corporations is demonstrated by the low levels of R and D expenditures that they make and their apparent preference to import innovation from abroad.

There is a corollary difficulty with early stage "start-up" companies arising from the lack of seed capital. There is a lack of seed stage company management talent. One gains experience with early stage companies by working at an early stage company. In Silicon Valley, most of my colleagues had at least one experience living through a technology company start-up, many of which were launched in garages. The lack of such a "cultural memory" in Australia increases the risk of early stage investments. Equally, Australian venture capitalists lack experience with early stage companies, and can offer little in the way of assistance.

There has been some work with "incubators" in Australia such as those funded in part by the BITS program. However, the incubator-investor faces the same difficulty as the "friends and relatives" in financing a company at the seed stage. At some point the company and its investors must approach larger financial institutions for the larger amounts of funding required to "ramp up" the business. When this happens, the professional venture capital fund operator will frequently make the same funding proposal as is commonly given to "friend and relatives" investors: we take the lion's share of the business. Take it or leave it. Early stage investors including incubator investors are thus "painted into a corner" if they are not careful.

These issues are largely absent in the United States. U. S. venture capitalists are much more willing to fund "seed stage" technology companies recognizing that early stage investment will be largely consumed by R and D. The admission requirements are high as such investors, being extremely sophisticated, will require an experienced management and technical team and strong business plan. But experienced early stage venture funding is absent in Australia, and I see no reason to expect that it will emerge anytime soon.

There are numerous formal and informal networks of "angel investors" in the U.S. Many were formerly technology entrepreneurs whose earlier ventures were successful. These people understand the value of new ideas, intellectual property, and importance of enthusiastic and committed individuals with the intellectual capacity to carry ideas into products if assisted with seed financing. There is no comparable network in Australia because there are no resources of experienced ex-technology entrepreneurs with technology experience and background. Those angel investors that do exist frequently made their fortunes in other areas such as mining and property development, and do not respect intellectual property or the management of highly talented technical personnel. I do not expect this situation to change any time soon.

We conclude that the Australian funding culture at all levels is, in fact, innovation adverse. After our year of beating the Australian bushes, we found that operating from Australia, we were able to generate promising leads with reputable funding sources in the US and UK in only a few weeks. The difference in attitude, receptivity, respect for ideas and intellectual talent and experience, and acceptance of risk in exchange for potential rewards could not be more profound.

Immigration Difficulties

Australian immigration law has proven a barrier to importing unique intellectual talent. I can cite two examples related to our low cost maritime surveillance project.

A core element of our strategy is to provide extreme endurance, long range maritime surveillance with a dramatic reduction in cost. Key to this strategy is the use of low cost commercially available sensors (radar, optical, infra-red) coupled with unique, advanced real time signal processing capability which enables the combined system to identify and track targets on the ocean surface with excellent performance and exceptionally low cost. Instead of using the \$3 million Raytheon Sea-View radar deployed on Coastwatch aircraft, we plan to use a low cost commercial radar and sophisticated software operating on high performance computer chips. These can deliver the performance required at a cost that is about 1% that of the Coastwatch airborne radar. Once developed, the cost of putting software in the surveillance platforms is effectively zero. Platform costs are thus dramatically reduced.

The know-how for creating much of the software resides with an individual who is a U. S. citizen resident in Alice Springs who has worked at Pine Gap for 15 years. He has a PhD from Stanford University and spent his career in the world of classified projects. He and his wife like living in Australia. He seeks to retire from his current job and join our project working in the open, commercial, unclassified world. This requires a new visa. Being older than 45, his only opportunity for a work visa is to apply under the terms of "exceptional talent." Much of his past work remains classified and can not be disclosed. In spite of letters of recommendation and outstanding citations from the U.S. Dept. of Defense, his current employer, the Australian Defence Force, and scientists within the Australian Defence Science and Technology Organization who have worked with him side by side, his visa application was recently rejected.

Also key to our business are a husband and wife team, both U. S. citizens, who have also worked in Pine Gap. He is retired USAF formerly responsible for portions of the U. S. military satellite operations, and she was formerly responsible for technical management of an advanced research laboratory at Pine Gap. Being under 45 years of age, they applied for residency and work visas in Australia. Under the point score system each of them individually far exceeds the minimum threshold for qualification. Both have Master's degrees in technical disciplines. Their visa applications were lodged over three years ago. They are still waiting final processing of their request. They have been transferred to another military base in the U.K. and hope to return to Australia once our enterprise is underway. It is clear that the visa system provides no speed or procedural benefits to applicants having exceptional technology training or experience. Australia suffers as a consequence.

These individuals are instrumental to the success of our enterprise, and bring truly unique technology know-how and experience that can be transferred to our new business which will be predominantly staffed by Australians. Substantial amounts of know how will be transferred to native Australians and used to address critical Australian national problems. These immigrants are being shut out by the rules and inaction of the immigration system.

The Aussie immigration point scheme does not value the intellect or education required for innovation, people such as engineers, scientists, mathematicians, physicists and even science teachers. A PhD in electrical engineering or information technology from a top ranked technology university is valued less than an equivalent age hairdresser!! The system doesn't even award more points for more education, or the nature of that education. The age limitations and points attributed to applicants based on age make no sense either. A highly educated person takes longer to gain an education than a tradesman and will likely be productive much longer than a tradesman. The cut off age for immigration should reflect this fact.

The bottom line is that to promote technology innovation and to “seed” the innovation landscape with experienced technology innovators and entrepreneurs, Australia should welcome and encourage immigration of those with exceptional technical training, experience, and know how. It does the opposite.

We have found a way to do an “end run” around the immigration barrier rather than do battle with the bureaucracy. Being located in the Albany area of WA, we are considered to be a “regional location” far from the capital cities. Accordingly our company, once operational, can sponsor key personnel for “regional” work visas based on their technical qualifications. The barriers for qualification are far lower than in other immigration pathways. Those sponsored need to sign a contract guaranteeing that they will stay with the company in its regional location for two years. This is the pathway we will use. If it did not exist, the immigration difficulties would be fatal for our new enterprise.

These immigration rules suggest that exceptional intellectual talent can only be “imported” in the regional areas, and not the capital cities. Yet the capital cities host nearly all the technology innovation work in Australia. Consequently, most Australian technology enterprises are shut off from this source of talent due to immigration rules. We will succeed only because of our regional location, and in spite of Australian immigration regulations and policies.

Other Difficulties

In our case, in spite of a management and technical team with decades of experience in all aspects of technology company operations, R &D, and product commercialization gained by many of our team members while in California and elsewhere, we found the same general reception by Australian investment sources as would be received by a novice entrepreneur. As with the immigration barriers, we elected to go around the angel and venture capital financing barriers. We formed a strategic alliance with a Perth-based electronics company that would be not only an early stage investor, but also a supplier of about 80% of the electronics content required for the airborne and ground portions of our integrated surveillance system. This firm thus will gain both financial benefits from direct equity investment, and build a customer (our firm) that is generating access to new markets for the company’s custom-designed and manufactured electronic goods.

But this has not been the end of the story. Emerging technology companies need to focus on early customers. Our primary early stage customer is Customs Coastwatch which has expressed not only a strong interest in our technology, but also cites in obscure parts of its documentation that it will retain interest in evaluating new technology options notwithstanding its current procurement efforts for a new ten year prime contract. The inference is that if a better service or product is offered, Coastwatch will evaluate and then buy the better product.

An investor wants more than bland words in an obscure operations document. When we requested a face-to-face meeting with Coastwatch to discuss the issues and depth of commitment to evaluating new technologies in the future, our request was declined citing issues of probity surrounding the current tender evaluation process. This could mean many more months of delay while we wait for the tender process to come to completion. In response, we have requested a meeting with Minister Ellison to address this specific issue which we see as a policy issue unrelated to the current procurement. I have attached our briefing document on the issue which includes the previously mentioned summary description of our maritime surveillance system. The document speaks directly to the issues and barriers we currently face. **These barriers can be as effective in blocking technology innovation as the funding and immigration barriers described earlier.**

We can not conclude the discussion of technology barriers without a word about Telstra. Communications is the first and best tool Australia has for overcoming its tyranny of distance. Based on our experience, we believe it would be difficult to find even one innovative business owner who isn't dissatisfied, hindered or utterly exasperated with the disjointed, unresponsive and wholly inefficient deployment of telecommunications--especially cost effective broadband. At issue is not just providing cost effect services to consumers via private, monopolistic or Government services. Rather it is one of developing a critical national infrastructure—much like the US Interstate Highway system that was constructed in 1950’s and 1960’s, and became a massive engine for regional growth. Australia should be at the leading edge of telecommunications infrastructure and true broadband deployment. (Satellite systems and ADSL services with 512/128 kbs capability do not qualify as true broadband.) Korea, Japan, Taiwan, and many other

countries are much farther ahead in deployment of highly capable, low cost broadband systems. The U.S.A. is NOT a good model against which to compare as it is also years behind. Australia should aspire for leadership, but is currently a decade behind the “state of the art” in telecommunications infrastructure.

As in other cases, our approach is to make an “end run” around the IT network barriers. We will solve it by careful planning and expenditures of a lot of money. We have chosen a location three kilometres from the fibre optic ring that encircles Australia. We have determined that by expending substantial amounts of capital, we can pay for an interconnect point, and install a truly broadband fibre optic link to our business location to obtain secure true broadband capability which is essential for our business success. Additionally, we plan to install and operate our own fixed wireless broadband network to connect the business office with the homes of key employees so that they can work at home when appropriate, yet be in constant touch with the office and customers. This is now a prerequisite for modern technology companies.

Models that have worked elsewhere

There have been two particularly effective government initiatives in the United States. The first and largest is the Federal Small Business Innovative Research (SBIR) program launched (as I recall) in the late 1970's or early 1980's. It **REQUIRED** that Federal agencies set aside a small portion of their operating funds (about 2% as I recall) to be directed at the SBIR program objectives. The SBIR program invites new ideas on a broad range of topics of interest to the agency. These can be very broadly or narrowly defined and cover an enormous range of problem areas. The steps and structure are generally as follows:

- Government agencies periodically publish a list of topics or problem areas in which they have an interest. These are generally limited only by the imagination of personnel within the agencies.
- SMEs are invited to submit technical proposals outlining how they would address or solve the problem. Such proposals are generally limited to 25 pages and follow a simple pre-defined format.
- Successful proposers are given Phase 1 funding which may be up to \$100K to conduct feasibility studies, or in some cases to do experiments or build early stage hardware for evaluation. A final report is submitted together with a proposal for Phase 2 funding.
- If the company completing Phase 1 work is deemed to have done a satisfactory job, preferably demonstrating innovation, imagination, and competence, it is awarded a follow-on Phase 2 contract which may be as large as \$1 million. This is generally to create a functional prototype, or otherwise complete all the early stage R&D required to prove the validity of the new idea. **Note that both Phase 1 and Phase 2 funding is virtually all dedicated to early stage technological innovation.**
- Once Phase 2 is successfully completed, the government agency is ready to begin procurement of the product, or the company is in a position to gain venture capital, industrial, or conventional bank financing to carry the new technology to the market place.

Note that no cost sharing is required by the SME. Rather, the proposer must submit a persuasive proposal demonstrating an innovative new approach (which necessarily involves substantial risk) and the technical capability to execute the program. Also, the SME generally retains rights to the intellectual property developed. It does not automatically belong entirely to the government although the government may retain some rights for its own use.

Many technology businesses have been launched using SBIR contracts as the “seed funding,” and the government has accepted the risk of dealing with “start-up” companies recognizing that the people in these companies are highly motivated, and will work tirelessly to convert their ideas to successful products. Over the years I have written about half a dozen SBIR proposals, and been successful about half of the time. In each case, the SBIR contract was an important contributor to the success of the SME.

When the SBIR program was first set up, the screams of pain from the government agencies could be heard from coast to coast. Many agencies were convinced that they had already defined the best path forward on all the problems they faced and resented being forced to direct a portion of their budget to the SBIR program. But government bureaucracies are notorious for lacking good ideas despite their internal beliefs to the contrary. History has shown that innumerable entirely novel and innovative ideas have emerged from the SBIR contracts. Many government agencies are now “addicted” to the idea flow from externally-generated SBIR proposals, and use this “idea flow” as a major source for badly needed problem solutions.

The SBIR program has also generated an intensive secondary networking effect between businesses of all sizes and government. Once an SME has completed a Phase 2 SBIR contract successfully, the government may suggest a linkage with another larger firm to create the pathway to the market place, or to provide the government with the products at the large scales needed. As a consequence a rich network of strategically-linked small and large businesses has formed, and many large businesses now look to their SME "partners" as centres of innovation for additional problems that must be addressed.

The second set of government programs that have successfully stimulated technology innovation are in the U. S. Department of Defense. These started initially in the Defense Advanced Research Projects Agency (DARPA) which has long published invitations to small businesses to address technical problems of interest to the Agency. These have proven to be a rich source of new ideas and resources for DARPA, and have led to many new technologies and products being created to address many needs, not only those of the military. In a similar way, other US Government Agencies including the new Department of Homeland Security manage "Broad Area Announcement" (BAA) programs similar to the SBIR program in starting with a general announcement listing the problem or technology areas of interest to the agency (sometimes with hundreds of topic areas, some of which are broad and some of which are very specific). Ideas are solicited from industry and many of the announcements are specifically directed to SMEs.

Comparable Australian Programs (There are none)

We have identified two Australian programs that bear superficial similarity to the U.S. programs described above. The first is the **DSTO Capability Technology Demonstrator (CTD)** which is funded at about \$20 million per year. In principle any applicant can submit a proposal for consideration. In practice, success requires that the applicant search for sponsors within DSTO who have particular problems that they are addressing. The proposer then works with the DSTO sponsor to develop a new idea or concept which is then submitted through the CTD portal as a proposal directed to the sponsor. Such submissions are usually successful.

Note that to secure funding, the applicant must find an ongoing long term program within ADF and then define a solution to a problem already being addressed. Once the new idea is shaped to fit within the existing "mind set" and within the framework of existing programs, the proposer has a reasonable chance of submitting a successful proposal. But the character and scope of the CTD program is a far cry from the SBIR program as it has evolved in the U.S. Moreover, the CTD program is frequently used by large companies to pursue funding for R and D. There is no specific portal set aside for funding entrepreneurial SMEs.

The Defence Materiel Organization (DMO) maintains an **Unsolicited Proposals Gateway** "to bridge the gap between Defence, industry, and individuals in pursuit of the capability and business process enhancement." We have less knowledge of this program, but our experience suggests that it is but mere window dressing and appears to be undertaken without resources or enthusiasm.

The **AusIndustry Commercial Ready program**, derived from R and D Start, provides cost-shared funding for R&D. Commercial Ready was broadened to specifically include coverage of early stage companies and "start-ups" that are just getting underway. However, our experience thus far is that Commercial Ready managers do not yet have an appetite for funding start-up firms in spite of program directives to do so. Like venture capital investors, Commercial Ready thus far prefers to confine its attentions to lower risk programs with firmly established firms, not innovative new enterprises. Hopefully this prejudice will change in the future. While a step in the right direction, the requirement for 50-50 cost sharing does not address the barrier of seed funding that must be faced by the entrepreneur with a new idea and limited resources.

Conclusions

Government has long recognized the lack of technology innovation in Australia and through programs such as Commercial Ready, COMET, IIF and others has attempted to address this need. State governments have similar initiatives. But the absence of seed funding through a variety of vehicles, and the lack of tradition in innovation and entrepreneurship that is taken for granted in Silicon Valley and surrounding universities does not yet exist in Australia. Providing programs modelled after the U.S. SBIR program can assist with the seed funding problem.

Australia is evolving from an agrarian and mining culture, or at best one that values touch labour and hard assets above all else. We believe, based on our experience that it is not enough to provide incentive programs and support to innovators like the U.S. (SBIRs, Small Business Administration and loans). To change the existing cultural inertia, Australia government policies must become much **more** aggressive than the US/Japan/China/UK/EU about supporting innovation.

We have no simple suggestions about how to address the cultural differences, willingness to take risks, and lack of early stage company management talent. These are likely even greater barriers. A major push over many years will be required to help entrepreneurs and SMEs to develop and demonstrate their ability to innovate and succeed. Once the culture is seeded with enough success stories of technology businesses that create substantial value, the process will become self-sustaining. Even with a major increase in well thought out government support, Australia is more than a decade away from this point.

We wish to conclude on a positive note. As Americans coming to Australia, we see Australia as potentially the richest land of opportunity in the world over the next decade. We are betting our livelihoods on it. There are quirks in the systems and in the culture which work to impede the deployment of Australian technological potential which is really the deployment of human imagination and creative drive. These basic forces are abundant in the Australian character. Given the right funding, cultural, and policy environment, we believe that the Australian economy, standards of living, and national security can advance at an impressive pace.

Respectfully submitted,

/s/ Frederick E. Moreno

attachments: 2 page description of i3 Aerospace Technologies status and issues; 1 page product description

Issues, Background and History - March, 2005

Summary

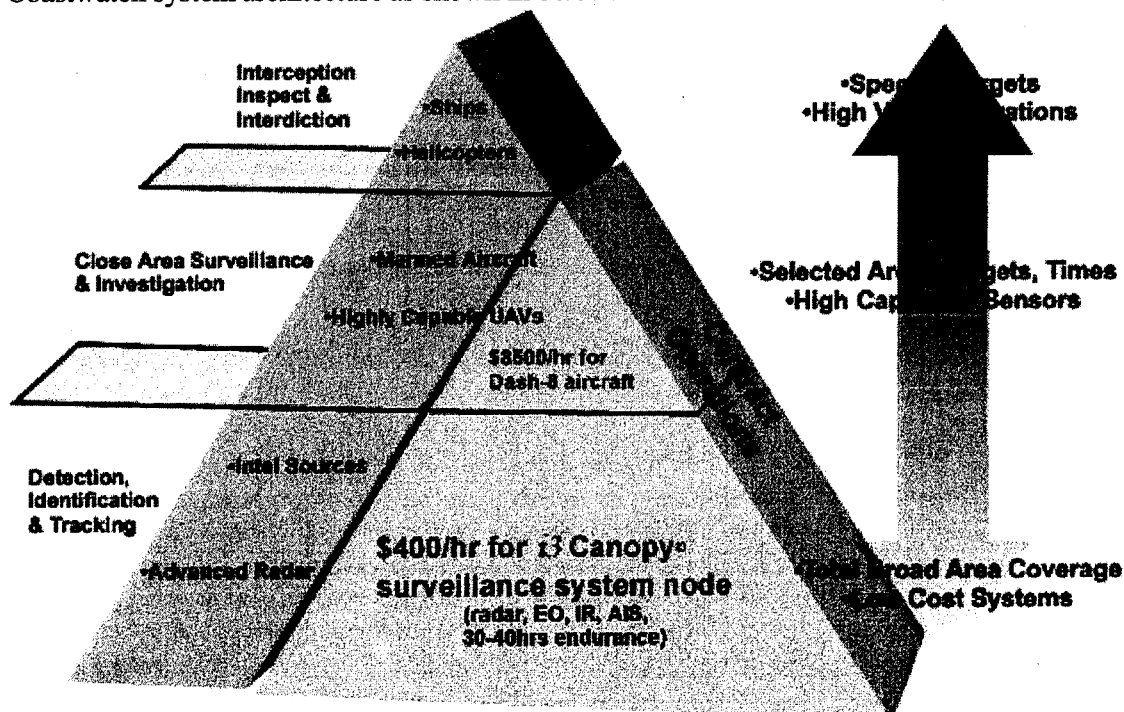
Our company is focused upon the development of new maritime surveillance technology that will dramatically cut costs and improve surveillance effectiveness. Coastwatch policy is inhibiting private investment in this critical area. We request a clarification of policy regarding new technology adoption.

Our Mission

There are customers that need to see the earth with much greater persistence, lower cost, and greater flexibility than is currently possible. This problem comes sharply into focus with peacetime (civilian) maritime surveillance – the need to see objects and activities on the broad expanses of oceans – which is the Customs Coastwatch mission in Australia. The problem is a top level, global issue. National security, terrorism, illegal immigration, safety of off shore assets (e.g. NW Shelf oil and gas platforms, LNG tankers) are all top level problems for governments and industry. **What is missing is truly persistent surveillance at an affordable cost.**

Recognizing this, we have devoted the last 18 months to design a unique, cost effective and highly capable surveillance system to fill this gap with low cost, truly persistent 24/7/365 broad area surveillance. Moreover, our approach is designed to compliment and mesh with existing higher cost assets providing the “foundation” for broad ocean detection, monitoring, inspection, and interdiction capability. Through a process of exhaustive technology surveys, detailed technical analysis, and careful mission and economic modelling we are convinced that truly persistent and effective maritime surveillance is achievable with at least a ten fold cost reduction (\$/sq. km) compared to current Coastwatch manned aircraft or military-derived unmanned aerial vehicles (UAVs) such as Global Hawk and Mariner .

We suggested to Coastwatch in February 2004 that optimal results would obtain from an overall Coastwatch system architecture as shown in below.



The most capable assets at the top of the “pyramid” are the most expensive and therefore the fewest in number. They would be reserved for specific, directed, mostly non-routine activities for which they are best suited. The lower part of the pyramid would provide true persistence with low cost platforms of extreme endurance and range carrying capable sensors. Coastwatch personnel responded that we had “hit

the nail on the head.” **The problem is that there is no technology that fulfils this need (the lower portion of the asset pyramid) at affordable cost.**

Solution – the **CANOPY ©** integrated surveillance system is described in the one page attachment that follows. Applied to Coastwatch, the benefits include surveillance via a network of low cost unmanned aerial vehicles and associated information technology systems for \$400/hour/aircraft as opposed to an average of \$3500/hour/aircraft for the manned aircraft currently used for the Coastwatch mission.

Core Competence

Our team combines experience in R&D, technology development, satellite operations, advanced signal processing and software, project management, company management, aviation, and other disciplines. Our experience was gained from the technology, space, military, and other backgrounds while in Silicon Valley, other U.S. locations, U.K., and Alice Springs (Pine Gap). We recognized a need for off shore surveillance at costs far lower than possible through the traditional military paradigm.

Status

We have formally briefed Coastwatch in late 2003 and 2004 and provided subsequent updates through March of this year. Because our company is early stage and our technology not yet proven, we did not qualify for the Coastwatch CMS-04 procurement, and would have been dismissed out of hand as “non-responsive” had we submitted any kind of tender offer. We have gained enthusiastic support from various State and Commonwealth agencies responsible for regional and business development, and submitted proposals under a variety of schemes, all of which require 50-50 cost sharing between private equity investors and government financial sources.

Securing the private equity investment for an early stage technology enterprise has proven extremely difficult. A long time Perth-based investment banker-turned-consultant has described it as “Virtually impossible in WA” which has been confirmed by our experience. “Venture capital” even under the Government-supported Innovation Investment Funds requires that the entrepreneur have an “operational prototype” and customer purchase orders in hand in order to qualify for consideration.

We have done an “end run” around the seed investment problem by developing a relationship with Romteck, a highly capable electronics design and manufacturing company in Perth with a broad and impressive technology product line. Romteck has internal venture capital resources for investment in early stage companies that can also act as market outlets for Romteck-designed and manufactured electronics. We determined that Romteck can design and manufacture about 80% of the CANOPY© system electronics. The balance can be purchased and integrated with the rest of the system. The combination of our surveillance/reconnaissance, aviation, and technology experience together with Romteck’s capability in electronics design and manufacture provides us with unique capability to complete the technology development. This would include constructing a “prototype” operational system which can be used for test and evaluation purposes by Coastwatch and subsequently for other similar clients. Many other “civilian” applications could be addressed once the technology was demonstrated in off-shore maritime surveillance.

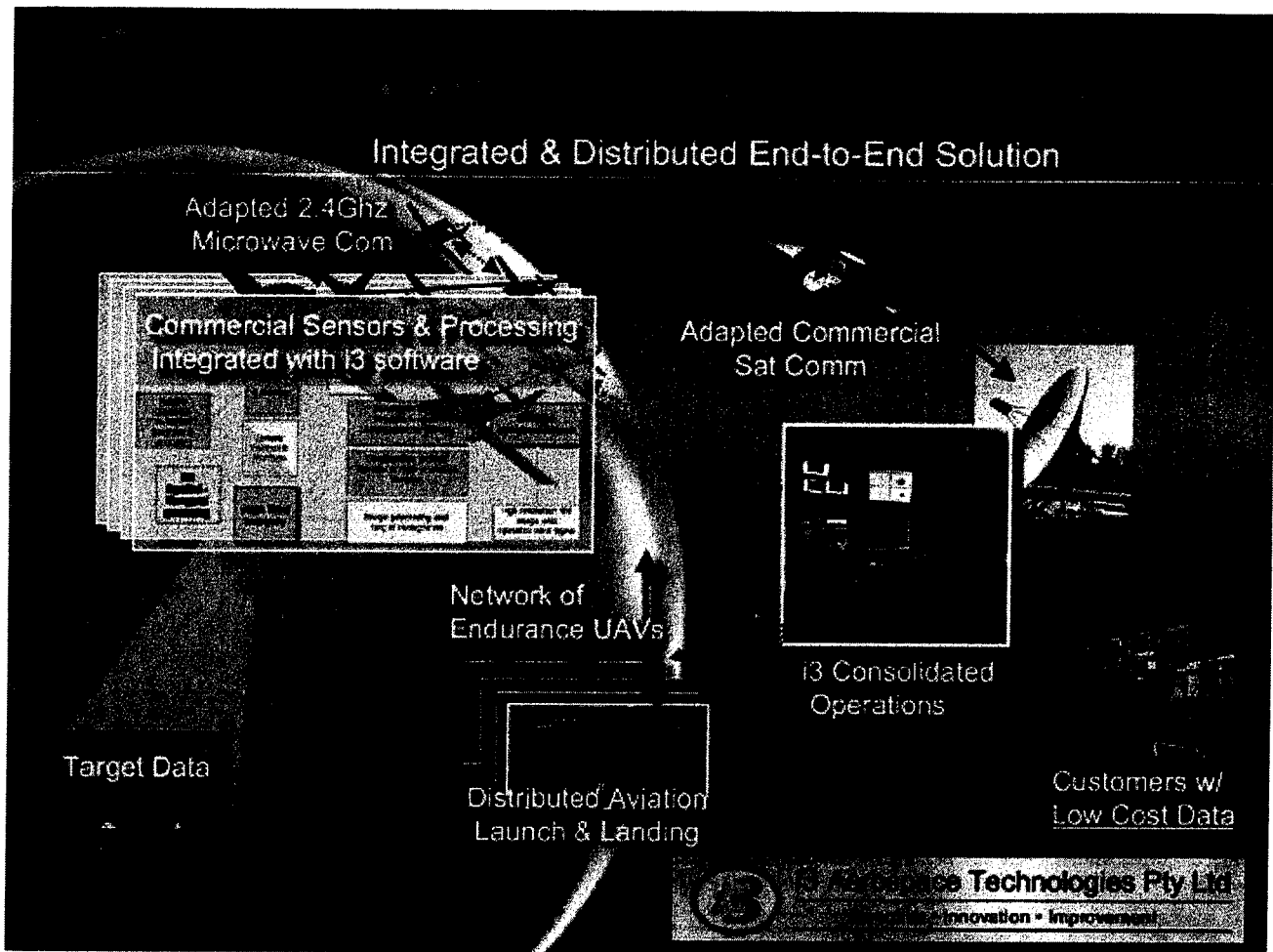
Issues and Needs

Before making a commitment for equity investment, Romteck (like any professional investor) requires assurance that there will be market opportunities. We approached Coastwatch to arrange a meeting to provide an update briefing and confirm that notwithstanding the CMS-04 procurement and subsequent long term contract, Coastwatch would remain open to consideration of new and emerging technologies that would permit improved mission capability with reduced costs. Investors need to know that if substantial sums are spent on a technology prototype to improve Coastwatch capabilities, Coastwatch will be willing and able to objectively evaluate the new technology and then procure surveillance services using the new technology if the technical and financial benefits can be clearly demonstrated.

Coastwatch declined our request for meeting citing probity and the current tender evaluation, stating that they can not comment until the new contract is signed. This is further delaying, and even jeopardising any private investment decision. We do understand and respect the constraints under which government civil servants must operate.

What is needed now is a policy-level statement from government confirming that Coastwatch will be in a position to actively evaluate new technologies and then procure new supplementary surveillance services if the new technologies provide clear technical and cost advantages. **Without such a clear statement and implied encouragement, no private investment funding will be forthcoming to address this clear and pressing Australian need.**

A brief description of the CANOPY© surveillance system follows.



The **CANOPY** © system integrates

- An array of carefully selected and modified sensors (including radar, optical, infrared, AIS interrogation) that survey broad areas of ocean.
- Sophisticated automated target detection algorithms that maximize detection probability, find targets in noisy surveillance fields, and minimize the need for ground monitoring and associated “back end” costs.
- Advanced software that uses the radar data to automatically find targets and “cue up” the optical/IR cameras to gather data during subsequent close-in target encounters.
- Highly sophisticated signal processing to enhance sensor performance using advanced methodology and software which we have proven elsewhere.
- Capture and immediate transmission of high resolution still images or lower resolution compressed video as required.
- Storage on board of high resolution data in mass storage elements permitting after-mission download of all mission data in a format suitable for judicial proceedings.
- Sensors, controls, signal processing, data storage, and communications equipment are carried by a unique, highly capable UAV capable of **7500+ km range and 30+ hours endurance**. It is based on proven airframe and power plant systems.
- **Low cost UAV arrays** can be deployed cost effectively yielding truly persistent surveillance & exceptional coverage.
- UAVs will communicate efficiently with compressed data via satellite and/or microwave network links between UAVs and the central ground control facility so as to reduce the need for limited and expensive satellite bandwidth.
- Data is directed to the central ground control facility and forwarded in real time to end users.
- Detailed costs projections allow **total loaded surveillance costs provided on a contract basis of ~A\$400/hour**.
- For Australia Coastwatch, manned aircraft costs average \$3500/hr, while the most capable aircraft (DeHaviland Dash 8) have an operating cost of ~\$8500/hour. Major cost benefits (based on \$/square kilometre of surveillance) and endurance/persistence benefits compared to satellites and manned aircraft can thus be gained using the **CANOPY**© system.