# TECHQUAD:

# CREATING JOBS AND ECONOMIC PROSPERITY BY HARNESSING THE TECHNOLOGICAL BASE OF SOUTH EAST QUEENSLAND

A Report from the TECHQUAD Task Force

to The Minister
for Business, Industry and Regional Development

via

The Conference of Queensland Vice Chancellors

December 1993

*DISCUSSION DOCUMENT, NOT FOR PUBLIC RELEASE*

# CONFERENCE OF QUEENSLAND VICE-CHANCELLORS

Chairman: *Professor B.G. Wilson*
*Vice-Chancellor*
*The University of Queensland*

The Honourable Jim Elder, MLA
Minister for Business, Industry
and Regional Development
Enterprise House
46 Charlotte Street
BRISBANE QLD 4000

8 December, 1993

Dear Minister

We are pleased to forward, with the endorsement of the Conference of Queensland Vice-Chancellors, the attached copy of the report of the Techquad Task Force for your consideration. In our view, the Task Force has well met the objectives they were commissioned to achieve.

The report outlines a vision for the accelerated development of the "Technology Quadrangle" in Southeastern Queensland and recommends specific action steps to achieve that vision. The vision is one which promises significant job creation and economic development benefits for the region, which should overflow into other parts of the State as well.

A key recommendation focuses on the establishment of a substantive partnership between government, academia and industry. A central element of that partnership would be formed through an organisational vehicle which would be responsible for delivery of tangible progress for the development of Techquad.

We seek your support for implementation of the action steps recommended by the Task Force, beginning with the needed organisational initiative. As an indication of our institutional commitment to Techquad, the universities we represent are prepared to join with the State Government in making significant financial and other contributions.

A specific proposal to create the needed organisational vehicle based upon government, university and private sector sponsorship is in preparation. We hope to discuss this proposal with you and address any questions you may have in our scheduled meeting on 17 December.

We hope you share our enthusiasm for Techquad, and look forward to the prospect of working together with your government and others to realise its true potential.

Your sincerely

R. D. Gibson
Vice-Chancellor,
Queensland University of
Technology

H. Messel
Vice-Chancellor
Bond University

L. R. Webb
Vice-Chancellor
Griffith University

E. T. Brown
Acting Vice-Chancellor
The University of Queensland

TECHQUAD
• TASK FORCE •

14th Floor
410 Queen Street
Brisbane Qld 4000

GPO Box 2577
Brisbane
Qld 4001

Phone: (07) 221 1485
Facsimile: (07) 221 8703



7 December 1993

The Honourable Jim Elder, MLA
Minister for Business, Industry
and Regional Development
Via the Conference of Queensland Vice Chancellors

Dear Minister,

Attached for your consideration is a copy of the Techquad Task Force report. The report represents the result of a cooperative effort undertaken between government, industry and academe over the last 18 months. Earlier drafts have been reviewed with senior officers of your Department, and this document reflects their input. Since the attached report is intended for limited and not public distribution, we plan to prepare and release a more suitable version for promotional purposes at a later appropriate time.

As you know, our Task Force was commissioned to assess the potential and define a strategy for accelerated technology-based economic development in South East Queensland. Our work has led us to conclude that we have within our grasp a momentous opportunity to create Australia's equivalent of the North Carolina Research Triangle. The Triangle initiative delivered substantial job creation and economic benefits to enable that region to have significantly lower unemployment and higher economic growth rates than the rest of America.

We in the Task found our Techquad region has all of the key ingredients for success found in the Research Triangle and other notable world centres of knowledge-based industries. These particularly include the needed "critical mass" of intellectual capital - as found in our network of Techquad universities. Nonetheless, global, as well as national competition for attracting such high-value industries is intense, and the Task Force concluded that additional action steps are needed to ensure our opportunity is not lost.

As outlined in the recommendations of the Task Force, the first proposed step involves the establishment of an organisational vehicle to embody the needed partnership between industry, government and academe. This entity would be charged with the responsibility for realising the opportunity of Techquad. Importantly, it would do so by strengthening linkages and networks, and helping to create synergies, between the many relevant initiatives already underway. We are separately defining a specific, actionable proposal to make this happen.

We members of the Task Force are pleased to have had the opportunity to serve the interests of our regional community. We are each indebted to our employers and other organisational sponsors, who enabled us to donate time and effort to this task. We hope you will agree the work was worthwhile, and view it as an important step forward toward realisation of the Techquad vision.

Yours faithfully,

R. L. Sampson
Chairman

**Techquad is the "regional brand name" for the "Technology Quadrangle" - a concept of technology-based economic development in South East Queensland (SEQ),** principally along the Brisbane-Gold Coast corridor. In its essence, **Techquad means job creation and economic growth** by capitalising on the human intellectual and skill-based resources, along with other factors of the region to attract and develop **clusters of knowledge-based industries.** Such industries involve research and development in any field or the production and commercialisation of technology-based products and services. They make major contributions to regional economies, and are the sources of **high value jobs which are both socially and environmentally desirable - since they are based upon intellectual, and not natural resources.**

**The Techquad Task Force was formed to find a way to build on the strengths of SEQ to turn the concept of Techquad into a reality,** thereby addressing some critical jobs and economic challenges faced by the region. **A collaborative, voluntary effort between industry, academia and government,** the Task Force first assessed overseas experiences to identify the key steps to success. They thereby **identified the North Carolina Research Triangle as a particularly relevant success model and benchmark.**

## FINDINGS

Upon analysis, the Task Force found that the Techquad region compared quite favourably in key success factors to the Research Triangle in its developmental stages. Specifically, the Task Force found that **the Techquad region is endowed with a relative wealth of both natural, institutional and human resources upon which regional competitive advantage can be built and sustained.** These resources include: climate; lifestyle; physical infrastructure, such as transport and communications; evolving institutional linkages between government, industry and academe; and, most importantly, four major universities and a strong technical training system to provide the critically needed pool of human intellectual and skill-based assets.

The Task Force also found that, on an informal, albeit fragmented basis, **Techquad is already developing.** However, the rate of progress was found to be well below its potential and below the level needed to meet major employment and competitive challenges. The employment challenges are found in the fact that **a significant gap is currently projected during the next two decades between: (a) the number of jobs needed in the region to merely maintain current levels of unemployment; and (b) those which can be projected on the basis of current trends and initiatives.** The other challenges arise because **regions throughout the world are strongly competing to establish clusters of knowledge-based industries,** and Techquad was losing major opportunities to other Australian regions. Indeed, because national competition was intensifying, the Task Force found that **"time is of the essence" for Techquad to either establish a leader's advantage or be relegated into the background** for decades.

Based upon its findings, **the Task Force proposed a strategic plan to meet the challenges, incorporating: a vision; specific, actionable goals; strategies to reach those goals; and specific steps to implement the strategies.**

## THE VISION

**Within the concept of a "Pacific Triangle" of technological innovation formed by Australia, the United States and Japan, Techquad will become an internationally recognised centre for regional clustering of research and development institutions and high value-added industries involved in technological innovation. Techquad will deliver substantial benefits to the local community in the form of increased economic prosperity and the creation of socially and environmentally desirable jobs.**

This vision builds upon the reality that, amongst Pacific Rim countries, Japan and the US still dominate technological innovation, while Australia enjoys special bilateral relationships with both of those countries. In this context, **Techquad appears well positioned to become a key node in a vibrant network of technological centres likely to emerge across the Asia Pacific Economic Cooperation (APEC) region.**

## PRIMARY GOALS

**By the year 2010, Techquad will: (1) create 35,000 new technology-based jobs, leveraged to at least 100,000 total new jobs through support demand and economic multiplier effects; and (2) progress average weekly wages in the region from about 6% below the national average to 6% above - without corresponding increases in the local cost of living.**

These goals are realistically based upon what was actually achieved in the Research Triangle.

## BROAD STRATEGIES

To achieve the goals of Techquad; **(1) the alliance between government, industry and academe must be strengthened through innovative institutional linkages; (2) initiatives must be taken to build the infrastructure needed to mobilise and leverage the intellectual resources of the region to create competitive advantage; and (3) regional identity must be built and used to attract to the region the involvement of national and international organisations who operate at the leading edge of technological innovation in their industries.**

## THE INITIAL ACTION STEPS

The Task Force proposes a series of specific action steps beginning with the following:

1. Form the Techquad Institute. Recognising that reaching goals can only be attained if adequate and accountable resources are allocated to the task, **the Task Force recommends establishment of the Techquad Institute (TQI), a small, catalytic organisation modelled after highly successful Research Triangle entities.** The Task Force defined specific actionable roles for the Institute, which would **serve as an adjunct network to existing initiatives of government, universities and other regional institutions.** The Institute would not only avoid direct duplication of effort, but help build synergies through linkage between initiatives arising from otherwise independent interests.

Based upon analysis of the options, **the Task Force recommends that the TQI be constituted as an independent, non-profit company.** Although it necessarily must be private sector led, the TQI should be directed by a Board structure representing the various funding stakeholders of Techquad, including the State Government and the Techquad universities. **The Institute should be housed in an appropriate, high profile location, such as the proposed Clunies Ross House in the Brisbane Technology Park.** If done, the park could appropriately be renamed the "Techquad Park", with other regional research and technology parks also renamed in a complementary manner to portray a network of parks, rather than a single location.

On a preliminary basis, **it is estimated that the Institute would require an annual operating budget of about $1,000,000, with the exact amount dependent upon the structure and mission adopted.** This budget would be funded by the primary stakeholders, including the State Government and Techquad universities. It would enable the Institute to undertake specific roles proposed by the Task Force and be accountable for the accelerated development of Techquad. In the view of the Task Force, **such a level of funding would be well justified by the potential economic and employment gains.** Progress should be reviewed after three years to confirm the basis for continued future funding.

2. Extend Regional Headquarters Incentive Program. As a primary marketing tool for the Institute, the **Task Force recommends the State Government extend the tax concession program recently formulated to encourage location of regional headquarters in Queensland to new, properly qualified Techquad facilities establishment.** Such an extension would be consistent with the intent of the regional headquarters initiative and counterbalance competitive regional incentive schemes. Although it is recognised that such incentives do not provide the major reason for location of new organisations in a region, **such incentives can prove decisive when two or more regions appear equally acceptable for strategic reasons.** Importantly, in this regard it should be noted that establishment of the knowledge-based industry clusters targeted by Techquad promises much more employment and economic leverage than regional headquarters.

3. Establish the Techquad Roundtable. Amongst other recommended action steps is the establishment of the Techquad Roundtable - **a forum for senior executives from industry, government and academe to sustain an active network** to exchange ideas and **promote and facilitate the development of Techquad.** This forum could evolve from, but extend beyond the membership of the Techquad Task Force.

## IN CONCLUSION . . .

The Techquad Task Force recognises that the recommendations presented above merely represent starting points for a needed and concerted regional effort. **The objective is to realise a vision under which South East Queensland achieves its potential for making extraordinary progress in job creation and economic growth - importantly in ways which enhance the standard and quality of living in the region.** Longer term, Techquad may be expected to serve as a hub of technological development with spokes extending to regions throughout the State. Additionally, the learnings for Techquad's development could be extrapolated to facilitate development in other regional centres of the State. **Importantly, the path to regional success is not a high risk or highly uncertain one. Indeed, it is a proven path successfully used by others working with no more than what is available today in Techquad. The Task Force believes the time has now come to take substantive steps toward turning the vision of Techquad into a reality!**

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# 1. BACKGROUND

The Techquad Task Force evolved as a cooperative effort between industry, academe and government to address certain challenges and opportunities facing the community in Southeast Queensland. Their task was to find a way to turn the concept of Techquad into a reality.

## 1.1. TECHQUAD AND THE TASK FORCE

Techquad is an abbreviation for the "Technology Quadrangle", which represents **a concept of regional, technology-based economic development in Southeast Queensland, principally along the Brisbane-Gold Coast corridor.** Essentially, the concept is one of capitalising on the human intellectual and skill based resources, along with other factors of the region, to attract and develop clusters of knowledge-based industries. Such industries are sources of high value jobs and make major contributions to regional economies.

**The conceptual cornerstones of Techquad are provided by the universities of the region**: University of Queensland; Queensland University of Technology; Griffith University; and Bond University. **These educational and research resources are complemented by the vocational training and skill-development resources of the Training and Further Education (TAFE) system,** as well as the network of other universities throughout the State.

Techquad was conceived in 1987 by Professor Roy Webb, Vice Chancellor of Griffith University, as a "corridor of cooperation" between the universities. This led to establishment of an informal protocol between the universities to enhance co-operation in research and development activities. This protocol was formalised in 1990 as a special activity under the auspices of the Queensland Conference of Vice Chancellors (CQVC).

The 1990 protocol stated an objective to facilitate the development of "a cumulative, self-reinforcing investment process, based on research and development in high technology" in the Techquad region. Importantly, the protocol recognised that "cooperation between the four university partners in Techquad is a key element of this process, but not a sufficient basis for its ultimate success. The support and co-operation of the Queensland Government and its departments and agencies, local government authorities, and the private sector are vital."

The protocol also recognised that, although the focus of the activities would be within the Techquad geographical region, a network with the other Queensland universities would necessarily extend its benefits throughout the State.

Through the Department of Business, Industry and Regional Development (D-BIRD), the State Government supported further development of the concept and encouraged its use to promote collaborative ventures and attract high technology industries to the region. Initial successes included the relocation of software development and support organisations for the Digital Equipment Company (DEC) and the Hong Kong Jockey Club into the Techquad region.

**In 1992, a Task Force was commissioned under the auspices of the CQVC to establish a common vision, strategic plan and community support base for further and accelerated development of the Techquad concept.** The Task Force was organised under the sponsorship of the State Government, the four universities and the non-profit Queensland Research Institute Limited (QRI). The group was chaired by Professor Ron Sampson with the co-sponsorship of QRI, Griffith University and Procter and Gamble Australia Pty Ltd.

Contributions from the public sector sponsors provided funding for Secretariat support of the Task Force which was delivered by QRI. The Task Force drew membership from senior executives in both the private and public sector, with each person sponsored by his/her employer or another organisation. This sponsorship amounted to a significant "in-kind" contribution from each involved individual and organisation.

**BACKGROUND (CONTINUED)**

Upon formation, **the Task Force adopted the following mission:**

**"To accelerate technology-based, economic development in Southeast Queensland by mobilising intellectual and skill-based resources in concerted action and fostering the development of needed infrastructure."**

The work of the Task Force was initiated through a major "Challenge Conference" held in mid-1992 which gathered together key thought and community leaders from the private and public sectors.

A set of "Core Teams" was organised to address the key issues in the following areas: infrastructure development; government policy and initiatives; human and organisational resources mobilisation; property and financial development; sectoral initiatives; and communications. Involvement of other interested parties in the community was solicited, and nonmembers who contributed to the work of the Task Force were recognised as "Task Force Associates".

Identification and analysis of success models was based upon literature research and direct investigation through contacts with relevant overseas organisations and visits to their locations. The cost of such travel was underwritten by individual Task Force members and/or their sponsoring organisations.

## 1.2. THE BASIS FOR INTEREST IN TECHQUAD

**The basis for community interest in the concept of Techquad is found in the enormous job and economic benefits Techquad promises to deliver.** The benefits are derived from knowledge-based industries which are the drivers of technological innovation.

To better understand the implications of this, it is useful to reflect on what the terms "technological innovation" actually mean.

Broadly speaking, **technology may be defined as: "the application of science, or any organised body of knowledge, to solve practical problems".** This definition suggests that technology is more than just "high technology" which deals with complex sectors of industry, such as microelectronics, information technologies or biotechnologies. Indeed, under its broad definition, technology relates to the interests of virtually every one in the community.

Similarly, **the process of innovation may be defined as: "the process of creating change by introducing something new."** Combination of these terms therefore refers to the knowledge-based forces driving the enormous rate of change in the world - in any and all industries. This reality is recognised by many authoritative researchers throughout the world.

For example, **the management guru, Peter Drucker, sees technology as a principle driver of economic growth and the development of entrepreneurial economies.** Similarly, it's importance is described by **Michael Porter of the Harvard Business School** in this way:

> **"Technological change is one of the principal drivers of competition.** It plays a major role in industry structural change, as well as in creating new industries. . . Of all the things that can change the rules of competition, technological change is among the most prominent."

In his analysis of the competitiveness of nations, Porter went on to say:

> "An upgrading economy demands a steadily rising level of technology. Improvements in technology, broadly defined, are integral to . . . penetrating new industries and segments, and (are) the underpinnings of productivity growth."

**BACKGROUND (CONTINUED)**

It follows that technological innovation (TI) is the basis for competitive advantage in high value goods and services. It involves the conception, development and application or commercialisation of new technologies. TI encompasses the conduct of research and development in any field, as well as the production and marketing of technology-based products and services.

**TI-based jobs are high pay and high value ones which are knowledge-based and require human resources with significant intellectual and technical skills.** In general, these jobs are highly desired by communities because they are socially and environmentally compatible - since they are based upon intellectual, and not natural resources.

**Kenichi Ohmae**, recognised author and Managing Director of McKinsey and Company in Japan, underscored a basis for interest in TI jobs when he observed:

> "A modern government's concern is jobs. . . But what we have observed over the past decade is that (the) conventional wisdom is wrong. . . Most governments want foreign producers to come in and build factories. . . What they don't realise is that . . . production . . . is usually just labour that creates no more value than it costs. . . **Countries will gain a lot more important and profitable parts of businesses if they can attract R&D, engineering, financing and marketing functions.**"

In other words, **TI-jobs add more to an economy than production ones.** They also command premium pay and are highly satisfying to the people involved, while providing leverage through multiplier effects to create many more, lower skilled jobs. As described below, they do the latter by increasing demand for many peripheral and lower skilled jobs in a community.

**Robert Reich**, currently the U.S. Secretary of Labor and a former Harvard University professor, reinforced this point when he observed the following :

a. "The aim of economic policy is to maintain and improve the standard of living of a nation's (or region's) citizens."

b. "Our standard of living depends mostly on what work we do."

c. **"The work we will secure in the new global economy will depend on our skills and on the quality of our infrastructure** - the physical assets like telecommunications, roads and ports which support production."

d. **"Because technology and capital are more mobile than people, the high-value tasks we will want to do will gravitate to the workforce with the skills and support facilities to do it best."**

Reich also stated a belief that **value is no longer a component derived from production but rather from design and the development of niche products.** In other words, the main assets of competitiveness no longer are factories and low cost and skilled labour, but intangible skills associated with R&D, trade marks, speed to market, and brand names.

These recent authoritative views are consistent with prior notable findings. For example, in the 1984 milestone analysis of "Technology, Innovation and Regional Economic Development", **the Office of Technology Assessment (OTA)** of the Congress of the United States reached several important and relevant findings.

While the OTA observed that such jobs only represented a minor proportion of national employment in the total U.S., **TI-jobs were found to play a major role in the economies of many regional communities,** such as the Research Triangle region in the State of North Carolina in the United States. Furthermore, they found that **employment in technology-based industries grows at a much faster rate than overall employment** - admittedly from relatively small bases.

**BACKGROUND (CONTINUED)**

Importantly, in the mid-1980s officials in **the U.S. Department of Commerce uncovered significant leverage in technology-based job creation**. Their exploratory work suggested job leverage much higher than can readily be documented as additional support or peripheral jobs are created in a community for every new technology-based job. The support jobs include those which provide the support and service infrastructure and also include such diverse groups as accountants and bakers.

Conservative estimates could appropriately be based upon a combination of documented reports of direct total support jobs with indirect job multipliers. For example, France's Sophia-Antipoles is reported to have delivered direct job multipliers of 2.2 for their technology based jobs. To this could be the added leverage of indirect jobs created by economic flow through.

Factors from the literature suggest that each $1 million of new funds injected into a local economy indirectly generates over 24 additional jobs. To illustrate this effect, about 32,000 employees within the Research Triangle Park draw an annual payroll of $US2 billion. That local payroll, which importantly is sourced outside the region, would therefore generate a demand for about 50,000 other jobs as a minimal economic flow-on within the region. This suggests a 1.6X indirect or economic multiplier.

**A cumulative job leverage factor of about 3.8 is therefore suggested through the combination of direct and indirect multipliers.** This suggests the Research Triangle Park, for example, may be responsible for delivering a new demand for over 100,000 new jobs, although some support jobs would flow beyond the region and economically driven ones would be hard to trace.

Significantly, the OTA study found that technology-based employment growth is largely based upon large, multilocation firms, which were tending to become more internationally dispersed. In other words, **multinational firms were found to be a primary initial source of such technological jobs for a region.** Such large firms were also found to be trending toward global decentralisation of these functions.

At first glance, this finding appears to contradict what is known about the general employment profile - that is, the local small business sector is the prime source of new local jobs. However, this finding is quite consistent when one considers the fact that **the leverage effects of technology-based jobs primarily foster additional job growth in the local, small business sector** - in both supportive, "high tech" enterprises as well as "low tech" indirectly induced ones.

Global experience reveals that communities can set the stage for development of clusters of "spin-out" and other start-up technology enterprises by: (a) establishing a local "critical mass" of highly educated workers who produce advanced technologies for world markets and (b) attracting multinational organisations to locate in the region. These regional clusters abound in the U.S., and are known as "Hot Spots".

An example is provided by the so-called "Silicon Hills" region around Austin, Texas. Its development is attributed to what was described as an "uncommon alliance" between state and local government, business and the University of Texas. Forming a critical mass by attracting firms such as IBM and Motorola, the region then attracted new major technological consortia, such as the Microelectronics & Computer Technology Corporation and Sematech Inc. Cumulatively, the region nurtured the establishment of 450 firms generating over 55,000 high paying jobs (without considering the leverage factor) and has held unemployment in the region well below the national average.

**The importance of such technology-based clusters to a regional economy is widely recognised.** David Harrington, an Australian consultant who has studied industrial policy matters, observed: "Most nations that have achieved world competitive advantage and a growing standard of living have nurtured industry clusters."

**BACKGROUND (CONTINUED)**

**Michael Porter** pointed out the localised leverage effect of clusters when he observed that:

> **"Competitive advantage is created and sustained through a highly localised process.** Competitive industries are not scattered helter-skelter throughout the economy but are usually linked together . . Nor are clusters usually scattered physically; they tend to be concentrated geographically. . . One internationally competitive industry also creates new related industries, through providing ready access to transferable skills, through related entry by already established firms, or by stimulating entry indirectly through spin-offs. . . Once a cluster forms, the whole group of industries becomes mutually supporting. . . **Firms from an entire group of interconnected industries all invest in specialised but related technologies, information, infrastructure and human resources, and numerous spill-overs occur.** . . The pull of size and prestige in attracting talent to the cluster becomes stronger. . . **The cluster of competitive industries becomes more than the sum of its parts."**

Because of the major contributions TI-jobs make to the prosperity of a region, **competition between communities to source these jobs is intense throughout the world.** Local initiatives focus on both attracting existing organisations to locate within the region and also to nurture developing new organisations from within the region.

Overall, it's obvious that the concept of Techquad presents enormous opportunities. What is less obvious are the keys to successfully competing with other regions around the world.

## 1.3. REALISING THE OPPORTUNITIES

Study after study concludes that **realising such opportunities requires the "uncommon alliance" of industry, government and academe with a shared commitment to a common vision - a vision which strengthens community identity and pride.** With such a shared vision and commitment, the well documented pattern of success can be adapted by each sector from the many success models available.

**The success models are invariably based upon coalitions between the three sectors which designed and implemented policies to encourage growth by building on the intellectual capital, particularly the academic resources available within a region.** Such policies relate to: building infrastructure; fostering idea exchange and trust development between the sectors; undertaking spirited and cooperative planning and promotional initiatives; and fostering the development of seed and venture capital sources.

Pointing out the intense competition between regional communities to promote technology-based, economic development, the OTA report identified some of the roles for each sector to play in creating success.

### 1.3.1. *The Role of Government*

**Michael Porter** summed up a key responsibility of government when he said:

> **"Stimulating improvements in science and technology is a widely acknowledged role of government."**

Based upon his global research, he summarised the key characteristics of government policy needed to spawn technology-based growth. These included:

1. **Matching science and technology policy with the region's mix of competitive industries, its stage of competitive development, and the capacity of its firms and research universities.**

2. **Developing strong links between research institutions and industry,** particularly noting that internationally leading industries are most frequently associated with specialised research institutes or university departments, often located in close proximity.

**BACKGROUND (CONTINUED)**

**The importance of academic/industrial cooperation in the development of human capital was underscored by the OTA.** This involved meeting needs for both improving science and engineering training, and also **providing continuing education for those already employed in industry.** The latter need is particularly critical in a time of rapid technological change wherein skill obsolescence occurs rapidly without continuing education. **Today's world clearly mandates a need for "life-long learning" for anyone seeking to make and sustain high value contributions - that is, anyone seeking a high value job.**

According to OTA findings, research partnerships were a key vehicle to match the special needs of technology-based industries with the unique resources of the educational sector. University-based research centres, such as the Microelectronics Center of North Carolina (MCNC) in the Research Triangle, were also cited as significant catalysts for university/industry collaboration.

Others reinforce the importance of enhancing such linkages through institutional innovation to harness the benefits of technological change. For example, using the agricultural sector as an example **Vernon Ruttan of the University of Minnesota** pointed out:

> ". . . **institutional innovations can be designed to generate technical change in a manner consistent with resource endowments** and product demand and to bias the incidence of benefits and burdens in a manner consistent with social policy. . . . The evidence suggests that the institutional linkages that have provided effective articulation between science, technology and agriculture (for example) have continued to be productive sources of economic growth in both developed and developing countries."

In other words, **the benefits of technological change can only be realised if appropriate linkages are made between sectors via innovative organisational approaches.** These are appropriately nurtured by government - obviously in a cooperative framework with industry and academe.

In its major study, **the OTA** also found that **successful State and local government initiatives to support the development of regional technology-based growth focused on creating the cooperative institutional networks that constitute the technological infrastructure.** These initiatives strengthened the linkages between government, universities and industry in ways which were aimed at developing and integrating technical and entrepreneurial resources within their regions.

**Successful initiatives often began with a technology task force or commission, appointed by the State Government.** Such a group served as a primary mechanism for identifying needs and formulating strategies and policy recommendations. These task forces always involved the participation and support of university officials and business leaders.

**Related initiatives focused on mobilising the necessary local resources and/or removing barriers** in the following areas: research, development and technology transfer; human capital, including education and training; entrepreneurship training and assistance; financial capital; physical capital; and information gathering and dissemination. The objectives were to stimulate, attract, or retain technology-based, industrial development through collaborative action between government, academe and industry.

### *1.3.2. The Role of Academe*

Not surprisingly, the OTA found that universities and training institutions played **two major roles** in technological innovation and its diffusion through a regional economy.

First, **they trained and educated scientists and other technical personnel** and expanded the base of scientific and technical information.

Second, **they transferred this talent and information to the private sector,** thereby fostering the commercialisation and diffusion of innovation.

**BACKGROUND (CONTINUED)**

In other words, **tertiary institutions provided the foundations for establishing a "critical mass" of intellectual and skill-based human resources**. This role was summarised by the late Professor Terman of Stanford University who stated that:

> "They (universities) are major economic influences in a nation's industrial life, affecting the nation's industrial life, affecting the location of industry, population groups and the character of communities. **Universities are a natural resource.**"

Amongst the contributions made by universities today are facilities, equipment, database access, and library and other information services.

### *1.3.3. The Role of the Private Sector*

The OTA found that the private sector played an important role in the design, operation and success of regional initiatives to foster technology-based jobs. **Industry participation provided perspective - vital commercial insight and influence toward practical outcomes**. They also substantially extended regional networks through global business contacts and industrial associations.

Such private sector involvement was usually driven by company policies reflecting the personal beliefs and commitment of the executives of firms located in the region. In other cases, business involvement was driven by identified self-interests in:

- improving the general business climate, thereby improving a firm's operating costs and profit structure;
- ensuring adequate public services and facilities to foster economic growth; securing a well-trained labour force; and
- ensuring the local tax burden remained at reasonable levels.

According to the OTA, the private sector primarily made resource or "in-kind" contributions toward development and implementation of strategies which could influence:

- business investment decisions, particularly those related to new site relocations of organisations external to the region;
- education development, including personnel exchanges;
- technology transfer mechanisms and cooperative research arrangements; business development and risk or venture capital formation;
- and business/civic advocacy, usually through trade or business executive associations.

**The participation of industry helped to deliver more actionable, credible programs, and greatly facilitated the implementation of plans by enhancing access and influence through global industrial networks**. For example, business leaders are able to serve as "regional ambassadors" when they interact with their national and international colleagues.

## 1.4. THE BASIS FOR CONFIDENCE: A RELEVANT SUCCESS MODEL

Although it is relatively easy to establish a "Basis for Interest" in Techquad, serious pursuit of the concept also requires a "Basis for Confidence" - that is, sufficient understanding of why Techquad can be successfully developed in the face of intense national and international competition. **The building of such confidence can be based upon identification of, and learning from a relevant success model - that is, from a region which, while similar to Techquad in key characteristics, has been successful in accomplishing what Techquad seeks to do.**

**BACKGROUND (CONTINUED)**

Much literature has been devoted to analyses of technology-based regional developments, particularly those in the U.S. Illustrative of that literature is a recent publication by Paul Herbig and James Golden, who analysed the reasons for regional successes in such developments. In their analysis, they surveyed American regions which were or could be innovative "hot spots" - high growth, prosperous regions with a critical mass of high-technology firms which are technological leaders in their industries. The regions they studied included: Silicon Valley in California; Route 128 in Boston; Silicon Mountain near Denver; and Silicon Gulch/Hills near Austin.

**Herbig and Golden identified 13 key factors which explained the success of such regions**, ranging from educational and physical infrastructures to climate and lifestyle. They found that only five regions in the U.S. had all the necessary ingredients to become or continue to be an innovative hot spot. **The North Carolina Research Triangle was prominent** within that group of five.

**The OTA also identified the Research Triangle as a prime example of a successful cooperative initiative, wherein developing linkages between universities and industry stimulated regional economic development.**

More recently, **the prestigious U. S. business magazine, *Fortune*, identified the Research Triangle as the top region for business in the U.S.** This finding was based upon a 1993 survey of nearly 1000 corporate executives throughout America, supplemented with an analysis of economic and other relevant data on the 60 most prominent metropolitan communities.

In reporting their findings, *Fortune* observed:

> **"Executives consistently say the most important factor in choosing a business location is the quality of the work force - and the key workers of tomorrow will surely be knowledge workers**. . . Many jobs that didn't used to require knowledge workers soon will. . . So cities that expect to thrive will have to furnish a growing supply of knowledge workers. . . A number of elements draw knowledge workers to a particular community. Top-flight research universities are a must, along with the presence of innovative business enterprises. . ."
>
> **" . . Raleigh/Durham (the Research Triangle) shapes up as the model of a metro region geared to the rules of the new economic game.** Companies that prosper in the future will emphasise constant learning and more high-order thinking, and nowhere in America are such values promulgated with greater fervour. . . **What makes (the Triangle) work so well is a unique nexus of the business community, area universities, and state and local governments**. . . A less tangible though no less important business plus for Raleigh/Durham is the area's low-cost, laid-back lifestyle. . . Employers have used quality of life as a powerful recruiting tool."

Other regions around the world have been analysed by researchers with their results published. These include Montpellier, a cluster of technology focused centres in France; the cluster of advanced technology companies around Cambridge in England; and the Technopolis developments in Japan. However, although many of these could provide relevant learnings and experience for reapplication elsewhere, **the North Carolina Research Triangle appeared to have many remarkable similarities with the Techquad region.**

These similarities primarily related to the intellectual/human capital and related infrastructure, as well as quality of life advantages. These are the key regional sources upon which the Research Triangle built competitive advantage for extraordinary economic gain in harmony with the environment. Accordingly, **the Research Triangle offers an appropriate success model upon which Techquad could learn and build.**

**BACKGROUND (CONTINUED)**

### *1.4.1. The Research Triangle (RT) Model*

Located in the State of North Carolina in the United States, the Research Triangle (RT) is regionally defined by three cities - Raleigh, Durham and Chapel Hill. Each city is located roughly at the apexes of a triangle and linked together by express highways. Three universities - Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University - are dispersed in each of the three cities and served as foundations for the RT's intellectual resource base.

**The RT's success resulted from a coordinated private/public sector partnership working against a common vision and plan.** This approach contrasted with other regional developments, such as the U.S. Silicon Valley in California, which evolved spontaneously without coordinated planning.

**This planned and organised approach enabled the RT to stand today as an environmental and social success model, as well as an economic one.** Indeed, the Research Triangle concept provides the primary source of identity and pride for the regional community involved. In marketing terms, the RT is the region's "brand name" upon which the region's "brand equity" and goodwill is established.

In the beginning, the Research Triangle region was languishing economically with a modest and declining industrial base in timber, tobacco and textiles. Although the region incorporated three universities, none held national stature or recognition at the time. However, the region did enjoy an attractive climate and lifestyle, and nurtured a significant private/public partnership dedicated to progressive change.

Concerted action to develop the Research Triangle was initiated in 1959 by the then State Governor, Luther Hodges. He is today remembered as the political "father" of the Research Triangle, although others may have actually conceived the idea and made substantial subsequent contributions to its development. Importantly, he enlisted academic and business leaders from the region in cooperative effort to establish a vision and make it all happen.

**In the Research Triangle, three organisational entities were created with State Government support to serve as the primary catalysts for the development** as follows:

a. The **RT Foundation** was founded in 1956 to champion the development of the Research Triangle, based upon the strengths of the local research universities. In 1959, the Foundation was empowered to externally market and manage the Research Triangle Park. That organisation was founded and sustained with **a small organisation of 3 to 5 people**, funded initially by local community grants and then through proceeds from sales of land in the Park.

b. **The Research Triangle Institute** was founded in 1959 to establish an autonomous high profile international centre for research in the RT Park, and was established in close collaboration with the Triangle universities and drawing initially upon their resources. **From a modest start of two people, it has grown to be comparable in size and stature to the Stanford Research Institute,** now SRI International. It is also a key linkage for the local research base with industry.

c. **The Microelectronics Centre for North Carolina (MCNC)** was later founded to establish **critical infrastructure in information and computing systems**, thereby enhancing education and high-tech industry growth. It created the "Communications for North Carolina Education, Research and Technology" (CONCERT) system which provides a video-conferencing and supercomputing data network between the Research Triangle and other State universities, as well as linking them with industrial organisations located within the region.

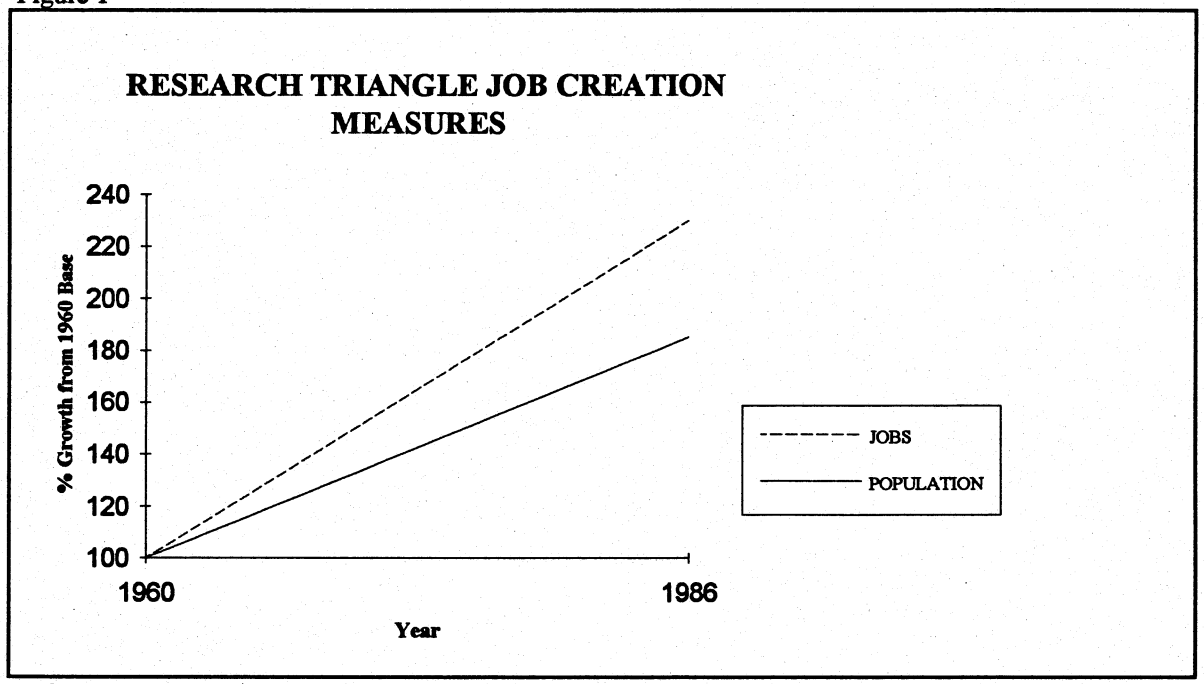
**Developmental progress in the Triangle was slow until 1965 when two key "magnet" organisations - IBM and the National Institutes of Health - were attracted to locate major R&D facilities in the region.** Development then accelerated to deliver significant economic benefits to, and increased community pride within the region.

**BACKGROUND (CONTINUED)**

Over time, other organisations were added by the State Government to foster accelerated development of targeted technology sectors within the region, for example, the North Carolina Biotechnology Center. This centre is credited with stimulating the start-up of 43 small bio-tech enterprises in the region during the five years to 1993.

These economic benefits of the Triangle initiative have been well researched and documented. As shown in Figure 1 below, **the rate of job creation in the RT region significantly outpaced that of population growth which nearly doubled during the same period.** Indeed, the Research Triangle concept is credited with directly contributing at least one-third of all employment growth in the region during a 25 year period, enabling the outpacing of population growth.

Figure 1

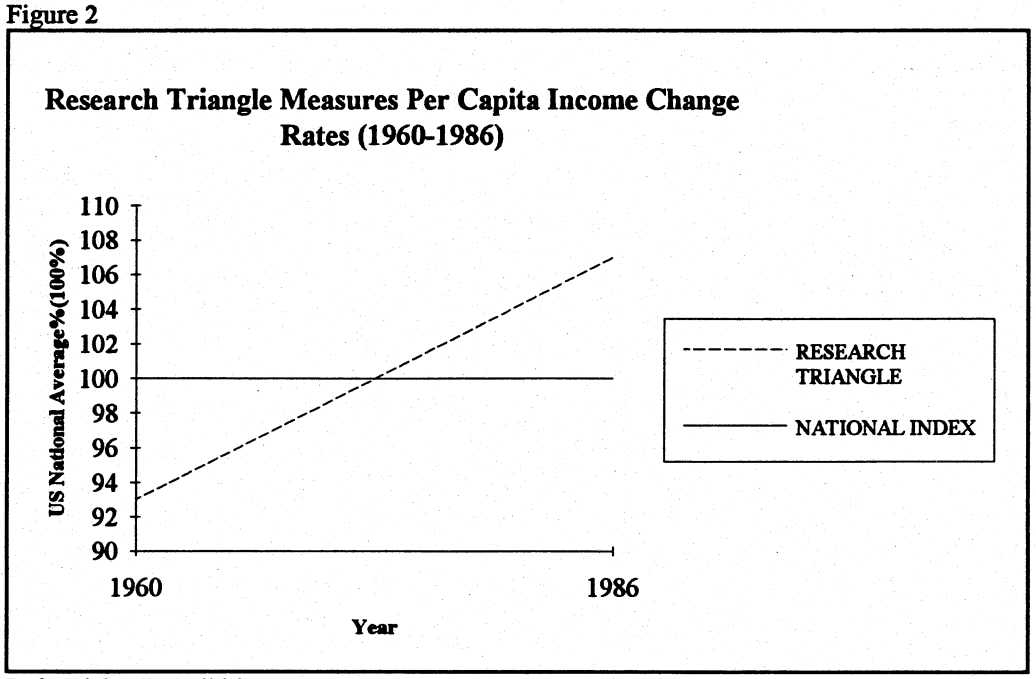



Ref: Hicks, Donald A, "Assessing the Input of MCNC on the Industrial and Economic Development of North Carolina", May 1990.

Importantly, as illustrated in Figure 2, **per capita income in the region significantly outpaced that of the national average since the development was initiated.** This took the region from significantly below to significantly above the national average income. This in part was due to the higher value of the technology-based jobs that were created during the period, and the economic growth those jobs fostered. It is noteworthy that organisations located in the Research Triangle Park alone now contribute an annual payroll of over US$2 billion.

**BACKGROUND (CONTINUED)**

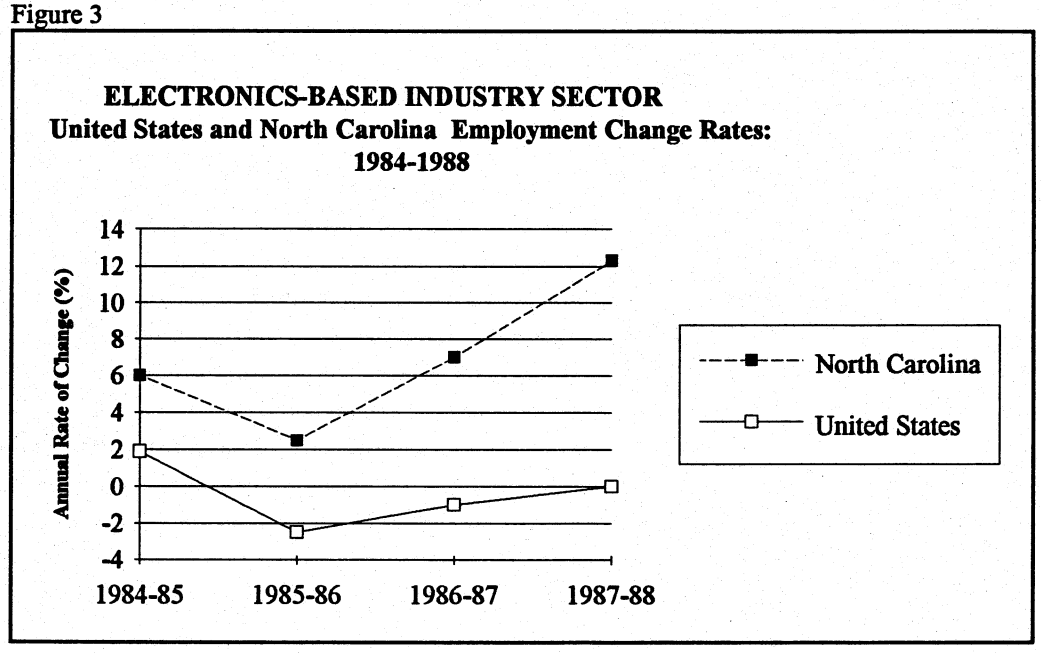
Figure 2




Ref: Hicks, D A, ibid.

As shown in Figure 3, during the 1980s State job growth in electronics based industries greatly outpaced that of the entire nation. Accordingly the electronic based sectors are strongly represented in the Research Triangle. Similarly, productivity growth in those sectors within the RT region greatly outpaced that of the remainder of the State and the U.S. as a whole, as illustrated in Figure 4. As shown in Figure 5, the measured contribution of that sector to the region's economy was in itself over US$2 billion in the mid-1980s - coincidentally equal in amount, but unrelated to the Triangle Park payroll. Other sectors, such as health sciences, pharmaceuticals, and biotechnology contributed substantial additional growth.

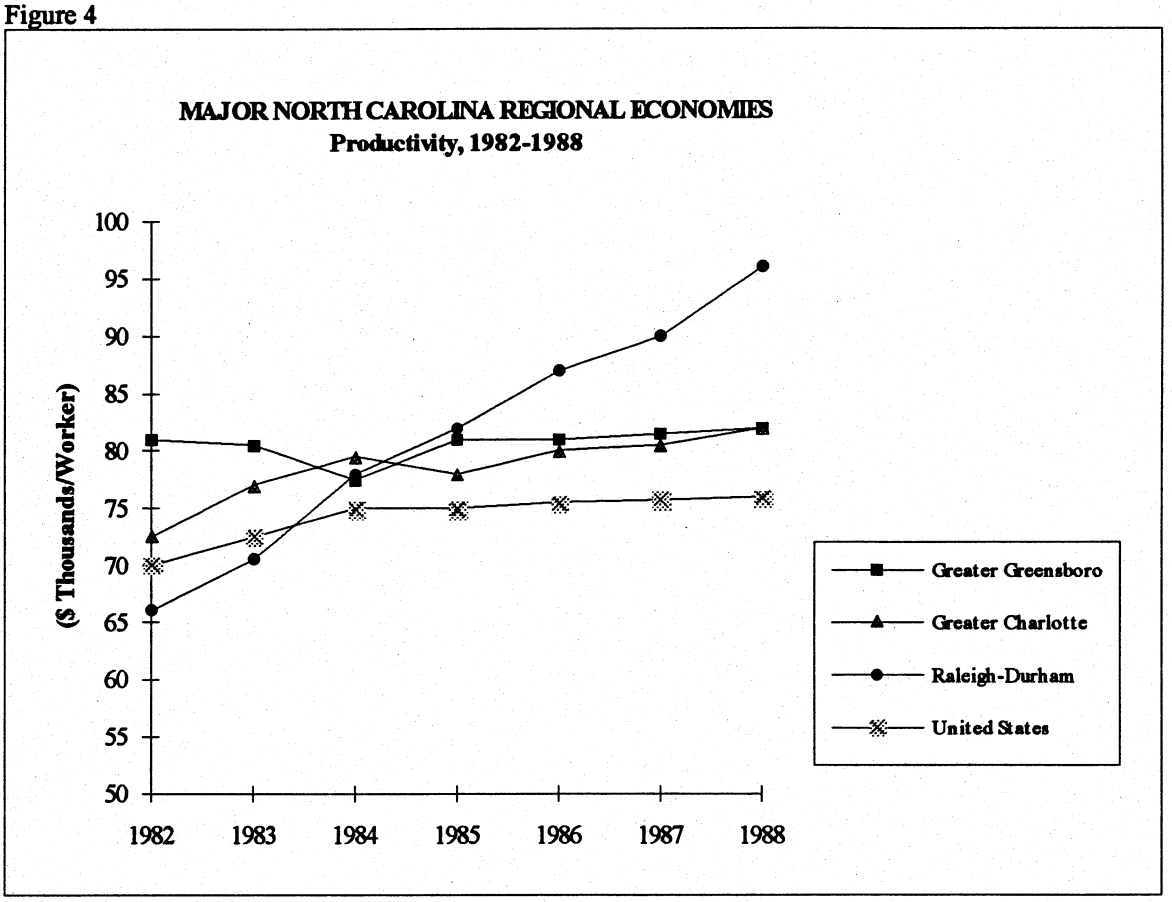
Figure 3




Ref: Hicks D A, ibid.

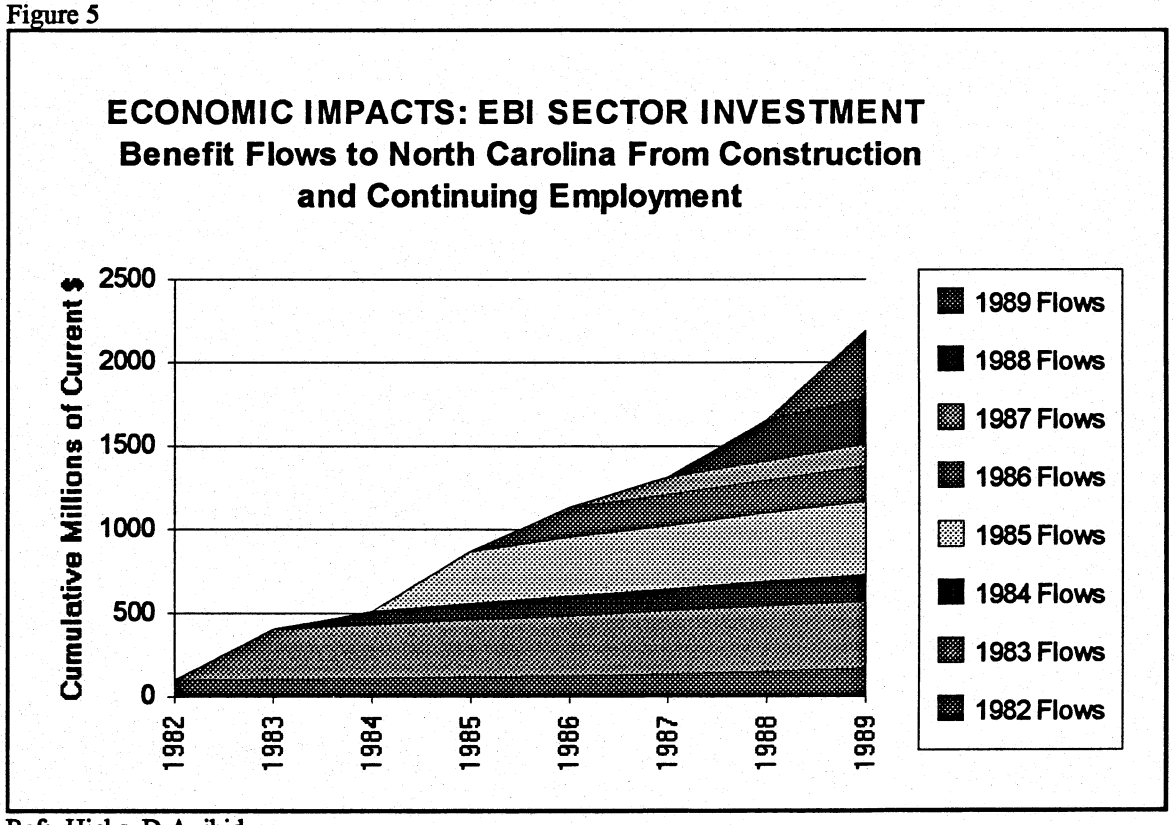
**BACKGROUND (CONTINUED)**

Figure 4




Ref: Hicks D A, ibid.

Figure 5




Ref: Hicks, D A, ibid.

**BACKGROUND (CONTINUED)**

Michael Lugar and Harvey Goldstein surveyed the reasons for the Research Triangle's success in attracting technology-based organisations. As summarised in Table 1, **proximity to research universities and access to skilled labour were the top two reasons given for why organisations located in the Research Triangle region.** Table 2 summarises the importance that Park tenants attached to the presence of research universities with human resource availability being paramount.

Table 1 *Reasons for Locating in the Research Triangle Region*
(R&D Organisations in RTP, N=40)

| REASON | RANK IN IMPORTANCE |
|---|---|
| Proximity to research universities | 1 |
| Access to skilled labour | 2 |
| Access to major airport | 3 |
| Business climate | 4 |
| Cultural amenities | 5 |
| Physical climate | 6 |
| Quality of public services | 7 |
| Access to unskilled and semi-skilled labour | 8 |
| Access to markets | 9 |
| Access to business services | 10 |
| Quality and adequacy of infrastructure | 11 |
| Preference of CEO | 12 |
| Concentration of firms in same or related industry | 13 |
| Other branches in the region | 14 |
| Access to materials | 15 |

Ref: Lugar, M I and Goldstein, H A, "Technology in the Garden - Research Parks and Economic Development", The University of North Carolina Press, Chapel, Hill & London., 1991.

Table 2 *Importance of Research Universities to RTP Organisations*
(N=40)

| FACTOR | HIGH OR MODERATE IMPORTANCE (% of Respondents) |
|---|---|
| Access to entry-level labour force | 85.7 |
| Access to faculty consulting | 71.4 |
| Courses and training for employees | 71.4 |
| Cultural milieu | 68.6 |
| Opportunities to subcontract | 67.7 |
| Use of university facilities | 55.9 |
| Faculty appointments for staff | 36.4 |

Ref: Lugar and Goldstein

These reasons appear quite relevant to consideration of how to develop the Techquad concept to its fullest potential.

# 2. FINDINGS

Through its work and deliberations, the Task Force found a basis for confidence that the concept for Techquad could be developed to its full potential - that is, an attractive and achievable vision could be defined for Techquad. More specifically, the Task Force found that:

## 2.1. TECHQUAD IS VITAL!

The Task Force found that **the Techquad initiative is imperative for the future economic health of the region.** Specifically, as the 21st century nears, **Southeast Queensland (SEQ) faces significant challenges imposed by trends and projections for substantial population growth in the region.** The challenges relate to the community's ability to meet the infrastructure and social service needs imposed by substantial population growth, while **creation of the jobs needed to ensure a prosperous and growing economy is absolutely vital.**

This latter challenge is particularly acute since much of the population growth is driven by immigration trends related to lifestyle attraction, not job opportunities. In other words, there is a risk of undesirable social consequences if population growth occurs well ahead of job growth. This challenge was recently quantified through work undertaken through the SEQ 2001 initiative of the State Government.

Under the auspices of the State Government's Regional Planning Advisory Group, a major step to address the infrastructure and service needs of Southeastern Queensland was taken via a planning initiative, known as "SEQ 2001". Essentially, the SEQ 2001 project revealed a significant gap between projected job creation by the year 2011 and what was needed to sustain, let alone reduce unemployment from 1993 levels. The gap of about 250,000 jobs is being driven by trends in population growth and, unless resolved, has foreboding social and economic implications for the future.

With such substantial population growth projected for the region, **there is an obvious and compelling need for concerted action to create environmentally compatible, socially acceptable, and high value-adding jobs - such as those involved in knowledge-based industries focused on the process of technological innovation (TI).**

Based upon the information available to the Task Force, **no other single initiative appeared to have the same potential as Techquad to deliver both the quantity and quality of jobs needed for economic prosperity in harmony with the environment.** However, it was equally clear that - unless high value job creation and economic growth are pursued with focus, coherency and vigour - opportunities for synergies will be lost.

## 2.2. TECHQUAD IS ACHIEVABLE!

The Task Force found that **the ingredients for success in developing Techquad are present in Southeast Queensland.** In other words, Techquad was found to compare favourably with overseas models, such as the Research Triangle, in key factors associated with their success.

The findings of the Task Force supported the premise that **the SEQ region has the potential to develop economic growth in a way which meets the job creation need in both quantity and quality terms - that is, by creating clusters of TI-industries within the region.** A key to that potential is found in the human and technological resources available within the region, and their relevance to technology-based industries and jobs. Many have agreed there must be a way to harness those resources in a manner which will meet the need.

**FINDINGS (CONTINUED)**

As detailed in an Appendix, **a benchmarking analysis provided a element of the underpinning for confidence that Techquad was achievable.** Although the Task Force extracted learnings from other developments, benchmarking confirmed the Research Triangle as a most relevant success model and benchmark for comparison. In other words, the Task Force observed that, **if the measures of success of the Research Triangle could be duplicated, let alone surpassed, Techquad would rate as a highly successful development.** Importantly, the Research Triangle built its success primarily on non-defence industry initiatives, such as health, consumer electronics, and the environment.

In this regard, the Task Force found **Techquad compares favourably with the Research Triangle in its earlier stages of development.** This finding provided encouragement for an objective to outpace the Triangle's rate of development - particularly by adapting relevant learnings from other successful developments, such as Frances Montpellier Development.

As summarised in the Appendix, the benchmarking analysis also identified certain indicated actions which should be undertaken to accelerate the development of Techquad - a development the Task Force found was already underway.

## 2.3. TECHQUAD HAS ALREADY BEGUN . . .

The Task Force found **many initiatives already in progress within the region embodied the Techquad concept.** That is, the development of Techquad had already begun - albeit not yet in the most visible, synergistic or effective framework. Examples of such initiatives include:

- Regionally located Cooperative Research Centres (CRC), such as the CRCs for Distributed Systems Technology and for Mining Technology and Equipment. The latter Centre builds upon a substantial local cluster of world class R&D activities focused on technological innovation for the mining industry.

- Other industry-academe cooperative research initiatives, such as: the development program for NMR/ micro imaging probes by Bruker Analytische Messtechnik GBBH and the Centre for Magnetic Resonance at the University of Queensland; the disease resistant plant program between Arthur Yates & Co Pty Ltd and the Queensland University of Technology; and the national pharmaceutical development program between Astra Pharmaceutical Pty Ltd and Griffith University.

- The State Government's Q-GRAD scheme for fostering industrial research and development with commercial objectives and QUESTNet, the Queensland Science and Technology Network linking the State's universities and associated research facilities and so on.

- Relocation of the CSIRO Division of Geomechanics to Pinjarra Hills west of Brisbane. A related grant of $20 million from the State Government provided funds to purchase a supercomputer and to establish the Queensland Supercomputing Laboratory, and has attracted significant additional Federal Government annual fund injections into the region's economy.

- An annual investment of about $150 million by the State Government into public sector research, largely concentrated within the Techquad region.

- An investment of over $6 million spread across three years to support the establishment of the Information Industries Board (IIB) to enhance the development of the information technology industry cluster in Queensland.

- Attraction of Digital Equipment and the Hong Kong Jockey Club to establish technological support facilities in the embryonic Techquad region.

**FINDINGS (CONTINUED)**

- Establishment of the Queensland Manufacturing Institute, as a cooperative initiative between government, industry and academe to transfer new manufacturing technologies to local industry.

- Establishment of a Queensland Clunies Ross facility to foster networking in science and technology areas.

Importantly, in a manner similar to overseas success models, **the Task Force itself represented a constructive step toward the establishment of the critically needed coalition between industry, government and academe to foster the development of Techquad.**

### *2.3.1. But many opportunities are being lost!*

Although much was being accomplished in technological areas, **the rate of progress in the Techquad region was found to be unremarkable relative to that of other localities and major opportunities were being lost.** In particular, the Task Force noted that the results delivered did not reflect the substantial effort and investment being made by the State Government to attract major new technological leaders to Queensland. Increased levels of collaboration with industry and academe could turn the current institution-based, fragmented approach into a more competitive and coherent one.

Illustrations of the missed opportunities include major efforts to attract a supercomputing facility supported by the Boeing Corporation through offsets obligations, and the $250 million information technology facility of Cathay Pacific, which went to western Sydney. In addition, institutions in the region had largely failed to successfully compete for major, internationally funded R&D projects of $20m+ magnitude. These attempts were generally undertaken by single institutions which competed against overseas consortia. More recently, Queensland missed out on siting one of the two R&D centres of the British software and services company, Logica, under the Federal Government's 35th strategic agreement with technology companies to invest in Australia.

Of course, there is no certainty that alternative approaches might be more successful than in the past; however, in the view of the Task Force, a more coherent joint effort between industry, government and academe would yield better results. In addition, the Task Force found that, without acceleration of the process to develop Techquad, there appeared to be significant risk that future opportunities will be increasingly at risk. This view was based upon recognition of not only global competition, but particularly of increasing competition between regions within Australia.

Examples of the rapidly accelerating pace of national competition include the:

(a) South Australian Government's recent offer to provide a ten year "tax-free holiday" for new businesses setting up in the Multi Function Polis (MFP) region;

(b) Announced joint Italian-Australian International Technology Park in Melbourne, linked to the Italian region of Piemonte and seen by the Italians as a springboard for Italian business into the Asia-Pacific region;

(c) Success of the Norwest Business Park development near Sydney in attracting a $260 million investment from Cathay Pacific to establish an international data centre - a major potential, but lost opportunity for Techquad;

(d) West Australian Government's plan to develop a technology-based city precinct at Bentley, southern Perth; and

(e) The $25 million joint project between the New South Wales and Federal Governments to establish the Advance Technology Park in the inner Sydney suburb of Eveleigh.

**In the face of such intense competition for TI-jobs, SEQ needs to establish a basis for competitive differentiation from other regions, along with a concerted effort to rapidly exploit the differentiation. Bringing the Techquad concept into an accelerated reality would meet that need.**

**FINDINGS (CONTINUED)**

## 2.4. TECHQUAD IS A "BRAND NAME"

Similar to the "Research Triangle", the Task Force found that "Techquad" really could be viewed as a "brand name" used to describe the SEQ region and what it has to offer for the development of technology-based industries. In other words, **Techquad could provide the critically needed, identity umbrella for the key activities of: (a) marketing and promotion of the region; and (b) networking and information coordination.**

The latter function is critical to **enabling synergies to develop between separate initiatives** by ensuring organisational "right and left hands" are linked together and aware of each another's plans and actions. This includes all of the regional institutions and government at both the State and local levels. **Underlying this networking concept is a premise which redirects the focus of action toward external competition, and away from internal competition within the SEQ region.**

### *2.4.1. Which serves an important purpose!*

The Task Force found that the importance of a "brand name" or identity label for the region could not be overemphasised. **Regional labels, such as the Research Triangle or Techquad, serve to distinguish one region from another,** just as brand names distinguish one product from another. Any experienced marketeer recognises the vital role branding plays in commercial development. Indeed, without cumulatively building the identity and "brand equity" of "McDonalds", Ray Kroc would still be an obscure figure selling hamburgers in the backwaters of America.

**Such labels focus marketing effort and enable the development of "regional brand equity" - invaluable to creating awareness and cumulatively building a reputation and stature.** In other words, they enable the accumulation of the intangible asset of equity or goodwill over time. Importantly, marketing experts recognise that the first brand to establish leadership in a new category historically achieves twice the long-term market share of the next brand. This also appears to be true for regional "brands".

As demonstrated by the Research Triangle, **regional labels can ultimately become a source for rallying community support, identity and pride.** In addition, the implications of regional, and even national identity labels on international competitiveness are recognised by a few astute observers.

For example, Tom Burton of the Australian "Financial Review" has suggested that the current debate over Australia becoming a republic should be seen as an opportunity to restructure the identity of Australia as an independent and important trading nation, regardless of whether it does so as a republic. He equated the matter to the repositioning of corporate identities and/or brand images.

In their book on "Positioning: The Battle for Your Mind", Al Ries and Jack Trout underscored the importance of names in overcoming the barriers and clutter created by competitive "overcommunication". They also confirm that **names must be based upon forward looking visions and be comprised of words which trigger the meanings one wants to establish.**

Some within the Task Force questioned whether or not "Techquad" was the most appropriate identity label for the region; however, upon review, the name was found to meet the key criteria for brand or identity names. Specifically, **"Techquad" is appropriately descriptive, concise (i.e., two-syllables) and memorable.** It also had achieved some modest, but positive awareness, locally, nationally and internationally, without any significant negative connotations.

In this regard, some healthy local impatience with the rate of progress of the development over the last few years was noted. However, long periods of gestation are characteristic of such developments and there was no evidence of external-to-the-region image issues with the name.

In net, the Task Force concluded that Techquad still seemed to provide an acceptable choice for the regional "brand name".

**FINDINGS (CONTINUED)**

## 2.5. ALTERNATIVES FOR ACTION

The Task Force found there were essentially three alternatives for action:

**a. Withdrawal.** A decision could be made to withdraw from the national race for regional leadership in technological innovation areas.

This would amount to active abandonment of the Techquad concept, and deny the region the economic and job growth potential that TI offers.

**b. Uncoordinated Development.** A decision could be made to passively allow the Techquad development to proceed on its own, in a spontaneous, fragmented and uncoordinated manner similar to the Silicon Valley.

Such an approach carries considerable risks. With the benefit of hindsight, Silicon Valley today is seen by analysts, such as Herbig and Goldstein, as a mature, declining and less desirable model. Silicon Valley faces the legacy of the many environmental and other problems which have resulted from uncoordinated development. Indeed, this is in stark contrast to the planned and coordinated Research Triangle, which continues to grow in stature

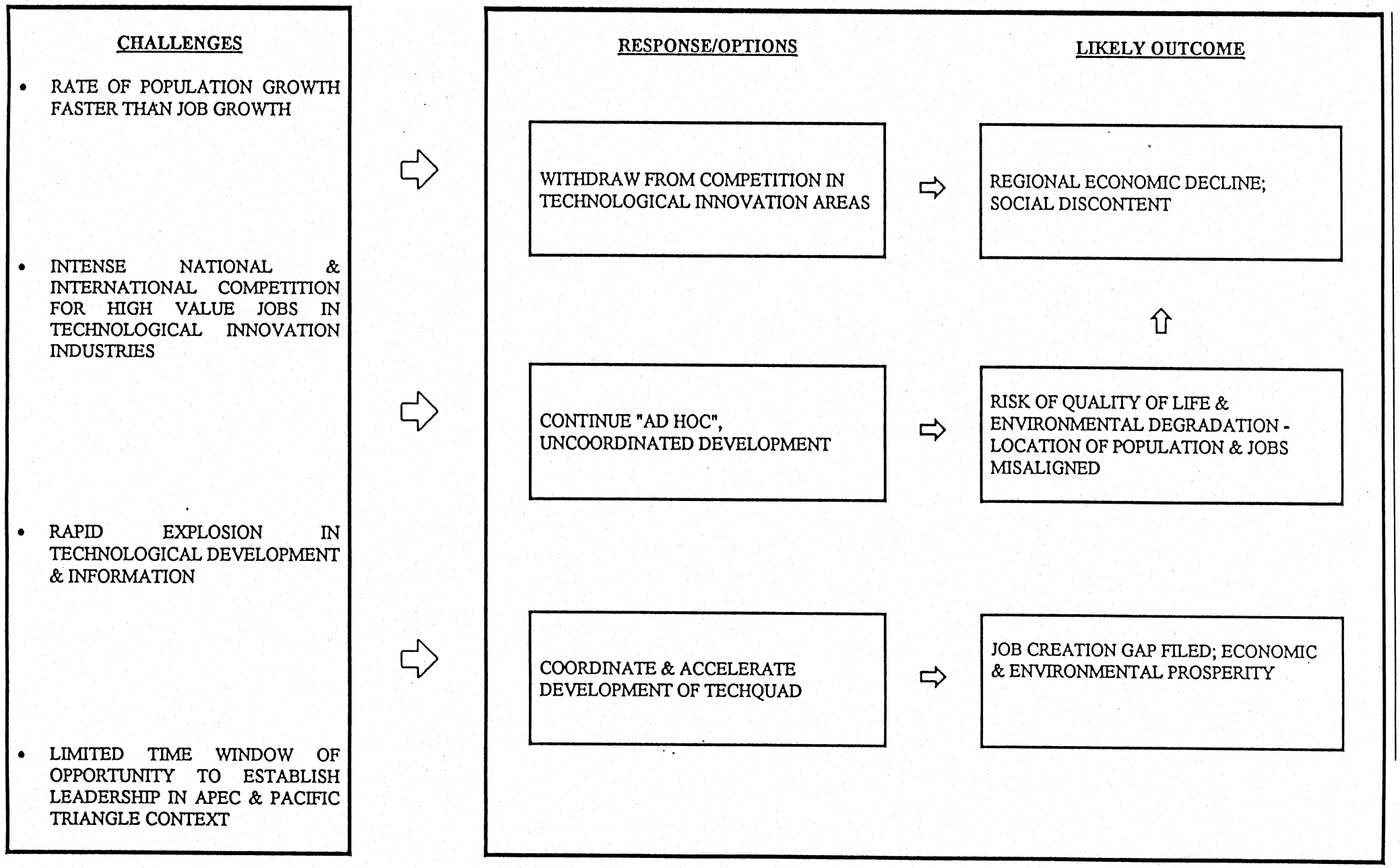
In any event, active, strong interstate competition suggests that passivity is tantamount to the first alternative.

**c. Coordinated Accelerated Development.** A decision could be made to undertake coordinated action to build on what already exists and rapidly accelerate the development of Techquad.

This option requires focus and dedication of effort between sectors, but promises great potential gains for the community. Judgementally, this effort could be undertaken in a highly efficient manner at relatively low cost, by drawing upon resources pre-existing in the region.

As illustrated in Figure 7, the implications of each alternative are substantial. **Although Techquad in and of itself, can neither create or deny prosperity, the path chosen will significantly contribute toward the relevant outcomes.**

Figure 7. STRATEGIC OPTIONS FOR TECHQUAD



# 3. CONCLUSIONS

**Based upon its findings, the Task Force concluded that:**

> **An appropriate vision for Techquad could be defined and attained to deliver significant job creation and other economic benefits to the community of Southeast Queensland.**

Importantly, the Task Force concluded that the development of the Techquad concept was key to the region's ability to compete for the creation of high skilled and valued jobs related to technological innovation (i.e., "TI-jobs"). As detailed above, these jobs add immense leverage to a region's economy and foster new demand for many more lower skilled jobs.

Building on the learning from relevant overseas success models, particularly the Research Triangle, the Task Force identified the key strategic steps for success. These steps form the basis for the recommendations of the Task Force.

Based upon the rapid pace that technological change was occurring and national competition for TI-jobs was developing, the Task Force concluded that a "time-window of opportunity" existed for Techquad. In other words, **time is of the essence to pursue the development of Techquad.** This is particularly true in the context of the evolving APEC community, within which regional leadership will be exhibited by the end of the decade.

In the view of the Task Force, national and international competition for such developments was now intense, and **the first region in Australia to truly establish an internationally recognised "critical mass" of knowledge-based industry clusters will also establish a major sustainable advantage over all other regions.**

Importantly, in spite of accelerated efforts in every State, no region in Australia had yet established the leader's advantage. **The Task Force concluded that Techquad is at least as favourably positioned as any other region to achieve that leadership.**

Although the Task Force concluded that Techquad could become the national leader, the group acknowledged **that outcome depended upon establishment of a shared commitment between industry, government and academia to a common vision** with a consolidated institutional will to make it happen.

Importantly, in the view of the Task Force, this effort could be accomplished by reallocation and restructuring of existing financial and other resources. In other words, **the accelerated development of Techquad could be undertaken through redirection, and not creation of new infrastructure or net expenditure.**

# 4. RECOMMENDATIONS

**Based upon their findings and conclusions, the Task Force recommends the third "alternative for action", that is, the development of Techquad be coordinated and accelerated.** Toward this end, the group proposes the strategic plan outlined below as a basis for concerted action.

The elements of the plan include the vision, objectives, goals, strategies and action steps which should be viewed within a strategic context - that of the "Pacific Triangle".

## 4.1. THE STRATEGIC FRAMEWORK - THE PACIFIC TRIANGLE

**A conceptual "Pacific Triangle" is formed by the apexes provided by the United States, Japan and Australia,** which encompasses the most economically dynamic region of the world - Asia Pacific. **Japan and the United States lead in technological development within the Pacific region, while Australia has a strong science and education base. Indeed, many Asian leaders in both private and public sectors have received their education in Australia. Australia enjoys extraordinarily strong bilateral relationships with each Japan and the US..** Indeed, development of the **Asia Pacific Economic Cooperation (APEC)** regional initiative is being led by Australia and the US with active support from Japan. APEC's initial objectives will likely include harmonisation of regulations and standards, including those governing intellectual property.

In the context of the APEC region, the technological interrelationships between the three "apex" partners could be of major importance in future years. Indeed, it is possible that APEC could transcend all other economic and trading groupings within the next two decades, with the Techquad region favourably positioned to secure a position of knowledge-based leadership.

Underscoring this point is that fact that over the last two decades a shift has occurred in the nature of strategic technology alliances between companies on an international scale. According to Professor Luc Soete of the Maastricht Economic Research Institute on Innovation and Technology, **recent trends have shifted toward collaboration in R&D activities, rather than manufacturing. Furthermore, 90 per cent of all such alliances involve companies from the U.S., Japan and Europe.**

**Australia is not particularly well placed in a geographic, and perhaps strategic sense for European organisations, but it is for those based in Japan and the United States.** In this context, the Techquad region incorporates the northernmost capital city in Australia, with climate, lifestyle, intellectual resources and infrastructure unsurpassed within Australia, and perhaps within the entire Pacific Triangle. Accordingly, **Techquad is well positioned to become a regional anchor for technological innovation within the Pacific Triangle.**

This proposition suggests that **a focus of Techquad's development should be on securing alliances with, and local commitments from American and Japanese organisations which are technological leaders in their industries.** Obviously, participation from such organisations in other countries would also be encouraged. However, focus is always needed for quick progress in any undertaking. That focus would be most appropriately directed toward technologically leading enterprises in the other two "apex of APEC" countries.

With this context in mind, a vision may be more readily shaped for Techquad.

**RECOMMENDATIONS (CONTINUED)**

## 4.2. THE VISION

The Task Force recommends adoption of the following vision:

> **Techquad will become an internationally recognised Pacific Triangle centre for regional clustering of research and development institutions and high value-added industries related to technological innovation.**
>
> The focus of related activities will be on selected: (a) services, such as education, research and development, particularly those related to mining, communications and environmental industries; and (b) high value manufactures, such as electronics, software and pharmaceuticals, which depend upon human resources with high levels of intellectual and technical skills.
>
> **Techquad will deliver to the community substantial benefits through increased economic prosperity and the creation of jobs in a manner which is in harmony with the environment.**
>
> Accordingly, Techquad will enhance the living standards and quality of life for residents in the region, thereby becoming a primary source of regional identity and community pride.

## 4.3. THE OBJECTIVE

The broad objective will be to:

> **Attain the Techquad vision by accelerating its development process through adaptation and reapplication of proven success models and outpacing the rate of progress made by the benchmark Research Triangle in comparable stages of development.**

**In more specific terms, Techquad should seek to accomplish by the year 2010 what took the Research Triangle (RT) three decades to do.** Key economic measures, including the number of technology-based enterprises attracted and/or nurtured in the region and the number jobs thereby created, would be used to track progress.

The experience of the RT and other models suggests that an initial critical mass of jobs and economic activity will be attained by securing commitments from technologically leading multinational companies for establishment of facilities in the Techquad region. As suggested above, these might initially be of American and Japanese origin.

Development of clusters of entrepreneurial firms should also be concurrently fostered and facilitated; however, significant contributions to job creation and economic flow from these sources will be slower than from attracting large, existing global technology-leader enterprises.

## 4.4. THE PRIMARY, LONG TERM GOALS

On a provisional basis, adoption of the following primary goals are recommended:

4.4.1. ***Job Creation.*** Based upon extrapolation of the Research Triangle model, **Techquad initiatives should directly create about 35,000 highly skilled and paid TI jobs, with over 100,000 new jobs created through leverage effects by the year 2010.** It should be noted that many of the leveraged jobs would be spread beyond the Techquad region itself.

Most importantly, these new jobs would help fill the region's projected job creation gap identified under the SEQ 2001 effort. Specifically, SEQ 2001 identified a need for 243,500 new jobs beyond those currently expected by the year 2011 - without reducing unemployment below current levels of about 11%!!

**RECOMMENDATIONS (CONTINUED)**

As suggested above, Techquad has the potential for filling nearly one half of the projected gap. This was recognised by the SEQ 2001 analysis which identified technology-based jobs as a key potential area for creating jobs to meet the projected shortfall. However, it is clear that such levels of job creation cannot be expected to occur spontaneously, and will only result from considered and concerted action.

4.4.2. ***Regional Income.*** Based upon reapplication of the Research Triangle model, **average weekly income in the Techquad region could move from its current level of about 6% below the national average to at least 6% above by the year 2010.** Importantly, this should be done without proportional increases in the cost of living, so it would result in a significant advancement in living standards - just as the Research Triangle still enjoys costs of living below the national U.S. average, while enjoying higher per capita income.

This model also indicates prospects for multi-billion dollar contributions to the regional economy to be realised from new organisations attracted to the Techquad region by that time.

## 4.5. THE SHORTER TERM GOALS

Accomplishment of the above longer term, primary goals will be dependent upon achievement of several key shorter term goals as follows.

4.5.1. ***Magnet Firms Establishment.*** Commitments from at least two leading international organisations to establish substantial technological facilities within the Techquad region should be secured by 1997. The projected direct job demand for these facilities should approach 2,000 people.

This could be accomplished by either or both attracting new organisations to the region or increasing the involvement of ones already present in the region. The organisations could be either multinational companies which are technological leaders in certain fields or international research organisations of substance and repute.

4.5.2. ***Major Project Funding.*** International funding for at least six new major, cooperative research or technological development projects should be secured by 1997.

These projects should cooperatively span across several Techquad institutions in either or both the private and public sectors and each exceed $10 million in value. The projects would signal international recognition of Techquad's world class capabilities, and also contribute to the further development of a critical mass in human and other resources in selected technological areas.

Examples of such projects meeting these specifications include the $30 million World Bank funded Polytechnic project for the Malaysian Government and the $50 million laser technology development project currently being independently pursued by certain Techquad universities with a low probability of success.

4.5.3. ***Increased Commonwealth Government Funding.*** Two additional Cooperative Research Centres (CRCs) to be secured by Techquad Universities within the next round (1994). Commonwealth funding for Research and Development within the Techquad region should be increased from current below national average levels to more representative levels by 1997/98. Specifically, according to 1991 Australian Bureau of Statistics data, Commonwealth R&D funding to institutions within the region should be increased from $26 to $61 per capita. This would deliver an increase of $65 million based on current population. If Techquad achieves the stature it is capable of attaining, the "fair share" levels should in fact be exceeded.

4.5.4. ***Entrepreneurial Cluster Development.*** The current rate of creation of local technology-based enterprises should be doubled in five years. This doubling in the number of such firms would be based upon an inventory of existing technology-based firms which were started-up within the last ten years. In other words, the objective would be to create in five years as many new technology based firms as started-up in the last ten years.

**RECOMMENDATIONS (CONTINUED)**

**4.5.5.** ***Stature & Recognition.*** Techquad should achieve broad-scale international awareness within ten years, and international recognition and stature as a regional "hot spot" ranking with the world's best technological regions by the year 2010.

Professional reputation of the regional identity should be benchmarked against that of the Research Triangle and other world models. Specific measures for these goals should be defined, and could be based upon the number of international literature citations attributed to the region and the number of collaborative international relationships which are linked into the region, in addition to other technological indicators.

**4.5.6.** ***Community Identity.*** Based upon measurements of community perceptions and attitudes, Techquad should achieve virtually universal local awareness and community support by the year 2000. Positive attitudes along with an identity association with Techquad should be reflected in such community surveys, which could be benchmarked against similar ones in the Research Triangle.

## 4.6. THE UNDERLYING INFRASTRUCTURE

Achievement of the above goals depends of course on the pursuit of meaningful strategies and action plans. However, such results must necessarily be built upon a sound, underlying physical infrastructure. No amount of promotion, coordination or networking could overcome the handicaps of inadequate transport, communications or water.

Accordingly, **the Task Force recommends that the State Government ensures the conditions necessary to support the accelerated technology-based economic activity form an integral part of the package of actions that will be implemented as a result of the SEQ 2001 initiative.** Key amongst these would be the provision of needed physical infrastructure, particularly including:

a. A world class, international air terminal;

b. Enhanced road and rail network system, particularly along the Brisbane-Gold Coast corridor;

c. Water supply system; and

d. World class, state of art communications systems, particularly via fibre optic, microwave and satellite linkages.

To ensure that critical infrastructure elements are indeed world competitive, the State Government should benchmark them against those of other competitive regions within Australia and elsewhere in key areas around the Pacific Rim. On the assumption, that these infrastructure elements will not be limiting, the Task Force focused its recommended strategies and action plans on Techquad specific matters.

# 5. STRATEGIC PLAN

To achieve the above recommended objectives, **the Task Force recommends adoption of the strategic and action steps outlined below.**

## 5.1. STRATEGIES

**As described above, the Task Force envisions that Techquad will achieve its vision by: (a) capitalising on the many advantages and resources found in Southeast Queensland; and (b) building upon proven, overseas success models and establishing a unique identity with global recognition and stature.** As established above, the Research Triangle provides the benchmark model of most relevance, while other regions, such as the Austin Silicon Hills, can also provide useful sources of learning.

As suggested by the mission of the Task Force itself, **the broad strategies should seek to: (a) mobilise Southeast Queensland's considerable intellectual resources together with the region's practical skill base; and (b) foster development of the local infrastructure needed to accelerate economic growth and job creation.**

This in turn will necessarily be dependent upon **establishment of the needed "uncommon alliance" between state and local governments, industry and academe, facilitated by institutional innovations** focused against sound strategies.

More specifically, the Task Force recommends the following strategies be adopted to achieve the above vision, objectives and goals:

5.1.1. ***Commitment.*** Adopt Techquad as a regional priority initiative, and allocate resources to support development of the Techquad concept as defined by the proposed vision.

5.1.2. ***Awareness.*** Foster a community awareness of, and a supportive environment for, technological innovation as a means to create jobs and economic prosperity.

5.1.3. ***Identity.*** Build regional "brand" identity and equity under the Techquad banner through appropriate communication, education and promotion programs.

5.1.4. ***Marketing.*** Market Techquad nationally and internationally to secure operational centres in the region for institutions and enterprises which are technological leaders in their fields.

5.1.5. ***Mechanisms.*** Establish and sustain a continuing framework for the needed alliance between industry, government and academe to develop, with particular emphasis on the exchange of, and building on ideas and the extension of global networks.

5.1.6. ***Information Gatekeeping.*** Develop and sustain a system to integrate and promote relevant information and data from dispersed sources, including:

- R&D programs and other technologically based initiatives;
- inventories of individual and organisational capabilities;
- inventories and mapping of geographical clusters of technologically related organisations; and
- property available for development and use by technologically based organisations.

5.1.7. ***Initiatives.*** Establish mechanisms to foster new initiatives and programs to stimulate and facilitate technological innovation within the region.

**STRATEGIC PLAN (CONTINUED)**

**5.1.8.** ***Infrastructure.*** Build networks, information systems, support systems and infrastructure to facilitate collaboration between academic institutions, industry and government, and to enhance the delivery of services which are critical to technological innovation.

**5.1.9.** ***Entrepreneurial Support.*** Facilitate the development of locally-derived, entrepreneurial technology based enterprises by establishing support infrastructure, such as incubation facilities and services, and fostering the accelerated growth of the venture capital industry in the Techquad region.

## 5.2. INITIAL ACTION

The Task Force recommends the action steps below to implement the above strategies and achieve the vision.

### 5.2.1. *Establish a Techquad Organisation*

It is axiomatic that **reaching goals can only be attained if adequate and accountable resources are allocated to the task.** Translating a vision into a reality requires even more. It requires organisational or individual project champions to serve as dedicated advocates or even zealots to overcome barriers to progress. Therefore, meaningful progress toward achievement of the Techquad objectives will depend upon establishment of a properly structured and supported central organisation

#### *5.2.1.1. Roles*

The Techquad organisation should be designed to collaborate with existing institutions to perform the following roles:

a. Actively promote and market Techquad, particularly to overseas organisations;

b. Assemble, maintain and promote integrated databases of relevant intellectual and skill based resources;

c. Establish and maintain networks of contacts and information relevant to development of Techquad, particularly existing across organisations, such as the Information Industries Board to ensure synergies and not duplication of effort are realised;

d. Serve as the "first port of call" or "one stop shop" to respond to enquiries from organisations interested in Techquad, drawing upon the information, contact and resource networks as appropriate;

e. Identify needs and opportunities for, define and foster establishment of programs and initiatives to accelerate the development of Techquad.

#### *5.2.1.2. Organisational Options*

As envisioned by the Task Force, **the organisation must be constituted in an appropriate manner with joint sponsorship and involvement from government, academe and industry.** Based upon consideration of existing models, **the Task Force recommends the RT Foundation and Institute models be adapted for the Techquad organisation.** Under this model, the "Techquad Institute" (TQI) would be **a small organisation which would provide a catalytic and coordinating role** for initiatives, to deliver the specific services cited above. Organisational options include:

a. Integration within existing organisational frameworks, e.g., within the Committee for the Economic Development of Queensland (CEDOQ);

**STRATEGIC PLAN (CONTINUED)**

b. Constitution as a new non-profit company or statutory body, e.g., similar to the Queensland Tourist and Travel Corporation (QTTC) or the Queensland Small Business Corporation (QSBC);

c. Establishment of a new protocol between the stakeholders and incubation within an existing entity or organisation, such as an existing non profit company with appropriate directors and employees; or

d. Establishment of a new non-profit company.

Regardless of the approach, **the organisation would require dedicated, highly qualified and motivated leadership, with accountability to an appropriate Board of community leaders drawn from the three stakeholder sectors - government, industry and academe.**

*5.2.1.3. Organisational Structure*

Based upon considerations of the alternatives, the Task Force recommends the TQI should be constituted as **a non-profit corporation with an appropriate Board structure drawn from its stakeholders, and accountable to, but autonomous from government.** It could be incubated in its early stages within existing organisational structures as suggested above. In any event, to maximize its reach and efficiency, the TQI should be closely linked with, and build upon existing institutional support structures.

The nature of the proposed TQI's vision, goal and mission suggests the entire community will be the beneficiary of its success. Benefits will therefore be diffuse - albeit real and measurable.

In the view of Michael Porter and others, the principal economic goal of any government must be a high and rising standard of living for its citizens. The Techquad initiative is focused on helping to achieve such a goal. Accordingly, the State Government would be the primary stakeholder since it is the one with the most direct responsibility for fostering job creation and economic growth and prosperity. Local governments within the region would also be stakeholders and should provide modest increments of funding.

Second only to the State Government, the Techquad universities would be stakeholders because of their expected gains in: international recognition; industry collaboration opportunities; future additional funding for research and development, consulting, education and professional development services; and demand for their graduates.

Generally speaking, local industries would also be stakeholders who would indirectly benefit from an improved business climate and a growing regional economy. Certain sectors, such as property development, might benefit more directly , particularly if they provided part of the property portfolio available to new organisations seeking to establish a presence in the region.

Given the above considerations, it would be reasonable to assume that the State Government should provide the primary source of funding and other support for the TQI, perhaps with additional funds sourced from the Federal Government. These investments would be supplemented with contributions of funds and "in-kind" services from the universities and selected industries.

As previously suggested by overseas experiences, given the nature of the diffuse benefits for most industries, we might expect support from business and industry will be primarily in the form of "in-kind" contributions of managerial assistance and executive networking. Certain sectors, such as land development, with more potential for direct gain, and industry associations may be able to justify limited financial sponsorship as well.

*5.2.1.4. Location*

**The Techquad organisation should be located in an appropriate and high profile facility.** Options include: a "Techquad House" within a research park or technology precinct; the proposed Clunies Ross House; or suitable space within the Brisbane Central Business District.

**STRATEGIC PLAN (CONTINUED)**

After due consideration, the **Task Force recommends the organisation be located within the Clunies Ross House**. If that facility is located within the Brisbane Technology Park as planned, that park should be renamed **"Techquad Park"**. Other regional and technology parks should also be renamed in a complementary way to connote **a network system**, rather a single location for Techquad.

***5.2.1.5. Funding***

Funding options for the proposed TQI include the following:

a. Through a grant of assets, such as Research or Technology Parks, to market and manage in a manner similar to that of the Research Triangle Foundation; or

b. Through a multi-year commitment of sponsorship grants from the stakeholding organisations, drawn from a reallocation of existing expenditures.

The Task Force considers the first option impracticable and redundant, given the existing management structure for Government Research and Technology Parks. Indeed, it would be preferable to keep the TQI focused on its promotion, information gatekeeping and networking roles where it can add the most value, rather than land management.

In addition, to be most effective as an honest network facilitator, the TQI should have no vested interest in where any firm would wish to locate within the region. Essentially, the TQI should facilitate contacts between technological enterprises and land sources in both the private and public sector, while letting market forces determine the location outcome.

In net, **the Task Force sees the second option of multiyear grant funding as the only practicable one for the TQI.** The grant should be provided under the contract with the State Government, and possibly the Federal Government matching both cash and "in-kind" commitments from other stakeholders, such as the universities. An initial four year time-frame would be sufficient to enable meaningful measurement of progress and results as a basis for renewal of funding beyond that time.

The level of funding required for such an organisation would depend upon the vigour with which the task is tackled. Other competitive initiatives, such as the Multi Function Polis (MFP), suggest that a multimillion dollar program might be justified.

Indeed, major investments could readily be justified on the basis that most government job-creation initiatives involve costs of tens of thousands of dollars per job created. **Referenced against typical job-creation programs, the projected 35,000 high value TI jobs alone could justify an expenditure of $7-14 million over the next 15 years** - without considering the enormous leverage factor for other new jobs. Additionally, the expected multibillion dollar economic flows resulting from the initiative would create substantial new tax revenues for government coffers, as well as improve the economic well-being of the region's citizens.

Based upon their study of overseas success models, particularly the Research Triangle Foundation and the inception of the Research Triangle Institute **the Task Force recommends the Institute be supported by an annual budget of about $1 million**, with the precise figure dependent upon the exact structure and tasks to be undertaken. As indicated above, the direct benefits of only 35,000 new jobs would well justify the $1 million budget for a period of seven years to fourteen years - without taking the leveraging effects into account.

This recommended level of funding would enable:

a. Establishment and administration of the organisation, along with support of local promotional and networking functions;

**STRATEGIC PLAN (CONTINUED)**

b. Establishment, maintenance and dissemination of a comprehensive data and information database covering human intellectual and skill based resources, as well as financial and property ones; and

c. Establishment and implementation of a comprehensive overseas marketing and promotion program, along with the other proposed actions listed below. This will include establishment of industry, government, academic teams to approach key organisations and deliver a convincing case for interest in Techquad.

In other words, **the budget would be intended to enable the Foundation to lead, and be accountable for the achievement of the important and measurable goals cited above.**

Such an expenditure falls well under the levels of support for the QTTC and the QSBC, as well as that of the Information Industries Board. Although clearly differentiated from the Techquad agenda, each of these initiatives was also undertaken to facilitate the development of certain industry sectors to enhance State economic development. Synergies and important outcomes should result between these investments and that in Techquad.

Importantly, for other new initiatives, the TQI could be expected to play a facilitating and coordinating role with the actual funding for such initiatives separately justified and derived. An example of such an initiative would be the fostering of an expanded regional video conferencing network for education, professional development and training similar to the Research Triangle's CONCERT network. Such an initiative, which could build upon the evolving TAFE network could be undertaken with or through the IIB. Presumably it would be funded by the sponsoring and participating institutions.

**The TQI should be seen as providing a service to the community on behalf of the stakeholders and funded on a continuing basis by those stakeholders.** In other words, to ensure the organisation remains mission oriented, **the TQI should not be expected to become self-funded through commercial efforts.** This approach would therefor ensure that the organisation did not seek to compete with, or duplicate the services of other existing organisations - as is the inclination when revenue generation becomes the paramount goal. Indeed, a $1 million annual budget would be a sustainable bargain if the job creation outcomes are achieved.

5.2.2. ***Extend Regional Headquarters Incentive Program.*** As a primary marketing tool for the Institute, the Task Force recommends the State Government extend the tax concession program recently formulated to encourage location of regional headquarters in Queensland to new, properly qualified Techquad facilities establishment. Such an extension would be consistent with the intent of the regional headquarters initiative and counterbalance competitive regional incentive schemes. Although it is recognised that such incentives do not provide the major reason for location of new organisations in a region, such incentives can prove decisive when two or more regions appear equally acceptable for strategic reasons. Importantly, in this regard it should be noted that establishment of the knowledge-based industry clusters targeted by Techquad promises much more employment and economic leverage than regional headquarters.

5.2.3. ***Establish a Techquad Roundtable.*** Establishment of the Techquad Roundtable - a forum for senior executives from industry, government and academe is recommended. The purpose of the group would be to sustain an active network to exchange ideas and promote and facilitate the development of Techquad.

This group would be modelled after higher education roundtable groups linking business and academic leaders, but would be intended to be service action oriented, in a manner similar to Rotary Clubs. It could evolve from the Task Force itself on a self-selected basis, and be expanded according to interest.

## 5.3. OTHER ACTION INITIATIVES

The proposed TQ Institute could foster or undertake the following additional initiatives, which are recommended for follow-up action.

**STRATEGIC PLAN (CONTINUED)**

**5.3.1.** ***Video Conferencing and Data Network Development.*** Building on the relevant initiatives already in progress, a long term plan for the establishment of an integrated video conferencing and data network similar to the Research Triangle's CONCERT network is recommended. Senior executives of the Microelectronics Center of North Carolina (MCNC), the developers and operators of CONCERT, have offered to help transfer their learning to assist in the development of such a system in Techquad.

Such a network could also serve as a platform to integrate library and other informational resources between institutions on an equitable cost basis. This facility could be extended for access by industrial client users and others beyond the institutions.

Increased emphasis on cooperation in developing and delivering professional development programs (i.e., short training and development courses for working professionals) should also be encompassed by this initiative.

**5.3.2.** ***Research Triangle Institutional Collaboration.*** Collaborative initiatives should be established between Techquad institutions and their Research Triangle counterparts to facilitate people and learning exchange, as well as to undertake cooperative projects and programs. Development of university linkages, as well as ones between Cooperative Research Centres and entities, such as the MCNC, would be important.

**5.3.3.** ***Data and Information Base Organisation and Management.*** As suggested above, the Task Force recommends that the large variety of dispersed information and data relevant to technological innovation capabilities in the Techquad region be integrated and supplemented as needed.

This would facilitate marketing and networking activities focused on organisations external to the region. It would also be helpful in ensuring organisations within the region are aware of activities and resources with which they might interact and produce synergistic results.

The particular focus areas for such an integrated database include inventories of:

a. Intellectual and skill based resources, both organisational and individual in a variety of fields of expertise relative to TI;

b. R&D programs or projects completed and in progress;

c. Joint or other collaborative TI-related ventures between universities and private sector enterprises;

d. Resources and enterprises engaged in specific technological categories, and mapping of geographical clusters;

e. Property suitable for location of new TI industries and organisations, such as research and technology parks, and incubation and other support services; and

f. Sources of venture and other investment capital.

**5.3.4.** ***National Technological University (NTU) Linkage*** Collaboration should be established between Techquad institutions and the U.S. National Technological University (NTU). An accredited university in its own right, NTU is actually a consortium of 45 U.S. universities, which delivers postgraduate education and professional development training via satellite linked distance education.

It is arguably the premier organisation for distance education in the US. A Memorandum of Understanding has been established with NTU to provide institutional linkage with Techquad. Under this protocol, Techquad has been invited to provide video material of an educational or professional development nature for transmission within the NTU's North American satellite network. The latter encompasses general information on emerging technological developments in Australasia, and thereby provides an extraordinary opportunity to familiarise key technology managers and thought leaders throughout the U.S. with the existence of capabilities found within the Techquad region.

# APPENDIX 1: THE BENCHMARKING OF TECHQUAD

The Task Force extracted learnings from other developments throughout the world through first hand inspection and literature research. The group found one literature reference particularly useful as a basis for benchmark comparisons with the leading technology-based regions in America. Specifically, **Herbig and Golden's 1993 paper on "How to Keep That Innovative Spirit Alive" cited key factors against which different regions could be scored and compared** as detailed below. In their analysis, they provided scores (on a 9 point scale) against these factors for the Research Triangle and other regions in both 1970 and 1990.

The Table below summarises an analysis which **incorporates Techquad into the comparison group on a judgemental basis**. Judgement was based upon extensive study of the other developments and intimate knowledge of the current status within the Techquad region. In addition, a score for 1960 has been added based upon documentation of the situation existing in the Research Triangle at that time. As detailed below, **a diagnosis of the actions indicated to strengthen the competitiveness of Techquad was also completed.** Certain factors in the original paper, such as Attitude toward Risk and Entrepreneurship, have been consolidated because of obvious overlap.

**WHAT'S NEEDED?**

REF: Herbig & Golden - "HOW TO KEEP THAT INNOVATIVE SPIRIT ALIVE: AN EXAMINATION OF EVOLVING INNOVATIVE HOT SPOTS"

**THE KEY FACTORS ARE:**

| | | RATED ON A SCALE OF 1-9 (HIGHEST) RESEARCH TRIANGLE | | | TECHQUAD |
|---|---|---|---|---|---|
| | | **1960** | **1970** | **1990** | **1993** |
| 1. | AN INITIAL LEADING ENTREPRENEURIAL FIRM | 0 | 5 | 7 | 3 |
| 2. | EDUCATIONAL INFRASTRUCTURE | 4 | 6 | 8 | 6 |
| 3. | PHYSICAL INFRASTRUCTURE | 3 | 5 | 8 | 6 |
| 4. | LOW DEVELOPMENT COSTS | 9 | 9 | 8 | 6 |
| 5. | ATTITUDE TOWARD ENTREPRENEURSHIP | 4 | 7 | 8 | 4 |
| 6. | ATTITUDE TOWARD RISK | 3 | 7 | 8 | 4 |
| 7. | PRO-BUSINESS ATTITUDE | 9 | 9 | 9 | 7 |
| 8. | VENTURE CAPITAL AVAILABILITY | 3 | 5 | 8 | 3 |
| 9. | GOVERNMENT RESOURCES | 5 | 5 | 7 | 5 |
| 10. | LOCAL SCHOOLS | 3 | 6 | 8 | 4 |
| 11. | PHYSICAL CLIMATE & ENVIRONMENT | 7 | 7 | 8 | 8 |
| 12. | RESEARCH PARKS & INCUBATORS | 3 | 4 | 9 | 3 |

**APPENDIX 1: THE BENCHMARKING OF TECHQUAD (CONTINUED)**

The key factors of Herbig and Golden are summarised as follows.

1. ***An Initial, Leading Magnet Firm.*** Establishment of an initial magnet firm to provide credibility for the region and establish a critical mass of technology-based jobs is an important catalytic step for the development of a region. The firm must be one of the technological leaders in its industry to serve the purpose.

As mentioned above, development of the Research Triangle languished until 1965 when IBM was attracted to establish a large R&D facility in the region. This was complemented by the National Institutes of Health also choosing the region for establishment of a new laboratory complex.

**Although still lacking a critical mass, international awareness and credibility, Techquad has an existing base upon which to build.** These include:

- A hub of mining industry educational research and development fostered by locally based, technologically driven firms in the mining industry, such as MIM Holdings;
- Several university "spin-out" technology-based, entrepreneurial firms, including Agen and Mitec, along with niche market industry leaders, such as Mincom in mining software; and
- Small technology-based developmental facilities of overseas leaders in their industries, including DEC and the Hong Kong Jockey Club.
- The evolving Queensland Manufacturing Institute which is becoming a recognised asset to the region.

In addition, new cooperative research centres and CSIRO laboratory facilities add to the technological job basis of the region. However, Techquad still lacks the drawing power and critical mass provided by the substantial presence of a recognised global leader of the stature of IBM in 1965.

Based upon these considerations, Techquad could appropriately be assigned a rating midway between the 1960 starting point and the 1970 post IBM rank for the Triangle.

**The indicated action for Techquad is:**

*to recruit the major global magnet firm needed in an appropriate technological area; and also*

*to continue to nurture the development of the mining and entrepreneurial base already existing.*

2. ***Education.*** Each hot spot developed in proximity to prestigious technical universities. Besides having access to major science and engineering schools, they also had top ranked business schools nearby. The culture to promote linkages between universities and industry is also important.

Although in 1960, the three universities of the Research Triangle lacked national stature of significance, they stand today prominent in many fields.

**The four universities within Techquad have strong bases in technical and managerial sciences, but could benefit from improved global recognition and strengthened linkages.** An example of the latter would be provided by a video conferencing network linking each of the four universities, and the proposed Clunies Ross House, which could be used to deliver selected courses in real time from one campus to students in other locations. Such an integrated network is widely used in the Research Triangle, and enables students in any of the three universities to take courses offered by the regional leader in a given field, regardless of his/her location.

Nonetheless, Techquad compares quite favourably today with the Research Triangle through its first 15 years of development.

**APPENDIX 1: THE BENCHMARKING OF TECHQUAD (CONTINUED)**

eg, a tech-based CIRCT

**The indicated action for Techquad is:**

*to increase overseas awareness of existing academic strengths in the region, particularly building on the worldwide networks of academics within the institutions;*

*to develop additional infrastructure which links the universities in a cooperative framework, particularly with regard to education and professional development.*

3. ***Physical Infrastructure.*** According to Herbig and Golden:

> "Physical infrastructure is of prime importance to the development of an innovative hot spot. In selecting a site, companies no longer need locate near supplies of raw materials, rivers, ports or customers. All the classic innovative hot spots have an outstanding physical infrastructure in terms of highways, water, sewage, airports, ports and hospitals and other medical facilities. Access to highways and airports is especially important in site selection decisions. Additional infrastructure requirements seem to include a plentiful supply of technical, managerial and assembly labour."

The Research Triangle adequately met these requirements in the early stages and continued to upgrade over time. The region today is linked with an excellent high capacity highway system and an international hub airport. Medical schools at the universities ensure the region is at the "state of the art" in medical care and their facilities are unsurpassed.

Within the Techquad region, **the highway infrastructure is competitive within Australia, provided expansion of capacity between Brisbane and the Gold Coast continues ahead of demand.** The domestic air terminal meets world standards, and the new international terminal promises to do so by 1996. This would be particularly true if it is integrated with the domestic terminal along the lines of the Qantas proposal. Other infrastructure needs are currently competitive within Australia, and continuing development issues are being addressed within the SEQ 2001 initiative.

On a scoring basis, Techquad compares favourably with the developmental stages of the Triangle on the infrastructure factor.

However, while the infrastructure of Techquad region is currently competitive within Australia, **there is a significant short term issue - the lack of an existing world class, international airport facility to serve as an international hub.** Although Australia is distant from major markets and population centres, Techquad is better placed for proximity to Asia Pacific markets and population centres than any other capital city in Australia. Under the hub concept, the Techquad regional airport could increasingly become a principal entry and exit Australian port of call for global carriers on key international routes.

**The indicated actions include:**

*strengthening overseas air transport linkages by ensuring the international terminal upgrading proceeds at best speed and also by establishing the regional airport as an international hub for additional airlines;*

*focusing development on categories wherein proximity to markets is not critical - such as specialised technology-based markets with a high intellectual value-added component;*

*encouraging continued development of critical infrastructure, including water supply, capacity on the Brisbane/Gold Coast highway, and port facility capabilities; and*

*communicating the current status, plans and strengths of the region to overseas target organisations.*

**APPENDIX 1: THE BENCHMARKING OF TECHQUAD (CONTINUED)**

4. ***Low Development Costs.*** According to Herbig and Golden: **"Cheap land and facilities appear to be a major requirement for the birth and growth of an innovative hot spot."** This is certainly true for small start-up firms, which are usually undercapitalised and need inexpensive work space. However, it should be noted that the land within the Research Triangle Park was sold to prospective firms at representative market rates. In fact, land outside the Park was actually lower cost than that within the Park because of Park restrictions on utilisation.

**Relative to the rest of Australia, there is low cost land available in the Techquad region, and housing and living costs remain below the national average. What is missing is inexpensive work space for entrepreneurial firms.** On a scoring basis, the Triangle maintains a global advantage over Techquad in this regard, while Techquad still rates well within Australia.

**The indicated action is to:**

*assess what exists and what is needed - particularly with regard to development land for major R&D facilities of multinationals and incubation facilities for local entrepreneurial firms;*

*develop integrated databanks to facilitate land searches by prospective organisations considering location in the region; and*

*develop incubation facility capability as needed and appropriate (see below).*

5. ***Attitude toward Risk and Entrepreneurship.*** **In innovative communities, the predominant attitude toward entrepreneurship was found to be one of not only acceptance, but admiration** - particularly when coupled with a culture which is hard-working and individualistic. Risk-avoidance is not characteristic of hot spot communities, and (legitimate) failure is not faulted, while not trying is.

The Research Triangle held few of these characteristics in the early 1960s. However, thanks to the political coalition formed between government, industry and academe, a cultural shift was achieved which enabled the Triangle to be well ranked in this factor by 1970.

Although perhaps less burdened than other parts of Australia, Techquad carries a national burden in this regard. Entrepreneurship has been sullied by failed market manipulators who paraded as entrepreneurs, yet added little value to the enterprises they accumulated. Consequently, community confidence must be restored.

In spite of this legacy, **Techquad still appears to compare favourably with the culture of the Triangle in its early days, but clearly stands behind many other world communities today.**

**The indicated actions include continued and concerted effort by the three sectors to:**

*provide inspiration for entrepreneurship and technological development through recognition of organisational and individual role models; and*

*build on the learnings elsewhere to set policies and establish incentives to encourage true entrepreneurial activities beneficial to the community.*

6. ***Pro-business Attitude.*** Herbig and Golden found that **hot spot communities looked to businesses as key to prosperity and providers of answers to problems. During the conception and growth phase, businesses were given favourable treatment and encouragement.**

Mature hot spots, such as Silicon Valley and Boston's Route 128 region were found to be declining in response to governmental attitude shifts toward more regulation and higher taxation. Importantly, the authors found that a positive "climate" encompasses the extent to which a state is perceived as friendly to business interests - particularly when it comes to balancing tax loads with the provision of necessary services.

**APPENDIX 1: THE BENCHMARKING OF TECHQUAD (CONTINUED)**

The recent actions of the South Australian Government to encourage MFP investment indicate awareness of taxation and perception issues.

The "Queensland Leading State" economic development policy published in April 1992 espouses a pro-business policy basis which provides a framework for building a positive image in this factor for Techquad. The State Government has existing programs to foster industrial development, such as the Major Projects Incentive Scheme (MPIS) and the more recent Queensland Regional Headquarters Initiative.

Overall, **Techquad appears competitive within Australia, but remains at a disadvantage relative to competitive, overseas regions.**

**The indicated actions include:**

*ensuring actions are perceived as being consistent with pro-business policies;*

*extending the Regional Headquarters Initiative toward Techquad establishment; and*

*identifying and pursuing opportunities to increase the effectiveness of government expenditures to strengthen regional competitiveness in TI areas and maximize economic returns to the community.*

Examples of such opportunities might involve remissions of stamp duties on intellectual property and venture capital transactions.

7. ***Venture Capital Availability.*** Venture Capital availability is critical to the development of clusters of spin-out and start-up enterprises. However, venture capital was found to follow rather than lead movement to new geographic high-tech areas.

Importantly, under the Research Triangle model, the first step of attracting a critical mass of existing technology-based organisations is not dependent upon a substantial availability of venture capital. Rather only conventional development finance is needed to meet the working capital needs of established multinational organisations.

As indicated above, limited early stage development capital is provided by the State Government through the QGRAD and other venture capital programs. Importantly, the need for enhancing venture capital availability is recognised by key officials.

For example, the Honourable Keith DeLacy, Treasurer of Queensland, recently was quoted as stating he was looking at appropriate roles for Government in facilitating the development of a venture capital market in the State. This view was supported by Jim Kennedy, Chairman of the substantial Queensland Investment Corporation (QIC), who indicated that the QIC Board was open to consideration of participation in the venture capital market. However, the appropriateness of, and approach to such participation had not yet been determined.

Unfortunately, outside of State Government's direct participation in provision of venture capital and potential stamp duty remissions on venture capital transactions, taxation incentives for venture capital formation fall within the domain of the Federal, not State Government.

Although Techquad appears to compare favourably with the early stages of the Research Triangle on this factor, **action is indicated to:**

*accelerate development of venture capital sources within the Techquad region.*

Such efforts should also help encourage establishment of Pooled Development Funds (PDFs), which are the focus of a tax-advantaged Federal Government program to encourage investment in small businesses.

**APPENDIX 1: THE BENCHMARKING OF TECHQUAD (CONTINUED)**

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**APPENDIX 1: THE BENCHMARKING OF TECHQUAD (CONTINUED)**

Given that venture capital formation generally follows, rather than leads "hot spot" development, creation of information networks and promotion of investment opportunities developing in the region should accelerate development.

**8.** ***Government Resources.*** Governments need to provide strong incentives and play a catalytic role for technological innovation, although much of these responsibilities tend to fall more within the domain of the Federal Government. Nonetheless, the State Government's grant to facilitate the relocation of elements of several minerals and manufacturing related CSIRO divisions into the region illustrates recognition of the need. Unfortunately, Federal Government spending in R&D in Queensland falls well beyond the national average in a per capita basis - $26 in Queensland capital with $61 national average.

Noting that the development of the Research Triangle was not significantly related to American defence industry support, the Techquad region appears comparable to the Research Triangle in this factor.

**The indicated action is:**

> *for continuing effort to attract major additional public sector research organisations to locate facilities in the region and to increase Federal spending on R&D in Queensland to the average level in Australia on a per capita basis..*

**9.** ***Local School System.*** During their birth and growth, hot spots were characterised by strong school systems. This is because the key to managing innovation is found in the availability and recruitment of qualified human resources.

Compared with the Research Triangle, the Techquad region has an adequate and improving primary and secondary education system and a world class vocation training system in TAFE.

However, **there is an indicated need to continue upgrading of the education system with particular emphasis on science subjects.** Additional effort is also needed to improve the image of science subjects within the student population - although increasing high pay job opportunities for science graduates might be the most efficient means to do so.

**10.** ***Physical Climate & Environment.*** Herbig and Golden found that all of the innovative hot spots enjoyed favourable climates, with few extremes of hot and cold, and most had the advantages of being near the ocean. Other quality of life features, such as the cultural amenities available in urban areas, were also found to be important.

Significantly, in his book on "Megatrends", John Naisbitt observed that **geographical shifts to "sunbelt" regions are related to the global shift from an industrial to an information society occurring concurrently with trends toward globalization and decentralisation.** He also found that the sunbelt shift phenomenon is not initially one of relocation of existing facilities, but creation of additional ones. However, the new facilities tend to replace the older ones which were first shutdown when conditions required consolidation. In other words, many such shifts becomes sequential relocations.

On any measure of this factor, Techquad compares favourably with the best. The region offers an outstanding life style with the enjoyment of an outstanding environment and climate. Indeed, SEQ was strongly favoured by overseas sponsors of the MFP concept over any other location in Australia.

Nonetheless, outside of Australia, there is limited awareness of the region's lifestyle and environment. Tourism promotion is unlikely to provide an efficient or effective means to reach this group since the environmental benefits need to be communicated in tandem with other business-relevant ones. This indicates **action is needed to promote Techquad's environment to a select group of overseas decision makers in technology-based industries through conferences and professional networks.**

## APPENDIX 1: THE BENCHMARKING OF TECHQUAD (CONTINUED)

11. ***Research Parks and Incubators.*** Technology parks were found to be a positive factor in the development of hot spots. In addition, incubator facilities were found to be important to the development of entrepreneurial clusters.

Although the Research Triangle developed through focus on efforts to attract tenant organisations for the region's major research park, recent direct investigations revealed that collocation in a single research park is not a critical factor for such firms. This is because such parks primarily serve as catalysts to bring companies near the intellectual resources and research labs of universities. Very little interaction actually occurs between the firms located within the park - although they each draw from a common, "floating" labour pool.

Although research parks can provide a marketing focus, this need can also be met under a branded concept, such as Techquad, with an integrated land development information base. The above finding implies collocation in single park is not critical in itself, as long as the local human resource and technical infrastructure is readily accessible. However, this means firms must be collocated within geographical boundaries effectively determined by acceptable commuting distance between locations (e.g., one hour's drive).

Electronic networks, such as video conferencing, can of course extend the boundaries for information access, but not for employment until "telecommuting from home" becomes a more accepted and common practice.

**Techquad has a dispersion of research, technology and industrial parks located on both private and public sector land. However, appropriate information and communication networks are needed to ensure that the lack of a large central research park is not a handicap for the development of Techquad.**

It should be noted that establishment of incubators to foster the development of entrepreneurial clusters has only recently been initiated within the Research Triangle, with incubation support not an initial strength for that region. However, given the entrepreneurial base already developing in SEQ, effort to accelerate these "home grown" enterprises appears warranted.

In this regard, it should be noted that Herbig and Golden observed an "agglomeration effect" that occurs as an innovative hot spot builds momentum and reaches critical mass. Such a critical mass of firms generates a pool of technical personnel, which in turn makes staffing new ventures relatively easy.

This then enables the spin-off of enterprises resulting from the close proximity of firms engaged in related activities in rapidly evolving industries. It also encourages other high-tech industries to locate in the same region rather than diversify elsewhere. Once again, the key is geographical proximity - which enables a talented pool of human resources to change jobs without relocating their households.

Based upon the above considerations, Techquad appears to compare favourably with the early days of the Research Triangle, although it is at a relative disadvantage today.

**The indicated actions needed to close the current gap include the establishment of:**

> *an information and communication network to link the current dispersed land assets together in a coherent framework which identifies existing and emerging industry clusters; and*
>
> *low cost incubation and management support systems for entrepreneurial, technological start-up enterprises.*

# APPENDIX 2: PROPOSED TECHQUAD INSTITUTE STRUCTURE

## OVERVIEW

The Task Force recommends the establishment of the Techquad Institute as the catalytic force for turning the vision of Techquad into a reality. Funding for the Institute should be approached like that for statutory body, with no expectation of the Institute becoming self-funded. Nonetheless, the Task Force recommends this entity be structured as an autonomous, non-profit company, not a statutory body. This would maximise flexibility and more readily enable the direct participation of other stakeholders.

As proposed, the entity would be strategically guided by a representatives of the private/public sector coalition of funding sponsors. However, private sector leadership is imperative to ensure market-oriented focus. The actual work of the Institute would be specified by a contractual agreement between the Institute company, the State Government and the Techquad universities. If a major sponsor, the Federal Government would also be party to the contract. Specific performance measures would be specified in the contract. With an initial contract period of four years, a review of progress should be conducted after the first three years of operation.

Funding for the Institute should be leveraged through contributions from each class of stakeholders. The Task Force recommends that each the State Government and the Federal Government, if possible, financially match the cash and substantial "in-kind" contributions from all other contributing stakeholders: the Techquad universities; local governments/councils within the region; industry associations, such as the Queensland Confederation of Industry and the Queensland Chamber of Commerce; and private sector business enterprises or firms. Continuation of funding should be expected if satisfactory progress is maintained. Given that each funding stakeholder will be closely involved with the planning and operations of the Institute, satisfactory progress should be an expected outcome.

## ORGANISATIONAL STRUCTURE

The following specific organisational structure of the Institute is recommended:

1. Corporate Structure. The Institute should be constitute as a "limited by guarantee" company, with Members, not shareholders. Memorandum and Articles of Association should be structured to enable the company to qualify as a tax-exempt, non-profit entity, as approved by the Australian Taxation Office.

2. Members. As proposed, there would be six classes of Members: State Government; Federal Government; Local Government; Universities; Training Institutions; Industry Associations; and Private Sector Firms/Enterprises. A class of membership would be activated by a funding commitment from one or more organisations within the category. Membership in any category will require an appropriate financial commitment to the Institute. Each class of Members would have the right to nominate one Member to serve as a guarantor of the limited liability of the company.

3. Board of Councillors. A Board would be constituted of 12 Councillors as follows:

   **The State Government** would appoint one Councillor; normally the Director-General of the Department of Business, Industry and Regional Development;

   **The Federal Government**, if a major contributing sponsor, would appoint one Councillor, normally an appropriate First Assistant Secretary, or possibly a State Director of the Department of Industry, Technology and Regional Development;

   **Each contributing Techquad university** would appoint one Councillor, normally the Vice Chancellor or other Chief Executive of the university;

   **The group of training institutions would appoint** one Councillor, normally a senior administrator from the TAFE system, such as the Executive Director, TAFE TEQ.

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## APPENDIX 2: PROPOSED TECHQUAD INSTITUTE STRUCTURE

**The group of Local Government Members** would appoint one Councillor, drawn from the representatives of the Local Councils which are financial contributors.

**The group of Industry Associations** would appoint one Councillor, drawn from the representatives of the Associations which are financial contributors.

**The group of Private Sector Enterprises/Firms** would appoint one Councillor, drawn from the representatives of the firms which are financial contributors. and

**Two Councillors drawn from private sector community leaders** will be appointed, by one each the State Government, the Federal Government and the group of Techquad Universities.

In the event that the Federal Government is not a major funding partner in the Techquad coalition, the State Government and the Techquad university group will each appoint one additional Councillor drawn from private sector community leaders.

To help ensure market focus, the Chairperson of the Board of Councillors will be elected by the Board from the field of private sector Councillors.

Each Councillor who is not appointed "ex officio" by way of position will serve for four years. His/her appointment would then be confirmed by the group of Members the Councillor represents or the position rotated to a new representative.

In addition to selecting Directors, the Board of Councillors shall meet at least semi-annually to provide strategic oversight and counsel to the Board of Directors and Executive Officers of the Institute.

4. Board of Directors. A Board, of not less than six nor more than 10 Directors, will be appointed by the Board of Councillors subject to the following specifications:

a. One Director shall be a nominee and representative of the State Government;

b. One Director shall be a nominee and representative of the group of Techquad universities; and

c. A majority of the Directors shall be drawn from the private sector.

The Directors shall elect a Chairperson, who shall be drawn from the private sector field of Directors. Amongst their statutory responsibilities, the Directors shall be responsible for strategic planning and oversight of the operations of the Institute, and shall appoint the Chief Executive of the Institute. Each Director shall each be appointed for four year terms on a rotational basis, with one-fourth of the retiring each year. Directors may be reappointed according to the will of the Board of Councillors.

5. Staffing. The Chief Executive of the Institute shall be accountable to the Board of Directors. He/she shall serve under a fixed term contractual appointment, not extending beyond the term of funding commitment by the sponsors. In addition, the Chief Executive shall appoint additional managerial and secretarial, administrative or research staff as approved by the Board of Directors. In any event, it is anticipated that the total level of staffing will not exceed five, including the Chief Executive.

# LIST OF TASK FORCE PATRONS, MEMBERS AND ASSOCIATES WITH SPONSORING ORGANISATIONS

## PATRONS

| | | |
|---|---|---|
| Hon. Jim Elder, MLA | Minister for Business, Industry & Regional Development | Queensland State Government |
| Prof. Dennis Gibson | Vice Chancellor | Queensland University of Technology |
| Prof. Harry Messel | Executive Chancellor | Bond University |
| Prof. Roy Webb | Vice Chancellor | Griffith University |
| Prof. Brian Wilson | Vice Chancellor | University of Queensland |
| Dr. Nicholas Girdis | Chairman | Queensland Research Institute Limited |

## PAST PATRONS

| | | |
|---|---|---|
| Hon. Geoff Smith, MLA | former Minister for Business, Industry & Regional Development | Queensland State Government |
| Prof. Phil Lader | former Vice Chancellor | Bond University |

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| Prof. Phil Lader | former Vice Chancellor | Bond University |

**LIST OF TASK FORCE PATRONS, MEMBERS AND ASSOCIATES (CONTINUED)**

**MEMBERS**

| | | |
|---|---|---|
| Professor Ron Sampson<br>Chairman | Professor, Technology Management<br>Executive Director<br>Executive Director | Griffith University<br>Queensland Research Institute Ltd<br>Procter & Gamble Australia Pty Ltd |
| Mr John Allpass | Managing Partner | KPMG Peat Marwick |
| Mr Tom Baxter | Chief Executive | State Chamber of Commerce & Industry |
| Mr Robert Bowen | General Manager | AGEN Ltd |
| Professor Ted Brown | Deputy Vice Chancellor | University of Queensland |
| Mr Graeme Burkett | National Sales Manager<br>Corporate & Government Business Unit | Telecom Australia |
| Dr Alan Hayman | Manager<br>Innovation & Technology | Dept Business, Industry & Regional Development |
| Mr Kevin Hesse | Manager Engineering | SEQEB |
| Mr Daniel Holland | Director of Engineering<br>Corporate Development | Digital Equipment Corporation |
| Professor Roger Holmes | Deputy Vice-Chancellor (Research) | Griffith University |
| Mr John Kelly | Partner | Corrs Chambers Westgarth |
| Mr Daniel Lai | Manager | Hong Kong Jockey Club Systems |
| Mr Lew Laing | Queensland Manager | JTEC Pty Ltd |
| Mr David Merson | Managing Director | Mincom Pty Ltd |
| Mr Jim Miller | Director-General | Dept Primary Industries |
| Mr John Ness | Managing Director | MITEC Ltd |
| Professor Millicent Poole | Pro Vice-Chancellor<br>Research & Advancement | Queensland University of Technology |
| Mr Terry Quinn | Deputy Editor | Courier Mail |
| Mr Colin Robertson | Director | Logan College of TAFE |
| Mr Norbury Rogers | Senior Partner | Ernst & Young |
| Mr Robert Starkey | National Manager<br>Optus Network | Digital Equipment Corporation |
| Mr John Tilston | Director<br>Economic Development Division | Dept of the Premier, Economic & Trade Development |

**LIST OF TASK FORCE PATRONS, MEMBERS AND ASSOCIATES (CONTINUED)**

**ASSOCIATES**

| | | |
|---|---|---|
| Dr Jeff Barker | Associate Dean<br>School of Information Technology | Bond University |
| Mr Max Beatty | Managing Director | Business Model Systems Pty Ltd |
| Mr Don Keough | Publisher | Business Queensland |
| Mr Colin Melvin | Manager | Office of Commercial Services<br>QUT |
| Mr Tony Pascarelli | Principal Industry Development Officer | Dept of Business, Industry &<br>Regional Development |
| Professor Peter Poole | Dean<br>School of Information Technology | Bond University |
| Mr Jim Reeves | Director Co-ordination | SEQ 2001 |
| Mr Dick Schoorl | Special Projects Officer | Dept Primary Industries |
| Mr Eddie Scuderi | Partner | Corrs Chambers Westgarth |
| Mr Ray Shaw | City Planner | Logan City Council |
| Mr John Turner | Operations Manager | MITEC Ltd |

## REFERENCES

*Business Week*, "Hot Spots - America's New Growth Regions are Blossoming Despite the Slump:, pp 54-60, October 19, 1992.

Bureau of Industry Economics, "Recent Developments in the Theory of Economic Growth: Policy Implications", Occasional Paper No.11, AGPS, Canberra, 1992.

Bureau of Industry Economics, "Multinationals and governments: Issues and implications for Australia", Research Report No.49, AGPS, Canberra, 1993.

Costa, M & Easson, M (eds), "Australian Industry What Policy?", Pluto Press, Leichhardt, NSW, 1991.

Department of Industry, Technology and Commerce, Australian Centre for Innovation and International Competitiveness, University of Sydney, "Innovation in Australia's Service Industries", AGPS, Canberra, 1993.

Deputy Commonwealth Statistician, "Queensland Yearbook 1993", No. 51, ABS Catalogue No. 1301.3, Australian Bureau of Statistics, 1992.

Dorf, R C & Worthington, K K F, "Technology Transfer from Universities and Research Laboratories", Technology Forecasting and Social Change 37, 251-266, Elsevier Science Publishing Co Inc, 1990.

Drucker, P F, "Innovation and Entrepreneurship - Practice and Principles", Harper & Row, Publishers, New York, 1985.

Economic Planning Advisory Council, "Improving Australia's competitiveness at the enterprise level", in Competing on world markets, Discussion Paper 90/08, by Pappas Carter Evans & Koop, AGPS, Canberra, 1990.

*Fortune*, "The Best Cities for Knowledge Workers", November 15, 1993

Goss, W, "Queensland Leading State - State Economic Policy", a statement by the Premier, Government Printing Office, 1992.

Government-University-Industry Roundtable, "New Alliances and Partnerships in American Science and Engineering", National Academy Press, Washington DC, 1986.

Harrington, D, "Visual Clusters: A useful Paradigm for Australian Industry Policy" in Australian Industry What Policy, Edited by Costa M & Easson M, Pluto Press, Leichhardt, NSW, 1991.

Herbig P & Golden J E, "How to Keep That Innovative Spirit Alive", Technological Forecasting and Social Change 43, 75-90, Elsevier Science Publishing Co Inc, 1993.

Hicks, D A, "Assessing the Impact of MCNC on the Industrial and Economic Development of North Carolina", May 1990.

Krimmer, A W, et al, "The Future of Techquad", Report to the Director-General, Department of Business, Industry & Regional Development, 1991.

Larrabee, C X, "Many Missions - Research Triangle Institute's First 31 Years 1959-1990", Research Triangle Institute, 1991.

Luger, M I & Goldstein, H A, "Technology in the Garden - Research Parks & Regional Economic Development", The University of North Carolina Press, Chapel Hill & London, 1991.

**REFERENCES - 2**

Monck, C S, Porter, R B, Quintas, P, Storey, D, Wynarczyk, P, "Science Parks and the Growth of High Technology Firms", Croom Helm Ltd, Peat Marwick McLintock, 1988.

Naisbitt, J, "Megatrends - Ten New Directions Transforming Our Lives", Macdonald & Co, 1984.

Office of Technology Assessment, "Technology, Innovation, and Regional Economic Development - Background Paper #2 - Encouraging High Technology Development", US Government Printing Office, Washington DC, 1984.

Ohmae, K , "The Borderless World", Collins, London, 1990.

Porter, M E, "The Competitive Advantage of Nations", Macmillan Inc, New York, 1990.

Price Waterhouse, "Italians' Move Shades MFP Development", Techwatch, Vol 3 Number 19, 12 May 1993, Government Liaison Service, Canberra, 1993.

Prime Minister's Science & Engineering Council, "Australian Science and Technology Opportunities and Strategies in the Asia Pacific Region", AGPS, Canberra,

Regional Planning Advisory Group, SEQ2001, "Industry Location and Tourism", pp 28-30, prepared for SEQ2001, 1992.

Reis, A, Trout, J, "Positioning: The Battle for Your Mind", McGraw Hill Inc, 1981.

Rhodes, J, "Agricultural Science Policy in Transition", Agricultural Research Institute, USA, 1986.

Stanford, J, "Industrial Policy in Australia and Europe", prepared for Department of Industry, Technology & Commerce, Australian Government Publishing Service, 1991.

Tassey, G, "The Functions of Technology Infrastructure in a Competitive Economy", Research Policy 20 345-361, Elsevier Science Publishers, 1991.

*The Australian*, "Model Precinct in Technology Park", p 22, 28 September 1992.

*The Australian Financial Review*, "$2.5m Technology Park Deal Signed", 1992.

*The Australian Financial Review*, "Italian Technology Park for Victoria", 14 April 1993.

*The Courier Mail*, "Kennedy Joins Call for Capital", 26 May 1993.

The SEQ 2001 Project, Position Paper Series, Regional Planning Advisory Group (RPAG), 1992-93.

Transport Working Group, SEQ2001, "Transport Position Paper", prepared for SEQ2001, 1992.

Wilmoth, D & Duff, A, "Higher Education and Training in Melbourne's Docklands: a Review of Possibilities", prepared for Melbourne's Docklands Authority, 1992.