

How to make

LIGHTNING

STRIKE



NEW ZEALAND

and the

KNOWLEDGE

ECONOMY

By

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## If you woke up tomorrow with a world-beating idea, how would you foster it in a nation with limited business infrastructure, diminishing talent and a dearth of venture funding?

**N**ew Zealanders seem to be relying on a romantic ideal of number eight wire and Kiwi ingenuity to gain a place in the global economy. But most OECD indicators highlight that, in this country, reality and romance are further apart each year.

Lightning cannot strike unless its target has the right characteristics. The target must be “positive ground”. The same could be said of “bolt from the blue” economic reform. But what would positive ground look like in the New Zealand economic setting of 2000?

Business leaders increasingly highlight the performance of other economies, many of which appear to be gaining benefits from economic development programmes spanning the past two decades or more. If New Zealand has been a straggler to date, then learning from other economies about establishing positive ground for entrepreneurial activity is overdue.

Several initiatives have focused on economic developments in Ireland, Finland, Denmark and the United States. This study arose from an evaluation of US business education, which was broadened to include other areas of entrepreneurial development.

I would like to focus here on two well-known areas of US economic activity, North Carolina’s Research Triangle and California’s Silicon Valley. Although very different from one another and from New Zealand, the two cases offer key insights for the development of New Zealand policy and practice. ▶

## **NORTH CAROLINA: INVESTING LONG-TERM IN RESEARCH AND HUMAN CAPITAL**

Forty years ago, North Carolina was an economic backwater, reliant on primary production and light manufacturing, both in decline. It suffered a substantial and continuing brain-drain.

At the turn of the millennium, it is far from an “economic miracle”, but it has seen sustained strong economic growth, and is consistently ranked in the top 10 business areas internationally. North Carolina also is positioned for the future, with programmes in place to further upgrade capacity and performance throughout the state. How has it achieved this?

North Carolina established the first research park in the world, using the engineering and biomedical competencies of three local universities – Duke University, North Carolina State University and the University of North Carolina-Chapel Hill. Although all three are now considered “world-class”, they were not particularly prestigious at the time of the park’s formation.

Within the park, an independent research institute was established with a strong statistical emphasis and a charter for research commercialisation. The state provided huge infrastructure development funds, tax and other incentives to gain the first large tenants from the public and private sectors.

These formed the anchors both for research commercialisation and the capture and retention of highly skilled people.

Over three decades, the park and affiliated universities established more than 50 national and international centres of excellence, attracted more than US\$1 billion in research funding, gained more than 100 tenants in the park itself and contributed more than US\$70 billion in economic return to the area. But this was not enough to guarantee continued economic development or to address inequities in economic development throughout the state.

In the past decade, development initiatives have been built upon the excellent existing national framework of small-business development centres, through the North Carolina Technological Development Authority and a regional network of entrepreneurship education, small-business development centres and business incubators – all tailored to the local needs of each area.

Within the park, the state-funded First Flight Venture Centre provides an incubator for high-technology and biotechnology developments. The Centre for Entrepreneurial Development, a non-profit organisation focused on developing and supporting entrepreneurial activity in the state, is considered the most effective organisation of its kind in the United States.

This mainly governmental initiative has been complemented by growth in the research and teaching infrastructure of the three universities. As well as developing world-class research and teaching initiatives, each school has strong undergraduate and postgraduate programmes in entrepreneurship and technology management education. These developments are strongly differentiated, however.

Initiatives have been built upon the excellent existing national framework of small-business development centres

North Carolina has the highest tertiary education subsidies in the US. This reduces tuition fees and increases participation, but it also means the state takes an interest in how education supports state and regional economic goals.

The universities are self-accrediting, which makes them responsive, flexible and able to launch new programmes and courses in a matter of months. But the state regulates new degree offerings to ensure they meet development needs and to reduce redundancy of offerings.

For example, because the University of North Carolina-Chapel Hill offers an MBA, this degree was not an option for North Carolina State University, which instead developed a well-regarded masters degree in the management and commercialisation of science and technology.

The universities collaborate in other ways, through the establishment of multi-university centres, centralised library resources and institutes and centres that span and unite the three institutions. Many of these centres have world-class standing in their own right and unite the research triangle area with international developments in the field.

The Kenan Institute of Private Enterprise, on the University of North Carolina-Chapel Hill site, encourages co-operation among businesses, academic institutions and government to strengthen the private enterprise system, through a series of centres, programmes and projects.

A second large-scale research park has recently been developed at the Centennial Campus of North Carolina State University. This is one of the new generation of research parks, in which private-sector offices and labs are built on the university campus. The School of Engineering and the technology management programme of the Business School are surrounded by the research and development labs of 18 major companies.

Internship programmes, joint research projects and speaker and seminar series are

### A note on virtuous and vicious cycles

The developments in North Carolina are even more impressive when compared with its neighbour, West Virginia.

In the 1950s, West Virginia was similarly reliant on agriculture and manufacturing, with considerable mineral wealth as well. The state has made relatively little investment in its universities, infrastructure or research in the ensuing 40 years. It now lags far behind most of the rest of the US in development.

Though recent regional and federal initiatives have targeted the state, it is believed human capital has dwindled to a level that a turnaround may not be achievable.

The inter-relationship of development and retention of human capital with enterprise stimulation and economic development have formed contrasting cycles – virtuous and vicious – in the two neighbouring states.

planned to capture the full range of benefits from co-location.

First Flight Venture Centre is establishing a second facility, separate from its current home in the Research Triangle Park, to provide incubator services to a host of smaller businesses that wish to benefit from both university and corporate R&D exposure in Centennial Campus. The site is being developed with a transport system, conference centre and full range of independent services to support a growing R&D community.

This development has also seen the prestigious Centre for Innovation Management Studies move to the North Carolina campus from Lehigh University. It joins the more than 50 other international and national centres of excellence that have located in the Research Triangle area.

### WHAT CAN NEW ZEALAND LEARN FROM THE RESEARCH TRIANGLE?

1: Development has been staged. The first step was to actively attract very large knowledge-based employers to hold human capital in place and enable economic development. This involved tax incentives, development 

of infrastructure (particularly transportation) and marketing at the governmental level. The second step was to create a development cycle for universities, institutes and private-sector R&D and then to create spin-off ventures. As Research Triangle Park nears capacity, this process is being repeated at the Centennial Campus development at North Carolina State. In each case, the close proximity of the universities, business and research institutes has been a key issue.

2: Activity to stimulate small-business development and new entrepreneurial activity followed the development of a human capital base. Small-business development centres, business incubators, loan programmes and entrepreneurship education flourish in a growing economy with a strong human capital base.

3: A broad network of services is available. Some arose from identification of opportunity. Others involve global business expansion of high-tech, biotech and other businesses. The emphasis is on ongoing development of small businesses for regional job creation.

4: Commercialisation of research is a strong priority and is advanced by independent institutes as well as academic and commercial institutions. Note that only half of the research

commercialisation and revenues in the area are linked to technology. Almost half of the economic impact on the region is from the application of social science research and evaluation research. This is also the case at research powerhouses, Massachusetts Institute of Technology and Stanford.

5: The state regulates degree offerings to limit direct competition and promote collaboration. This encourages distinctive but complementary competencies. Aside from this, universities are extremely well funded and self-regulating, particularly with regard to curriculum and academic processes.

6: Teaching, research and entrepreneurial practice are strongly linked. Internship and practical experience are key elements of entrepreneurship education. Experience in entrepreneurial start-ups and technology venturing is transferred into the classroom by academic practitioners. There is a strong tradition of evaluation research of initiatives. For example, the North Carolina Small Business and Technology Development Centre brochure presents the results of two masters theses on the survival rates of the centre's incubator clients and the impact of incubators on local real estate.

Service Providers										
Business Stage/Activity	NC Small Business Development Centre	Centre For Entrepreneurial Development	Research Triangle Park	First Flight Venture Centre	Technology Development Authority	NC State Centennial Park	Duke University	UNC-Chapel Hill	NC State University	Kenan Institute
Opportunity Identification	✓	✓			✓				✓	
Business Plan Development	✓			✓	✓		✓	✓	✓	
Plan Assessment	✓			✓	✓		✓	✓	✓	
Advice and Support Pre-Venture	✓	✓		✓						
Loans and Seed Funds	✓	✓		✓	✓					
VC Funding	✓	✓		✓	✓					
Owner/Entrepreneur Training and Support	✓	✓		✓						
Incubator				✓						
Research Park			✓			✓				
R&D Collaboration			✓		✓	✓	✓	✓	✓	
Technology Licensing			✓		✓	✓	✓	✓	✓	
Policy/Lobbying	✓	✓	✓		✓	✓	✓	✓		✓
Human Capital Development	✓	✓	✓	✓		✓	✓	✓	✓	✓
Human Capital Retention		✓	✓		✓	✓			✓	✓
Research on Entrepreneurial Development		✓			✓			✓	✓	✓

7: The culture in North Carolina, as in the rest of the United States, reflects a strong belief in capitalism and private enterprise. This is reflected in the government's willingness to intervene and in large-scale private philanthropic support of initiatives in entrepreneurship and enterprise development. Culture and philanthropy are significantly different in North Carolina and New Zealand. The differences in the government role in business creation and success are even more striking, particularly with the changes in New Zealand over the past two decades.

### **SILICON VALLEY: CRISIS AND RENEWAL THROUGH REGIONAL PLANNING AND ACTION**

The success of Silicon Valley needs little discussion. The intense build-up of human capital, a compelling technology and hyperbolic entrepreneurial expectations are well documented. The area is a hub of innovation and the frontier of the knowledge worker.

A new generation with high intellectual and employment expectations is growing in the shadow of two of the nation's most prominent universities, Berkeley and Stanford.

But, in the past decade, Silicon Valley has lost ground to new upstart areas of development. Rival concentrations have arisen in northern California and along the coasts of Oregon, Washington and British Columbia in an extension of the Seattle micro-electronics, defence and aerospace complex. New "valleys" have taken shape in the Phoenix-Tucson corridor and in Austin, Texas.

From 1988, job growth in Silicon Valley was virtually stagnant after growing at seven per cent or more throughout the 1970s and 1980s. From 1984 to 1994, Silicon Valley lost 40,000 manufacturing jobs.

In the past five years, however, Silicon Valley has reversed these negative trends and begun to grow again at a rate rivalling the late 1970s. How did Silicon Valley respond and begin its renewal?

Leaders from the Valley's high-tech and business service communities launched Joint Venture Silicon Valley (JVSV) in the spring of 1992 out of concern for the region's prospects for sustained economic vitality. Note that this was not a case of a new economic initiative. Nor was North Carolina's. Rather both involve historically successful patterns that had to be adapted to assure sustainability.

Any new initiatives in New Zealand or globally must reflect not only historical patterns, but also more recent refinements.

The idea of a collaborative regional strategy was originally conceived by the San Jose Metropolitan Chamber of Commerce and then championed by then state Senator Becky Morgan. Through three phases – analysis, participatory strategy and implementation – JVSV evolved from a broad-based movement into a new organisation for ongoing regional collaboration. It describes itself as "a dynamic, new model of regional rejuvenation", drawing together CEOs and presidents from the academic, public sector, high technology and service sectors throughout the Valley. JVSV is organised into a core group and 11 action-oriented initiatives.

JVSV was designed to:

- Identify issues that were preventing economic development.
- Commission research to determine their causes and impacts.
- Mobilise resources to fix problems.
- Pass new systems on to the community. ▶

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Its aim was not only to resolve a crisis in development, but also to position the Valley for the future. It is a think tank that resolves key issues by seeking community input while gaining the commitment of community leaders to assign their resources to make things happen.

JVSV is attempting to build a region that is an international model for technological innovation, economic prosperity with an inclusive diverse society and stewardship for the resources of the region.

In the first five years, JVSV projects have included:

- A web-based planning consent process that has unified and harmonised the requirements of 29 planning authorities, allowing industrial planning consents to be gained in weeks rather than months or years.
- Challenge 2000, a school reform initiative aimed at increasing maths and technology skills throughout the region's secondary schools, through a series of outreach and support projects. (Costing \$22 million, this is the world's largest privately funded renaissance in public schooling.)
- Direct initiatives to foster hundreds of start-ups and retain and expand dozens of existing businesses.
- Formation of 37 technology partnerships and consortia.
- Recruitment of the flat panel display consortium, a major industry initiative.
- The United States' first environmental industry incubator.
- Development of a directory of worksite health promotion resources.
- Establishment of a new office of the US Foreign Commercial Service, assisting 54 companies to export into 158 new markets

in its first year (18 of these companies had never exported before).

- Influence in tax and information policy throughout the region and state.

## WHAT CAN NEW ZEALAND LEARN FROM SILICON VALLEY?

**1:** JVSV's success demonstrates the importance of large-scale regional planning and of full involvement of all sectors. This has been a powerful force for re-development of the area, with even greater implications for new initiatives. In contrast, North Carolina officials say their project suffered from insufficient regional planning throughout its first 30 years and diverse localised interests are still significant impediments to the optimum development of the area.

**2:** Key decision-makers, across business, government and academic institutions, are members of the leadership councils and lead task forces. This results in both credibility and fast action.

**3:** The three-stage process – of research-based analysis, participatory strategy setting and implementation followed by implementation – is essential. Identified issues are assessed for causes and impacts before they are discussed with the community and options are identified.

**4:** Entire regions (in this case 29 geographic areas and more than two million people) are involved. Earlier piecemeal, short-term approaches had been singularly unsuccessful. Regional co-ordination and collaboration are seen as essential for optimal economic development.

**5:** Milestones are clear and annual reports document achievements and "lessons learned". Involvement of the community requires accountability to the community and wide-spread communication.

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6: Large-scale regional resources, including private-sector donations totalling millions of dollars annually, are mobilised in support of the goals. A strategic approach requires clear choices backed by sufficient resources for their accomplishment. The resources required include both manpower and equipment support, as well as general funding.

7: The JVS strategy is a balanced blend of sustainable environmental planning, infrastructure support and development, targeted business development and long-term human capital development. After five years, it is clearly working, with growth outpacing many other established commercial corridors in the world.

### ENTREPRENEURIAL DEVELOPMENT AS LIGHTNING

New Zealand appears to be awaiting an intervention from elsewhere – a lightning strike of initiative, cultural transformation and/or venture capital. But even physical lightning doesn't work this way.

Lightning involves a high-voltage discharge, orders of magnitude beyond what we normally encounter in human-generated power discharges. Perhaps that is why it is such a dazzling and exciting spectacle. But lightning strikes are far from random.

The electric build-up of charge in the atmosphere is usually the result of convective forces within clouds. While there are often discharges within or between clouds, strikes to ground usually occur when there is both prominence (height above the surrounding area) and complementary charge.

If New Zealand is looking for the economic “energy” of entrepreneurial development, what are the forces that lead to complementary ground-level developments?

Clearly the fundamental “ground” is New Zealand's society and culture. The United States is notable for its business zeal, but that

does not mean New Zealand should wholeheartedly embrace US ideals.

Positive venture experiences for students and others, however, and a broader acknowledgement of the role and contribution of business in a healthy and dynamic society are long overdue here.

Drawing from the Research Triangle and Silicon Valley examples, the “charge” to attract

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entrepreneurial development seems to include human capital and effective infrastructure. Both examples draw on large, deep pools of talent that have been decades in development.

This human capital is fostered with pre-eminent educational institutions, national commitments to research and national initiatives to foster and secure a strong employment environment for globally competitive talent. Each of the areas profiled is a net importer of talent, not a net exporter.

Infrastructure is equally critical. Both North Carolina and Silicon Valley have struggled to sustain growth without competent infrastructure and are undergoing massive re-development to assure the future.

The infrastructure includes business and tax environments (including incentives) as well as liveable cities.

In New Zealand, prominence would require the development of national eminence in a very limited number of areas<sup>1</sup>. New Zealand 

<sup>1</sup>Peter Drucker's recent analysis of the IT revolution suggests that technology itself has become an enabler of societal transformation, not the source of any competitive advantage. It has shifted from being a differentiator to a prerequisite. New economic drivers have yet to emerge and will probably be discontinuous with anything currently generating wealth. Drucker does suggest, however, that biology appears to hold the key to the next generation of economic “revolution”.

# Silicon Valley and the like attract ventures and funding because of the quality and availability of their human capital

has been advised to focus and excel by numerous writers for more than a decade. Time is running out if we are to avoid the vicious cycle that ensnares declining economies.

The two US areas profiled have clear and compelling areas of international expertise, including commercialisation of technology. New Zealand requires both clear emphasis and supporting competency in commercialisation to succeed.

The two cases profiled are part of a much broader study evaluating US centres of excellence<sup>2</sup>. The results of the broader study and reported evaluations of similar centres in the European Economic Union give rise to policy recommendations for New Zealand.

## RECOMMENDATION ONE: DEVELOP AND RETAIN HUMAN CAPITAL

While the focus in entrepreneurship and enterprise development is traditionally on finance and venture capital, it is very clear that the Research Triangle, Silicon Valley and the like attract ventures and funding because of the quality and availability of their human capital.



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The talent base of a region has to be developed to international standards, and global talent must be attracted and retained.

Requirements include:

- Increasing differentiation of the tertiary sector in both purpose and funding. The sector must include institutions of international scope and scale.
- Fuller funding of tertiary development initiatives from both the public and private sector.
- Attraction of large “anchor employers” in key sectors to stabilise the talent pool, initiate secondary developments and form geographically dense development corridors and research clusters.
- National and private-sector investment in pure and applied research, with particular targeting of identified areas for future national prominence. This may include re-evaluation of both funding and tax structures.
- Attraction and retention of top international talent through re-evaluation of the role of foreign graduate students, repatriation of New Zealanders abroad and a shift in immigration policy from venture capital to human capital.
- Increased tertiary participation rates (in relevant qualifications) to above the OECD median.

## RECOMMENDATION TWO: ESTABLISH A “POSITIVE GROUND” OF CULTURE AND INFRASTRUCTURE

Many of the initiatives encountered in the US sprang from fundamentally different assumptions from those found in New Zealand about the nature of work, the role of business in society and the responsibility for infrastructure development. ▶

<sup>2</sup>See *Looking for Lightning: Entrepreneurial Development and Human Capital*, by M. Wilson, 1999, American Chamber of Commerce (NZ), or visit the website [http://www.business.auckland.ac.nz/looking\\_for\\_lightning](http://www.business.auckland.ac.nz/looking_for_lightning) for the monograph with back-up reports and linked websites.

US ideology is perhaps captured best by the quote from “Engine” Charlie Wilson, that what was good for [the auto manufacturer] was good for the nation.

While that particular perspective may have waned, the belief in private enterprise and “constructive capitalism” underpins US developments in both business and education. This has fuelled both a cultural dynamic and a web of infrastructure that is unparalleled internationally – from small-business assistance and development programmes to globe-spanning transport and communication networks.

It would be both unrealistic and inappropriate to posit the same for New Zealand, but significant change is required to support effective business education and enterprise development.

Needs on the social side of the ledger cannot be resolved without sustained, strong economic development

Changes should include:

- Integrating models and experiences of enterprise and self-determination into the secondary and tertiary education systems (not just for business or professional students).
- Communicating models of business excellence, inclusion and innovation (including initiatives in kaupapa Maori business development) in the business and educational press as well as in governmental communication.
- Developing collaborative models within universities, particularly among professional

schools, and strengthening linkages between universities and other tertiary providers and the business and not-for-profit community. This may include research parks and incubators, but should not be limited to these.

- Moving toward clinical models of scholarship in professional education, incorporating applied research and teaching settings, a broader spectrum of scholarly activities and “pracademics<sup>3</sup>”.
- Providing integrated research and teaching on entrepreneurship, enterprise development and the management of technology and innovation.
- Emphasising high-level regional planning as the pre-requisite for effective economic development, including smoothing consent and communication processes, future-proofing primary and secondary education and providing liveable communities and effective transport systems.
- Examining compliance costs and structures, and securities and companies laws to provide an internationally competitive environment.

These policy initiatives have been effective in other arenas and may add value to New Zealand’s development.

Still, some commentators place New Zealand 20 to 40 years out of step with international development. This is a substantial gap to overcome. It will need to be addressed with focus and commitment at a time when a host of social and other problems compete for time and attention.

Needs on the social side of the ledger cannot be resolved without sustained, strong economic development. If we do not act both quickly and correctly, we will have fewer and fewer resources with which to address more and greater ills.

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<sup>3</sup>A phrase coined by Babson College, to include practitioner academics, or those utilising both experience and research evidence to teach and research in the university setting, particularly in the areas of professional education.