

The Banff Consensus

Integrating the Creative Capabilities of Western Canada into the Global Innovation System

Summary of the proceedings of the First Banff Innovation Summit

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The Banff Consensus was drafted by Richard Hawkins and Cooper Langford of the Science, Technology and Society Program, University of Calgary, with the assistance of Adam Holbrook (Simon Fraser University), Jeremy Hall (University of Calgary) and Peter Josty (THECIS), and with the invaluable feedback and advice of participants in the Banff Innovation Summit.

For further information, please contact:

Peter Josty
Executive Director
THECIS
p.josty@thecis.ca
403-249-0191

The Banff Consensus

Twelve principles for integrating Western Canada into the global innovation system

- 1. Bring the industry-government relationship into the open**

Acknowledge the necessity for cooperation between the public and private sectors and explore creative new ways of developing this relationship.
- 2. Tame the natural resource 'elephant'**

Rather than rely on resource industries to innovate or to stimulate innovation, take some of the organizational and financial models that have been applied successfully to innovation in the resource industries and transfer them into a wider range of industry contexts.
- 3. Focus further up the value-added ladder**

Build an explicit value-added expectation into all industry development strategies that envisages each raw material, manufactured product or new idea in terms first of the highest level of value that it can produce.
- 4. Add value by cooperating**

Re-orient intra and inter-industry cooperative activities towards pooling research capabilities, bringing complementary knowledge and skills together, leveraging R&D resources and raising the public profile of regional innovation initiatives.
- 5. Encourage paradigmatic thinking**

Envisage innovation in terms of product and service paradigms – systems of complementary inputs and outputs in which innovation in any of the parts affects all of the other parts.
- 6. Increase choices by creating diversity**

Create as much diversity as possible in the knowledge base and in the human resource pool – orient innovation strategies towards new options in both existing and new enterprises and towards exploiting adjacent value-chains.
- 7. Focus upon the enterprise and the market, not the technology**

Broaden the perception of innovation beyond the production of technology. Encourage more regional companies in all sectors – particularly services – to innovate by finding value-chain nodes that are linked to the intellectual capacity of their highly qualified personnel to add value and to capture markets.
- 8. Link innovation with education and training in all fields and at all levels**

Envision the role of the educational system in innovation as a K-to-PhD enterprise, encompassing all possible forms of knowledge and skills transfer and providing as many students as possible in every field of study with practical opportunities to experience and participate in some aspect of the innovation process.
- 9. Rebalance upstream and downstream investment strategies**

Allocate public investment not just to the 'Research' side, but also to the 'Development' side and in a wider range of industries. Prepare every investor, public and private, to absorb failure as well as success.
- 10. Match bottom-up initiative with top-down vision**

Innovation cannot be stimulated without vision and leadership. We need both top-down and bottom-up initiatives, but top-down initiatives can be effective vehicles for mobilizing creative resources at the community level.
- 11. Create a culture of innovation**

Create a climate of experimentation and openness to change that inflects every walk of life at every level of society.
- 12. Start moving to the global level by changing local attitudes**

Defeat the mindset that we are an 'exception' – that global market dynamics must adjust to us and that we can exploit only the knowledge we produce ourselves. Produce a positive balance of trade in ideas and knowledge so that we are retaining more value in the region than we are exporting.

Objectives and Goals of the First Banff Innovation Summit

Across Canada, 'innovation' is nailed to the masthead of every Provincial economic strategy. There is growing social as well as political consensus that in order to sustain our high quality of life, we need to enhance our basic and applied research capabilities and create new types of knowledge-based industries. Many actions have been undertaken at Provincial and Federal levels and in industry. But are we succeeding? Or more to the point, do we have the right conceptual tools even to plan and monitor our progress? Or are we chasing rainbows – setting unrealistic goals, missing obvious opportunities and investing in dead-ends?

The First Banff Innovation Summit, which concluded on 1 October 2006, was called in order to take a critical look at these issues and to re-assess the problem of how to ensure a prosperous future for the four Western Canadian Provinces in an increasingly competitive and rapidly globalizing innovation system. The goal was not just to talk about these issues, but to define new principles for research and innovation policy and to suggest new approaches based upon leading-edge thinking about how innovation drives prosperity and growth.

The Summit brought together 35 leading figures from across the four Western Provinces, drawn from business, government, the universities and the not-for-profit sector. The group included senior executives from key industry sectors, CEOs of internationally successful Western Canadian entrepreneurial companies, directors of major research agencies, senior civil servants from the four Western Provinces and the Federal Government, senior civic officials and leading scholars.

In order to set the tone and to challenge conventional wisdom about innovation and economic diversification, the Summit was joined by five internationally recognized authorities on various aspects of innovation – David Mowery of the Haas School of Business, University of California at Berkeley; Ian Miles, PREST, University of Manchester, UK; Daniel Levinthal, Wharton School of Business, University of Pennsylvania; Stuart Kauffman, Institute for Bio-informatics and Complexity at the University of Calgary and the Santa Fe Institute (New Mexico); and Richard Hawkins, University of Calgary Innovation Lab. The Summit was keynoted by John Dryden, Deputy Director of the Science, Technology and Industry Division of the OECD (Paris).

The goal of the Summit was to facilitate the free and frank exchange of knowledge among a multifaceted group of individuals who together incorporate as broad a range of experience and expertise relevant to western economic diversification and innovation as practically could be assembled in one room at one time. Summiteers engaged in intense discussions over three days, each session coordinated by a facilitator chosen from amongst the peer group.

The Chatham House rule was employed throughout in order to enable Summiteers to disassociate their individual observations and perceptions from the official positions of institutions to which they were affiliated.* All Summiteers were charged to think 'out-of-the-box' and to achieve consensus about key priorities that will contribute positively to cooperation between industry, government and the community at large on this crucial issue.

Given the varied perspectives of Summit participants, we did not expect to achieve complete agreement, although this was achieved on a remarkable number of issues; not always those upon which such a diverse group might be expected to agree. On contentious or politically sensitive issues we have tried to reflect the view of a clear majority, but also we have tried not to blunt views on sensitive issues that, on balance, reflected the collective opinion. Following the Summit, participants were given opportunity to review and shape the final synthesis, which they agreed would be published as a collective document, all priorities, positions and opinions being attributed to the group and not to any individual or institution.

...are we succeeding at innovation or are we chasing rainbows?

...to define new principles for research and innovation policy

...35 leading figures from across the four Western Provinces

...challenge conventional wisdom about innovation and economic diversification

...as broad a range of experience as practically could be assembled in one room at one time

...think 'out-of-the-box' and achieve consensus about key priorities

...collective attribution of priorities, positions and opinions

* Chatham House is home to the Royal Institute of International Affairs. The Chatham House Rule is that "... participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed." (Royal Institute of International Affairs 2002).

... Twelve Principles to unlock our creative potential

... myths and shibboleths encrust research and innovation policies

...current policy approaches are being challenged

...the experience of Summiters runs counter to prevailing policy approaches

... markets don't always embrace new ideas

...public investment has been essential for developing key technologies in Western Canada which now drive much of the growth in the region

...seeing public infrastructures and services as projects for creating knowledge and wealth

The *Banff Consensus* is the result. The pages that follow summarize what was achieved, presented in the form of *Twelve Principles*, each of which critically re-assesses a key issue, gets to the roots of a specific problem and suggests priorities and directions that Summiters were confident would unlock the creative potential of Western Canada and elevate it to a position of leadership, both in Canada and globally.

Challenging the mythology of innovation policy

There is broad agreement that knowledge and innovation are closely connected, but also that innovation is the application of an idea, not its creation.

Over several decades, however, both Federal and Provincial research and innovation policies have become encrusted with many myths and shibboleths about these relationships. Often this has resulted in one ineffective policy following another. Or much worse, it has impaired our ability to spot and build upon policies that actually have worked.

Current knowledge runs contrary to many long established assumptions and beliefs that there is a direct or linear relationship between science and R&D, or an exclusive link between innovation and the production of new technology.

In order to illustrate how much current innovation theory and research now questions many current policy approaches and practices, this document has been punctuated with *Challenges* drawn from the presentations and background papers prepared especially for the Summit by the invited group of innovation scholars.

It was remarkable how closely the practical experience of most Summiters paralleled these observations and how distant it was from many of the principles and practices that have dominated research and innovation policy for many years.

The Twelve Principles

1. Bring the industry-government relationship into the open

Summiters were strongly agreed that industries belong in markets and that first and foremost, innovation should be stimulated and supported by market forces. However, they were in strong agreement also that innovation is necessary *in order to create new markets* and that existing market conditions often inhibit new ideas.

Thus, markets alone will not provide everything that is necessary to grow innovation capabilities and capacity. Nurturing radically new technologies from conception through to commercial success can take decades and require investment periods that often are infeasible on commercial criteria alone. Significant public sector involvement at appropriate stages has been essential already to the successful application of many of the key technologies that were developed in Western Canada and which now drive much of the growth in the region.

Historically, many of these initiatives have shown great vision by policy-makers, a factor deemed essential by all Summiters. Initiatives like AOSTRA and the NRC agricultural biotechnology lab have been tremendous successes by any criterion. Less often seen in the same light, but every bit as productive, have been investments in innovation-intensive public services. To take one obvious example, Summiters saw very negative implications in current government attitudes toward the health system which portray it as a problem for controlling public spending rather than as a project for creating knowledge and wealth. Not only does the nature of our public health service bestow competitive advantages upon companies in Canada, but the health sector has been probably our largest single generator of successfully commercialized knowledge from basic research.

Creating a more positive role for the public sector

The question is not 'Should government play a role?', but 'What role should government play?'. Summiteers expressed dissatisfaction that in recent times the industry-government relationship at Federal and Provincial levels has been shaped more by ideology than by the realities of the global marketplace. This has resulted in uncertainty, selective and ambiguous policies and failures of leadership.

It was agreed broadly that it is not the role of government to pick winners, nor is it the sole responsibility of government to finance innovation. However, it is their role to ensure that potential winners get the chance to emerge and that they have access to the human, financial and managerial resources that will take them to the finish line. In this respect, Summiteers saw far fewer problems with the content of research and innovation policy – much of which simply mirrors policies in competitor countries – than with a lack of foresight as to how public resources should be deployed and sustained in the longer term.

Before we can begin to create the most positive possible environment for innovation in Western Canada, we must acknowledge openly the necessity for cooperation between the public and private sectors and explore creative new ways of developing this relationship to our advantage.

2. Tame the natural resource 'elephant'

In all four Western Provinces, the resource sector is the elephant in the room. Although not all Provinces are dependent upon natural resources to the same degree or in the same way, a large proportion of each Provincial economy and much of the current economic planning orientation of the region as a whole remains tied to a perilously narrow range of industries involved directly or indirectly with petroleum, agriculture, forestry and minerals.

Inevitably, most discussions about how to diversify these economies through research and innovation begin with the idea that we must induce more innovation in the resource industries in order to leverage more innovation in other sectors.

Summiteers agreed that the resource industries will be a dominant factor in the region for many years to come and certainly no one advocated turning our attention away from exploiting these resources – especially where it could be done in more innovative and sustainable ways. Moreover, it was stressed that the resource sector can and indeed has stimulated innovation in the region. From Canola and the oil sands to plant biotechnology and genetic animal breed tracking, the resource base has yielded many significant innovations. All were agreed that such initiatives have been major successes.

Nevertheless, when it came to building up a regional environment that is generally more conducive to research and innovation, Summiteers viewed the resource industries in a very different way. They stressed that the sector is made up of many different industries that share few characteristics and do not perform economically as a group. Prices for some commodities may soar while others collapse.

The one common factor is that all of our resource industries exist in volatile and ruthlessly competitive global markets with razor-thin margins and dense value-added structures. Moreover, few if any of the competitive conditions in these markets globally are determined in Canada, even where unique endowments like the oil sands are concerned.

All of these forces create an overall atmosphere of conservatism insofar as innovation is concerned, even though otherwise these industries are accustomed to accept enormously high levels of risk – every new oil well, crop planting, or mine is a speculative venture. Significant innovations do occur in these industries, but for all of the above reasons they tend to occur less frequently than in many other industries.

...ensuring that potential winners get to the finish line

...regional economic planning remains tied to a perilously narrow range of high-risk commodities

...resource industries as innovation leverage

...there have been major successes in stimulating innovation in the resource industries

...but resource industries do not perform economically as a group

...the competitive conditions are not determined in Canada

...resource industries accept risk easily but innovate slowly

Transferring resource industry innovation practices

Precisely because of adverse innovation conditions in the resource sectors, many of the organizational, managerial and financial models that have stimulated innovation in these industries – like consortium-based project development, real-time knowledge management and flow-through investment models – may be workable in other industries as well. In terms of building up overall innovation capabilities in Western Canada, the issue is not that we have failed to innovate in the resource industries, but that we have failed to transfer innovation management and investment models from these industries to other industries.

...changing attitudes so that we create new innovation opportunities out of new social pressures

The main area where Summiteers agreed that the resource industries could generate more innovation opportunities was in responding to emerging social and political pressures concerning the environmental impacts of resource extraction. But as much of our remaining discussion will show, Summiteers were clear that such ventures are dependent upon far more than the willingness of a few companies to invest. Rather, they require a sea change in many of the social, institutional and political attitudes that currently shape the innovation climate in the region.

The resource industries can be expected to innovate and to stimulate innovation, but they are not sufficient platforms upon which to build innovation strategies. Instead we must take some of the organizational and financial models that have been applied successfully to innovation in the resource industries and transfer them into a wider range of industry contexts.

3. Focus further up the value-added ladder

... we put our foot on the value-added ladder, but we devote most of our resources to attaining only the first rung

Growth and prosperity can be sustained only by producing higher value goods and services. In the Western Provinces, substantial public resources for climbing the value-added ladder are most often directed first at natural resources. Summiteers concurred that there have been many problems with this focus. Not only has it deflected attention and financial resources from industries that already are situated much further up their respective value-added chains and that could go further still, but also it has limited innovation activities to producing new kinds of commodities rather than value-added products. In other words, typically we put our foot on the ladder, but we devote most of our resources to attaining only the first rung.

Investing with our sights set low

Canola oil is the product of one of Western Canada's most significant agricultural innovation initiatives. But it is shipped to countries like Spain for conversion into bio-fuels. But even in the so-called high-technology industries – like information technology and bio-technology – we still too often export the virtual equivalent of raw materials in the form of intellectual property, which is sold off to foreign investors who then reap most of its benefits in higher value secondary and tertiary markets.

...we have developed successful models to emulate

Summiteers were adamant that it is not as though we have failed to generate alternative models. In the 1970s, for example, a group of industrialists succeeded in challenging the then dominant natural gas export model. Instead, with the strong support of the Alberta government, they built a highly efficient petrochemical enterprise to add value to this resource before it left the province. Today, an increasing amount of this value is being exported not as chemicals but as still higher-value products, processed and manufactured in the region.

But there was dismay that right from the beginning such a model has not guided policies for exploiting the oil sands. The extraction of usable hydrocarbons from bitumen is a major innovation almost entirely of regional origin. If the petrochemical model had been applied, we could now be producing high value-added hydrocarbon compounds, an activity that not only would be more environmentally friendly and better matched to the physical characteristics of the resource, but also that would stimulate further innovation locally in advanced fossil fuel technologies and petrochemical products. Instead, we ship our investment out of the region as crude oil – in other words, at its lowest, least environmentally sustainable and most vulnerable commodity value. Likewise, we have failed to apply any analogous model to forestry products, either in terms of adding value in the form of new wood products, or in terms of developing value-added machinery and processes.

Challenge: ...not to confuse innovation strategies with IPR strategies...

Patents protect inventions, they do not produce innovations. Knowing how to combine intellectual property with that of other stakeholders is far more important to innovation than knowing how to protect it. Moreover, not all innovation that involves technology involves new technology. Instead it involves new applications and combinations of both new and existing technologies.

Climbing the value added ladder would be stimulated greatly by building an explicit value-added expectation into every natural resource exploitation plan and into every intellectual property strategy. We have to learn to envisage each raw material, manufactured product and new idea in terms first of the highest value it can attain.

4. Add value by cooperating

In Western Canada, the value-added problem is often exacerbated by characteristically low degrees of cooperation between producers, either within the same industry or between industries, or between Provincial and municipal jurisdictions.

In agricultural markets, for example, the value chain typically is highly segmented with profit margins too narrow to provide incentives for individual farmers to innovate. But even if they had the incentive, most individual producers have neither the capital nor the business and managerial acumen to go up the value chain. If it occurs at all, innovation in the value-added structure is imported by multinational agribusinesses. But the problem is rife also in industries that are less oriented to individual producers. For example, failure over many years to sustain R&D investments in forestry at an industry-wide level has meant that where new capital goods and processes are needed in order to stay competitive, they must be acquired from Finland. The result is that many individual producers become competitors only in the inevitable race to the bottom.

Challenge: ...not to confuse R&D with innovation...

A highly developed R&D capability is an essential component of prosperity. But no country or region is necessarily better or worse at innovation based upon how much they spend on R&D overall. Appropriate investment levels are always industry specific. There is no magic percentage of GDP that will increase innovation performance if devoted to R&D.

...value-added and sustainability strategies can reinforce one another

...we don't think cooperatively

...becoming more than competitors in a race to the bottom

Learning cooperation from our competitors

In many competitor countries, the capabilities needed in order to exploit new segments of the value chain are nurtured collectively in industry consortia and trade associations, often supported by national research laboratories. There are enormous opportunities to adopt research consortium models in Western Canada, but we have failed to explore them adequately. Our own industry-wide institutions concentrate mostly upon supporting markets for commodities at existing levels of value and on regulatory affairs, but not upon developing new value-added industries. Thus, they tend to isolate our producers from world markets and not to engage them.

...Provincial dynamics can thwart industry-wide innovation initiative

...building up regional market leverage

...the evolving systems orientation

...positioning our assets in value-added systems

...organizing Provincially distributed assets and capabilities into new value-producing paradigms

...paradigms and industry clusters

Summiteers noted also that there is practically no cooperation between Provinces. Thus, essentially the same industry with the same competitive and innovation challenges can operate in four jurisdictions each with different research and innovation priorities and modalities. Good examples are the bio-technology, electronics and communication industries which engage in substantial R&D initiatives in all four Provinces.

The result is that innovators tend to think first locally and then immediately globally. The possibilities to leverage significant innovations first in the region are hampered by the fact that the supporting resources and the size of the potential market are in effect divided always by four. Possibilities seldom emerge for industry-wide R&D or market development consortia to organize on a regional level.

If it is to encourage innovation, cooperative activity must support more than just exports. It should encourage knowledge pooling, bringing complementary skills and knowledge together, leveraging scarce R&D resources and raising the profile of regional innovation capabilities at industry-wide levels and in the public eye.

5. Encourage paradigmatic thinking

Following close upon the cooperation problem, Summiteers noted also the difficulty of reconciling the currently highly dispersed structure of resource and value-added producers in the region with the rapidly evolving 'systems' orientation of many industries and markets globally.

The most obvious example is energy. Each of the Western Provinces has a stake in this industry, but each stake is oriented to a different resource base and to a different position in the energy value chain. Thus, although Alberta produces oil and gas, it generates its electricity mainly from coal. British Columbia produces mainly hydro-electricity,

but also exports electricity generated from burning coal and gas (including Alberta gas) in addition to exporting coal and gas as commodities. On the other hand, although still dependent upon oil, coal or hydro for electricity, Saskatchewan and Manitoba are making significant moves towards exploiting bio-fuels.

In the meantime, driven by an entrepreneurial critical mass in proton fuel cell development centered in Vancouver, British Columbia now has a leading edge capability in fuel cells which also require hydrogen and/or methanol. Alberta has a lot of both, but

Challenge: ...not to confuse innovation strategies with IPR strategies...

Patents protect inventions, they do not produce innovations. Knowing how to combine intellectual property with that of other stakeholders is far more important to innovation than knowing how to protect it. Moreover, not all innovation that involves technology involves new technology. Instead it involves new applications and combinations of both new and existing technologies.

Saskatchewan and Manitoba likewise are investing in plant biotechnology that will increase the methanol yield of fuel crops. To this point in time, however, no serious attempt has been made in the individual Provinces or in the region as a whole to organize and exploit this entire range of resources and technologies as one integrated energy system.

Most of our competitors would see these factors in terms of a whole paradigm in which innovation occurs in different parts at different times, each reinforcing the other. In terms of industrial organization, an innovation paradigm creates the classic 'cluster', writ large.

Innovation paradigms do not recognize borders or jurisdictions

Although many industrialists and policy-makers in the Western Provinces now recognize the importance of paradigmatic innovation strategies, we cannot yet seem to shift policy attention from the exploitation of individual (usually positional) assets. Most of our efforts are oriented not only to discrete industries and markets, but also to different political jurisdictions, resulting in failure to exploit much already existing innovation potential.

Paradigmatic thinking goes hand in hand with the development of effective cooperative practices, the boundaries of which may extend far beyond inter-Provincial cooperation. Thinking about innovation in paradigms, and indeed between paradigms, greatly increases our stock of value-added options.

6. Increase choices by creating diversity

Innovation is not just about creating novel products, services, technologies and organizations, but also about developing novel ways to combine and apply what is already at hand. Rather than novelty as such, Summiters identified diversity – creating more choices – as the key requirement for stimulating innovation.

In a region characterized by a relatively small number of industries with critical mass, inevitably many strategic questions about research and innovation center on whether to move up the value-chains in which you are situated already, or to jump to new value chains. Always these choices are constrained in that it is impossible for every region to be good at everything, nor necessarily is it desirable. Neither is it possible to allocate resources to every new choice that may be presented.

However, it is possible to evaluate new choices and to focus resources on those with the most realistic promise of return.

Challenge: ...to look beyond what you do well and to seek new choices...

The capacity to innovate depends upon the capacity to create diversity. As more choices are generated, more opportunities for innovation are presented and the probability is increased that more of them will bear fruit. Growth through innovation occurs not when you do something better that you are good at already, but when you exploit completely new opportunities.

...innovation requires a constant supply of new choices

...we can't be good at everything, so we have to evaluate new choices carefully

Diversity is the pre-requisite for creating new critical market mass

Creating greater diversity in the knowledge base greatly expands the number of potential situations around which critical market mass can accumulate. The greater the diversity of choices we can create in Western Canada, the richer is the environment for combination and recombination of all of the product and services elements in which we are strong already and in which we could become strong.

Diversity extends also to people, many of whom bring invaluable assets to Western Canada from outside the region, including the language and cultural translation skills that are vital to understanding and fully participating in the global marketplace. Summiters were unanimous that the bureaucratic and social barriers that still prevent rapid integration of these perspectives and skills into our social and economic fabric is both needless and the source of enormous economic loss.

As the Summit progressed, a strong consensus emerged that innovation in the value chain always involves more than simply moving to the next link in the same chain. Creating diversity creates also the opportunity to spot opportunities in adjacent value chains and to highlight opportunities to use knowledge and skills gained in one arena in order to add value in another.

Create as much diversity as possible in the knowledge base and in the human resource pool. Orient innovation strategies towards new options in both existing and new enterprises and towards exploiting adjacent value-chains. Innovation for competitive advantage requires more than taking the obvious next step forward; it means also taking the next step but one, or even two or three.

...cultural diversity is an enormous asset

...exploiting adjacent choices

7. Focus upon the enterprise and the market, not the technology

The Western Provinces in particular are considered to lack indigenous economic 'anchors' in the form of large, regionally headquartered, multinational enterprises, especially in so-called high technology sectors. As a result, much of the current policy orientation is towards starting up more high-technology firms and then growing them to critical size. But often this results only in struggling companies being sold-off to financially stronger competitors, or successful companies becoming take-over targets for multi-nationals who are more adept at identifying and acquiring the best product and service innovations world wide.

Summiteers gave this strategy mixed reviews, noting first that it is not entirely true that Western Canada lacks 'anchor' firms – we need only think of ATCO, Nova, EnCana, PCS, CAMECO, TeckCominco, Great West Life, Investor's Group or CanFor. Moreover, particularly in high-technology fields, the tendency worldwide is for there to be relatively few large multinationals who then partner with other companies, large and small, in a wide variety of ways.

Challenge:...to recognize that service industries play a major role in innovation...

Services comprise better than 80% of most OECD economies. Service enterprises can be major sources of innovation in their own right, but also they are a conduit via which new knowledge from many sources is transferred to the market. Services range from one end of the value-added spectrum to the other, but we must remember that the very highest levels of value-added in many industries come primarily from services.

innovative enterprises that do not produce technology as such. In particular, they devalue the innovative potential of services.

Summiteers questioned whether by focusing upon policies to grow companies according to abstract size thresholds, we were trying too hard to produce what we think we need while failing to nurture what we have already. They also questioned the overwhelming supply-side focus of current policies, most of which are based on the assumption that the best way to increase innovation overall is to increase the quantity and size of companies whose market orientation is specifically towards technology goods. These policies marginalize innovative or potentially

The limitations of supply-side policies

The main problem with supply-side innovation strategies is that they marginalize enterprises that develop and apply high-technology solutions and processes but that do not produce technology as such. In other words, the supply-side focus may actually ignore many of our most research-intensive companies, many of which are high value-added manufacturing and services companies. In particular, the approach marginalizes most services that are not 'technology' services (like software consultancy or systems management). But most importantly, the supply-side emphasis diverts attention from the most important issue for every type of business, which is how to develop markets – demand for new goods and services!

Summiteers noted several examples of Western Canadian companies that have carved out substantial positions in global markets. Virtually always, even where the principals in the business were technologists, the business and market sides were developed first and the technology acquired and shaped to fit the customer profiles and business models. This way, the companies accumulated a level of exclusive knowledge about their markets that kept them competitive regardless of changes in technology. In some cases, it also gave them freedom to partner with large multinationals without having to move their businesses out of the region.

Such strategies were seen to be essential if we are to be able to retain the research capacity that we are training in our universities. We can train the best, but we cannot expect that more than a few of them will become entrepreneurial in the region. Most will look for employment in existing research-intensive enterprises. The relationship is reciprocal – we will retain innovative companies if we train high-quality researchers and we will retain as many high quality researchers as we can retain innovative companies in all sectors of the economy.

...current policy has a pronounced supply-side bias – growing technology producers

...trying too hard to produce what we think we need while failing to nurture what we have already

...business comes first and technology comes second

...a reciprocal relationship between research talent and innovative companies

In order to develop effective strategies for growing and retaining innovative companies, we must broaden our perception of innovation beyond the production of technology and particularly to regard all services as potential sources and stimulants of innovation. We need also to focus less on the size of our companies and more upon whether they can sustain themselves in the region. We must encourage more regional companies in all sectors of the economy to innovate by finding crucial value-chain nodes that are not linked to geographical location, but to the intellectual capacity of their highly qualified personnel to add value and to capture markets.

8. Link innovation with education and training in all fields and at all levels

The relationship between education and innovation is often perceived mainly in terms of how to transfer knowledge from universities to industry by patenting scientific discoveries and commercializing them in spin-off companies. However, while acknowledging that this can occur, most Summiteers were dubious that it represents more than a peripheral interaction between higher education and industry. The innovation-related issues as Summiteers saw them were related less to spin-offs and more to the overall quality and scope of interaction between industry, the community and the education system as a whole – including everything from primary schooling, through to all forms of post secondary education and training.

Summiteers noted that not all of the knowledge that is essential to innovation comes out of the engineering labs. Where innovation involves R&D, the crucial and usually far more costly ‘D’ phase requires mainly knowledge of customers and markets or basic business and management skills. Virtually none of this knowledge comes out of engineering labs. It does come out of management, economics, sociology, psychology and dozens of other academic fields. Moreover, research universities are not the only source of knowledge – our community colleges and polytechnics play a crucial role also.

Challenge: *...not to assume that university patenting will be a major direct source of economic growth... Even in the United States, except in a very few sectors, inducements like the Bayh-Dole Act can be shown not to have changed long established patterns of patenting by university researchers. Even if patented, most scientific discoveries with commercial potential are transferred to the market mainly via scientific publications and researcher contact with industry, or through the skills and knowledge of highly qualified personnel.*

The technology commercialization focus in most of our universities has encouraged more young engineers and scientists to see a role for themselves in innovation or even to become entrepreneurs. But Summiteers were unanimous that the same encouragement needs to be extended to all students in every program of study.

Bring back the ‘lemonade stand’

If you leave the process of inculcating innovation awareness and skills until young people have entered higher education, already you are too late. Innovation is a K-to-PhD affair. To paraphrase one Summiteer “you can’t really learn science until you are in university, but any ten-year-old old can learn entrepreneurship by running a lemonade stand.” The question for our entire educational system is “Where are the lemonade stands?”

The concern of Summiteers was that far too few students leave university realizing that in order for their knowledge and skills to acquire practical value, they must be linked to other kinds of knowledge and skills. Unless they avail themselves voluntarily of few-and-far-between industry exposure, co-op, or internship programs, most students leave university completely unexposed to any of the working environments in which they might find themselves and oblivious of how what they know can add value to what somebody else knows. This is by no means a problem unique to Western Canada, but in the view of the Summiteers, a highly proactive initiative on this front would provide a considerable competitive advantage in the region – to the universities as well as to industry.

...innovation depends on the overall quality and scope of interaction between industry, the community and the education system as a whole

...innovation requires many kinds of knowledge from many different sources

...involve every student in every program of study

...learners need ready access to industry and the community

...placing learners in the global knowledge community

...trying too hard to produce what we think we need while failing to nurture what we have already

...business comes first and technology comes second

...a reciprocal relationship between research talent and innovative companies

In terms of securing a position for Western Canada in the global research and innovation system, Summiteers were concerned also that our educational system is not oriented more aggressively to the global exchange of students. Compared to other OECD countries, a paltry percentage of the student body in most of our universities comes from abroad. Our tuition regimes are narrow and shortsighted and our foreign scholarship and exchange programs grossly under-funded.

The education system should be engaged actively with the social and economic development of our communities in all possible ways. But the focus must stay with the overall contribution that educational institutions can make. University education in particular underpins the knowledge economy. University research is essential for innovation and greater resources should be devoted to it, but we should not let concerns about patent licensing and spin-off companies divert our attention from providing all students in all fields of study with practical opportunities to experience the innovation process at first hand.

What innovation is NOT

In order to keep Summiteers from our major industries and institutions in touch with how the innovation issue is seen by the generation now poised to take the reins, we invited a select group (lamentably all too small) of the brightest and best graduate students we could find who are researching innovation issues. During the wrap-up, we asked them for a reality-check. They obliged! One surpassed herself, and us.

Innovation is *not*

- reinventing the wheel - even the wheel was a recombination of other technologies and principles and I also remember buying jars that had both peanut butter AND jelly in them.
- long lasting, if stakeholders are myopic and do not see beyond their own region.
- always readily apparent, so it's honestly hard to tell - the cases of Novotel and Fairchild semiconductor tell us that much.
- always successful, but out of ten cases, one might be - so fear of failure and fear of risk need to be tempered.
- a short term goal - it is important to envision the future, and then see what we need to do in order to get there.
- just about the supply side, or just about the user end - it's a complex web of actors.
- going to just happen, unless industry associations and associations of people with similar interests reach a critical mass.
- born out of complacency - "good enough" just doesn't cut it anymore and we have to find different ways of allocating resources and supporting change.
- done by a bunch of cranky, defensive, middle-aged white men - it is becoming a public choice.
- for the faint of heart, especially if all of the ageing retire to British Columbia.
- facilitated by ignoring the importance of creating stimulating, multi-faceted and international educational opportunities for all ages and stages.
- achieved by having closed door and closed-eyed policies, and viewing Canada as anything but a member of a global community.
- just about picking the winners - it's about how much you take for granted as "common sense."
- waiting for Canada to 'clue in', leadership is key and the time is now to start thinking about it.
- inspired without stories - stories come from investigation which leads to inspiration and innovation.
- keeping tacit knowledge a secret - we need dialogue.
- just about marketing, but about people who can translate and recombine.
- going to occur without diversity - and what diversity is depends on where you are.
- for the sake of change itself - rather, we need good reasons for innovation, like promoting prosperity.
- the freaking Wheat Board.

Received with thanks from Florence Chee, CPROST, Simon Fraser University

9. Rebalance upstream and downstream investment strategies

Even if our capabilities to produce new knowledge and technology were to remain as they are now, our past record in finding finance for our entrepreneurial community would indicate that very little of what we produce will ever find its way to market, much less that it will grow new businesses that will remain in the region. And yet, there is little in our portfolio of financial instruments for research and innovation that would suggest that we are necessarily at a disadvantage. Canada rates behind only the US in venture capital availability and our R&D tax credit schemes are among the most generous.

The resource elephant may be part of the reason that we do not appear to be able to finance more new ventures. In terms of building new knowledge-based enterprises, every natural endowment is a two-edged sword. Resource-based industries can be highly innovative, making substantial investments in basic and applied research and spinning-off entrepreneurial activity. But resource-driven booms also can divert labor and capital from new areas of economic opportunity that in the longer run may provide a more diversified and stable economic base. They can also create an inhospitable environment for high-risk, high-cost experimental enterprises by raising overall business and living costs.

In the view of the Summiteers, helping to balance the flow of capital to a greater diversity of enterprises is a legitimate responsibility for government. However, there was concern that in today's political climate, governments are prone mainly to select upstream investments that are still far from the market interface.

Money, money everywhere....

Private investors accept risk for what it is and usually structure their investment portfolios accordingly. But public investors increasingly are looking only for successes, or for investment areas where lack of success is easier to justify. Thus, in the R&D environment, most public funds flow into upstream research (the 'R' side) and virtually nothing flows into downstream development (the 'D' side). Public investment in 'R' is politically risk-free – everyone is happy if a discovery is made but the Auditor General is not unhappy if it is not. In contrast, public investment in 'D' requires governments to accept explicit risks and to make long-term commitments – not in picking winners but in backing winners once the market potential and/or public benefit is evident.

In the upstream basic research environment, most new sources of public funding are earmarked for human and physical resources – hiring world-class researchers and building or refurbishing labs. But operational research funding has not increased in most cases. Summiteers were enthusiastic about the positive benefits of initiatives to improve the research infrastructure, but expressed concern about how newly acquired facilities and research talent could be sustained in the longer-run unless we increase operational funding, or at least develop strategies to divert more of our existing resources to sustaining what we have built-up so successfully.

In the downstream development environment, Summiteers noted that there were many possible investment modalities, but that we have tended to fixate on start-ups and venture capital rather than to develop financial models that fit the characteristics and needs of specific innovative enterprises. By assuming that the main way to stimulate innovation in the region is by financing individual entrepreneurs, we do not exploit the further financial potential that arises when entrepreneurs form relationships with larger customers or partners.

Governments have a role to play in ensuring a balanced flow of capital to a greater diversity of enterprises at both upstream and downstream levels. Public investment on the 'R' side requires counterbalancing by investment on the 'D' side. Innovation is not stimulated unless every investor, public and private, is prepared to absorb failure as well as success.

Challenge: ...not to assume that venture capital is appropriate for all types of new enterprises.

Most of the economic and commercial circumstances that drove the venture capital revolution of the 1990s (mostly in the United States) have changed significantly. The real issues are simply capital and management expertise; that enough of both is available in the right forms at the right times.

...we have the financial tools but lack the strategies

...booms also create disadvantages for innovative high-risk enterprises

...governments can help balance the flow of capital

...world-class researchers and facilities increase the need for operational research capital

...focusing on the downstream dimension

10. Match bottom-up initiative with top-down vision

...boosting overall innovation performance in the region

To this point we have noted many problems, challenges and failures. But also we have noted many successes and indicated that many of the solutions to our problems lie relatively close to the surface. But even if we were to take all of the positive steps that so far we have suggested, would this be enough to boost overall innovation performance in the region? On this question, the consensus of Summiteers was that probably it would not.

Boosting innovation performance requires high-level leadership and commitment to change at the community level

Innovation requires several highly essential intangible factors that policies and strategies alone cannot provide. In part, these concern leadership, vision, and the courage to act – to create a desired future by putting down big bets and being nimble in coping with the many shocks and setbacks that inevitably follow in their wake.

But innovation is essentially a social phenomenon and as such, the ability to change our technologies, practices and institutions depends also upon the willingness of the whole community to initiate change, accept its costs and absorb its consequences.

...top-down and bottom-up strategies

Inevitably, the broader social and community dimensions of innovation bring us face-to-face with the issue of how to motivate and coordinate public and private sector resources in stimulating an overall spirit of innovation in the region. In this context, there was much debate throughout the Summit on the relative merits, or more precisely the relative roles, of top-down and bottom-up innovation strategies.

...boosting overall innovation performance in the region

It was noted that historically Canada has followed a pattern where governments have invested (directly and/or via incentives) in large infrastructural projects that have spun out many other enterprises, large and small. Successful examples are railroads, communications networks and satellite systems. On the other hand, the principle of diversity would suggest that more could be gained by refocusing more of our financial and managerial resources on a greater number of smaller initiatives

...Canada's historical top-down strategy

The Summit produced no overall agreement about this issue. However, Summiteers did indicate a problem with much current top-down thinking; namely, the doctrine that public investments should yield returns from the primary enterprise in which the investment was made.

...re-conceptualizing the return on public investment

It was noted, for example, that a business trip between Calgary and Edmonton represents approximately the same time commitment as one between either city and Toronto. And yet, the debate about a rapid rail link still hinges mainly around its viability in terms of passenger fare revenues. On this basis, none of the high speed rail links in Japan or Europe would ever have been built. What they have retained and we have lost is the ability to see the advantages of such top-down investments in terms of their positive external effects – in this case, the economic gains from linking several distant communities into essentially one metropolitan region with a local market comparable in size to Vancouver, Montreal or Toronto.

...timidity and ambiguity of leadership

Summiteers were agreed that regardless of whatever mix of top-down and bottom-up strategy might be appropriate, currently the missing factor in our ability to consider either option is a lack of leadership and a generally timid and ambiguous approach to leveraging new enterprise and innovation with public investment.

First and foremost, innovation requires breadth of vision and commitment from the community as a whole to take risks, experiment and accept change. Top-down and bottom-up initiatives may reinforce one another and top-down initiatives can be effective vehicles for mobilizing creative resources at the community level.

11. Create a culture of innovation

While no Summiteer downplayed the critical importance of education, science, R&D and entrepreneurship, all were agreed that these factors cannot produce innovations on their own. A much more holistic conceptualization of the innovation process would recognize the need to understand and enhance the entire social and cultural environment in which innovation capabilities and skills are shaped and in which demand for innovation is incubated.

Lest this sound utopian, many Summiteers perceived a general trend toward much increased public demand for innovation, particularly in areas of high social relevance like the environment, public services, transport, water, public safety and healthcare. These are real issues for most people and increasingly they are convinced that solutions exist that must be deployed. To paraphrase one particular Summiteer "innovation is becoming the public choice for solving problems."

Summiteers agreed that more innovation tends to occur most often in communities that celebrate, nurture and combine creative talents of all kinds, that embrace new ideas and practices routinely in all aspects of daily life, that mentor entrepreneurship, and that make markets rather than just follow them. This is partly a function of the physical and social configurations of the communities in which we live. But the thread that links all of these factors is that the ability to produce new ideas in any locality must be complemented by the capability to absorb them. This ability is the foundation of an innovation culture.

...enhance the social and cultural environment in which innovation occurs

...innovation as the public choice

...the ability to absorb new ideas is the foundation of an innovation culture

Passing the 'taxi driver' test

One of our Summiteers commented that in Saskatoon, so many taxi drivers have taken so many fares between the airport and the Canadian Light Source that now automatically they talk about the synchrotron to every visitor. If perhaps relatively few of Saskatoon's citizens know exactly what a synchrotron is, it is becoming clear nevertheless that what the synchrotron represents is now becoming synonymous with the community's view of itself.

The comment pinpointed what all Summiteers agreed was the essential and likely the most difficult element in boosting the overall climate for research and innovation in the region – getting everybody involved in the idea that communities can stimulate sustainable growth by embracing innovation! At the community level, perhaps the 'taxi driver test' is the most realistic indicator of progress towards an innovation culture.

That in Western Canada we have a way to go in creating this culture can be illustrated by two observations, made at various times by several Summiteers. First, although we appear to know how to innovate, we do not do it often enough – we see it as an exceptional event driven by special circumstances. Second, we tend to view innovation primarily in terms of isolated major initiatives like Canola or the oil sands. We do not perceive it as something that occurs all around us every day in hundreds of different ways.

Stakeholders in all Provinces recognize this problem. Indeed, Saskatchewan has embarked upon an aggressive media campaign to challenge the public to think about their communities in terms of creating entirely new sources of wealth. On the whole, however, we have some way to go in connecting our innovative potential with our collective view of ourselves. We still see ourselves primarily as extractors and exporters, not as importers and combiners. We do not yet fully link the economic side of innovation with the environment in which it occurs. We do not consider carefully enough the kinds of organizational, managerial, social and cultural adjustments that may be required in order to encourage and stimulate innovation.

It was noted that creating such a culture confers a new kind of location advantage. This develops when a knowledge-based industry becomes established in a region and generates what several Summiteers referred to as "viscosity" – advantages that accrue when new ideas are "in the air" and the entrepreneurs in the region are perceived to be ahead of rather than behind the market. Such viscosity stimulates investor confidence and encourages new enterprise across-the-board.

Summiteers were agreed that the highest priority is to create a culture of innovation in Western Canada and that the first challenge in bringing this about is to change many of our attitudes and generally to create a climate of experimentation and openness to change that inflects every walk of life at every level of society.

...innovation should not be an exceptional event

... connecting our innovative potential with our collective view of ourselves

...the viscosity of new ideas

12. Start moving to the global level by changing local attitudes

...the main impediments are not imposed by our competitors

It is easy to describe the problems of becoming integrated into a global research and innovation system in terms of impediments put in our way by competitors in other countries – unfair trade restrictions, market distorting subsidies and so forth. But Summiteers did not see the issue in terms of external factors like these. They were agreed that the problem is not how to integrate Western Canadian enterprises into a global system, but how to integrate more of them.

...we are already integrated into the global system

Already we know that it is possible for enterprises based in this region to become globally competitive in high value-added, knowledge-intensive industries because we can identify successful examples. Many Western Canadian companies are very successful already in the global innovation system. The export of commodities from the region is complemented substantially by the export of high value-added products and services, by extensive capital in-flows and out-flows, and by technical exchanges.

“...invention proudly found elsewhere – innovation proudly made here...”

In order to achieve greater integration of more Western Canadian enterprises into the global innovation system, we must get over the ‘proudly invented here’ syndrome. We do not need to come up with every idea, but we do need skill in finding and exploiting the best ideas, regardless of source. The competence to trade in the global knowledge marketplace hinges mainly upon a sophisticated understanding of who is doing what, who is ahead and behind, and how what you know can add value to what others know.

...barriers to the global marketplace are local

Summiteers agreed that for most companies, the major barriers to participating in innovation on a global scale are not global at all. Rather, they are local – sometimes embodied in our institutions, but just as often in our business attitudes and practices. The main institutional impediments were lack of regional cooperation and a lack of vision and leadership. But Summiteers laid most of the problem at the door of regional companies themselves – noting a prevailing unwillingness to take risks and a mindset in many businesses that customer requirements in other countries and regions must accommodate the producers in this region rather than the other way around.

Challenge: ...not to assume that more inventors can or should become entrepreneurs...

Only a small minority of inventors ever become successful entrepreneurs. There are huge opportunity costs in trying to encourage or train them to become better entrepreneurs, and this can be the most inefficient route commercializing the ideas they produce. The people best equipped to come up with new ideas are seldom the ones best equipped to turn them into innovations.

...absorbing the example of globally successful regional enterprises

Western Canadian enterprises that have broken this mindset generally have been as successful globally as competitors in any other country or region. The problem is that not enough of the knowledge they have gained about how to organize and exploit these markets has percolated through to enough of the other enterprises in the region. Or worse, it has filtered through, but not been absorbed.

Challenge: ...to get beyond the production of new knowledge...

Although producing as many new ideas as possible is essential, growth is not a function of the number of ideas produced in any one place, but of the ability to identify and combine the appropriate knowledge from every possible source.

...the key is combination, not invention

Particularly from Summiteers who represented globally successful enterprises, one of the key lessons was that success in a globally integrated innovation system is aided by the fact that knowledge now circulates more widely from a much wider range of sources. If there is a magic formula, it is that success now depends more upon being able to identify and integrate new knowledge quickly than it does upon producing it.

The strong implication is that we do not have to source all of our ideas in the region in order to be successful at realizing their value in global markets. Indeed, many Summiteers stressed that trying to build globally successful businesses solely or mainly upon locally produced knowledge and technology might often be the worst strategy. The invention or discovery is not necessarily the key, rather it is the ability to imagine the potential of a new idea and then act upon it in a timely way.

Defeat the mindset that we are an 'exception' – that global market dynamics must adjust to us and that we can exploit only the knowledge we produce ourselves. The challenge is to produce and exchange new ideas, practices and technologies at a level that is competitive with the rest of the world, but also to produce a positive balance of trade in ideas and knowledge so that by combining ideas from many sources we are retaining more value in the region than we are exporting.