

**INNOVATION EVOLUTION**  
**The Future of Innovation at—and with—UBC**

**The Vancouver Board of Trade**  
**Wednesday, September 11, 2013**  
**Hyatt Regency Hotel—Regency Ballroom**  
**655 Burrard Street**  
**12 pm—2 pm**

Thank you Murali, and my thanks to Elio Luongo and Janet Austin of the Vancouver Board of Trade, to today's sponsors the Sauder School of Business and Odgers Berndtson, and to the Vancouver Board of Trade Women's Leadership Circle. I want to take this opportunity to tell you what a genuine pleasure it has been to be welcomed by you all at the start of each new academic year. I will miss this tradition.

Writer Lillian Gershwin said, "People change all the time and forget to tell each other." We do, don't we? I've always thought of the time I spend with you as my chance to tell you how UBC has changed since we last spoke. To reintroduce you to one another. To offer that spark of an idea or story or image that will cause you to see the University of British Columbia with new eyes. I feel the need to

do that today more keenly than ever before, and beyond that, I want to expand and strengthen the pathways that connect what *you* do with what *we* do with what our community, our province, and our world *need*.

So, ladies and gentlemen: the University of British Columbia .... An innovation powerhouse, with the highest income from licensed IP of the top 10 universities in Canada. Highest number of patents applied for per year. Highest number of US patents issued per year. Second-highest number of licenses executed, of discoveries and inventions, and of start-ups per year. Over 150 spin-off companies so far and a partner in over a thousand industry-sponsored research projects. In fact, we conduct \$500 million in research every year, which accounts for 25 percent of all research in BC, 94 percent of all industry-sponsored research in BC, and we contribute \$12.7 billion annually to the provincial economy.

We've committed \$150 million to sustainability infrastructure projects—more than any other university in the world—and have

turned our Vancouver campus into a living laboratory where buildings, energy systems, and classrooms are also experiments in sustainability. The results of those experiments, once transferred to the communities beyond our gates, hold the potential to influence the course of climate change on a massive scale.

We're BC's third largest employer, we graduated over 11,000 students last year, and just enrolled over 8,000 new ones from over 150 countries. Our 285,000 alumni form a worldwide network that has helped us raise \$1.2 billion toward student scholarships and academic initiatives in our *start an evolution* campaign.

Not too shabby for a 'medieval' institution! And that's what we are. Our roots lie in the 14<sup>th</sup>-century university model, a model grounded in service to the world through the conservation and creation of knowledge. But aside from the Latin motto above our very traditional-looking crest, you'd be hard-pressed to find evidence of those roots during a trip out to campus. Like every other institution around the globe, UBC has undergone a radical

transformation over the past twenty years, and ours has been both physical and operational. The drivers of that transformation include globalism and global competition, technological change, and economic upheaval as well as unprecedented student mobility, a radically altered work world, a shifting funding landscape, and the speed and necessity of constant innovation.

We've made our share of mistakes, and we've struggled with how to maneuver an occasionally unwieldy institution through the hairpin turns of the past two decades. Like all of our counterparts, we've grappled with how to hold to our core mission while maintaining a competitive edge in the new global education marketplace. After all, mission statements don't mean much if you have to close your doors. But here we are, 136 years after Superintendent of Education John Jessup made his initial proposal for a provincial university, consistently ranked among the top 30 universities in the world, the top three in Canada, mission intact .... And we're just getting warmed up.

I'm going to step outside the university gates for a moment now and hold up a snapshot of BC's innovation ecosystem as a whole. The tech sector has transformed our economy. KPMG's 2012 British Columbia Technology Report Card actually calls it a cornerstone. And you can't argue with the numbers:

- it employs 84,000 people, more than forestry, mining, oil and gas combined
- it's the third largest contributor to the GDP, up from number six a decade ago
- it produced \$18 billion in revenue last year, with a growth rate double that of BC's overall growth
- it accounts for 10 percent of all BC exports, or \$4.1 billion, double what it was in 2001
- it's been the second-fastest private sector job creator over the past decade
- and it provides \$5.3 billion in wages, with employees earning 50 percent more than the BC average

Incredible stats, but here's the sucker punch: BC ranks *ninth* among the provinces in productivity gains since 1985. As well, BC's tech sector is proportionately smaller in terms of share of GDP, investment, and employment than Canada's as a whole: 5.9 percent versus 7.5 percent.

*BC Business Magazine* released its annual "Top 100" list this July, ranking BC businesses by sector and revenues. They poured a bucket of cold water on the prevailing enthusiasm about our economy, noting that BC's top 25 companies saw revenue *drops* last year, particularly in the resource and energy sectors. Our top 10 financial service companies brought in 25 percent less revenue this year compared with last year's top 10, and mining, the golden child, dropped by nearly five percent. They cite our commodity-intensive economy as the reason. With the Asian market our largest trading partner as of last year, we're far more exposed than the rest of Canada to fluctuations in those economies.

Assuming wise stewardship, natural resources will always be foundational to BC's economic strength and success. But it's time we took the pressure off! Diversified our portfolio! It's time we invested much more deliberately in the greatest resource we have: our innovative minds.

Just for fun ... what would it look like if we closed the gap between 5.9 and 7.5 percent, the difference between the BC tech sector's share of our economy and Canada's national average?

- Well, for starters, a \$5.1 billion increase in industry revenue
- a \$2.5 billion increase in GDP
- an additional 23,000 jobs
- and a \$1.4 billion increase in wages paid

Again, fantastic numbers. But how's this for a surprise: the BC Technology Industry Association tells us that's setting the bar too *low*. That's letting the growth continue at its traditional rate for almost another decade, whereas the opportunity before us is

actually much bigger. BC stands to command a significant share of the technology market—*if we take deliberate action now*.

So ... who's 'we' and what action do we need to take? A report from C. D. Howe issued in June of this year names four key stakeholders in the future of the innovation economy: governments; the granting agencies; the business community; and the research universities.

Given that the majority of British Columbia's R&D takes place in the private sector, as is true worldwide, just how key a player *is* UBC—or the other research universities, SFU, UVic, and UNBC? That comes down to *where* we innovate. Universities were the first to develop much of the medical, engineering, and computer technology in use today. As well, many scientific discoveries that come from basic (versus applied) university research find their way into new technologies, such as breakthroughs in biology that lead to new methods of genetic engineering, or advances in solid-state

physics that make it possible to design faster processors for computers.

Teaching hospitals connected to universities are the source of most new surgical procedures. And university research was the source of almost all of the building blocks of our information age, from the architecture of digital computers to the development of the underlying protocols of the Internet. Many of the firms that pioneered modern information technology were spin-offs of university research projects, and are responsible for much of the productivity growth we've experienced in North America in the past quarter century.

So if we can agree that UBC is a key player in BC's innovation ecosystem, and if UBC really is the province's post-secondary powerhouse that I described earlier, then why aren't BC's tech sector numbers reflecting it?

The C. D. Howe report shows that right now, each of the four stakeholders is actually weakening or limiting the pathways by which technology transfer happens. Technology transfer is the process by which university research contributes to technological progress and economic growth. Broadly speaking, technology transfer requires university expertise to provide the research, and industry expertise to do the development. But universities and industry aren't the only players in the game; there are also the policy makers and funders. And Canada continues to rely on its universities to do development activities we are not designed—or best placed—to do. By maintaining this status quo, we risk compromising the quality of Canadian universities, the effectiveness of our tech transfer process, and ultimately our economic future. It's going to take all four of us playing as a committed team to produce the kind of results we're seeing in thriving tech hubs like San Diego's CONNECT and London's Tech City.

The C. D. Howe report makes these key recommendations designed to up Canada's game.

1. Canadian **businesses** need to spend more on research and development in order to play their role in the technology transfer process as effectively as their American counterparts.
2. **Granting agencies** need to insist that all journal articles resulting from research they fund be made freely accessible to the public—and I'll explain why in a moment.
3. **Granting agencies** also need to reallocate public funding to give more weight to overall academic excellence rather than immediate practical payoff. It seems completely counterintuitive, but the evidence shows that the greatest benefit to society and the economy comes from scientists for whom practical utility and individual financial reward are minor considerations. Canada's granting agencies have been shifting funds away from curiosity-driven research and toward commercialization. And yet the most effective technology transfer comes out of academic environments that are

attractive to scientists who are driven primarily by the urge to advance knowledge in their field.

4. Canada's **National Research Council Institutes** need to leave research to the universities, where the synergies between research and teaching can be most effectively exploited, and instead act as agencies that foster university/industry interactions. And ...
5. **University tech transfer offices** need to focus more on fostering general interactions between business and faculty, and less on generating licensing revenue. This goes back to recommendation number three, about making journal articles accessible to the public. In a Carnegie-Mellon survey on industrial R&D, businesses were asked to name the most effective channel through which they benefitted from academic research. In most industries, the leading answers were *publications*, informal exchanges and communications with scientists, and consulting. Patents and licenses were hardly mentioned at all.

So ... we've all got our work cut out for us. Let me share with you the progress we've made so far at UBC.

The three pathways by which we have traditionally transferred knowledge remain intact: 1) publications; 2) faculty experts acting as consultants; and 3) graduate students as 'living knowledge transfers' working in the field. However, we're recognizing that we have to go beyond these. So we've developed an innovation strategy designed to maximize the societal and economic benefits that arise through the transfer of innovations coming out of UBC. It's made up of five components:

**First**, we are opening a Corporate Relations office to better nurture and build our relationships with industry. Through it, we will be able to reach out proactively to individual business leaders and organizations, business associations, and think tanks. The office will also act as a concierge service for the business community in its interactions with UBC. We *have* heard you asking for this, and

we're responding. We also invite your input on the specific services you're looking for so we can be sure we're meeting those needs.

**Second:** Faculty consulting is a simple, effective avenue by which businesses and other organizations can benefit from university expertise and help build connections. Historically, faculty experts have been left to manage consulting contracts themselves. Now, we're looking at ways to take the administrative details off their plates so they can focus on delivering innovative solutions. We have been watching other universities globally opening agency offices for this purpose, and we will open our own version in the spring of 2014.

**Third:** I spoke earlier about UBC as a living laboratory. The sustainability systems and models we develop, from smart energy grids to zero-emissions buildings, will be directly exportable—and scalable—to the wider community, through industry partners and also through governments from civic to national. And the unique approach we've taken—of addressing operational requirements by

pairing industry innovation with our research expertise—is also applicable to a wide range of activities beyond sustainability.

**Fourth:** A key focus of our activities is entrepreneurship, and we have entirely redesigned our e@UBC program. It's now a full continuum consisting of education, workshops, venture creation, and seed funding. Alumni are contributing time and expertise as mentors and Executives in Residence. The methodologies taught at Sauder match those applied in the venture creation workshops, and all content will be available online, which ensures broad-based access and scalability. In our pilot earlier this year, of the 14 teams that undertook the eight-week process, seven are launching real-world companies. To cap our e@UBC component, Sauder is now offering a university-wide Entrepreneurship 101 class, which launched last week. The course is already oversubscribed and contains students from 14 different faculties and schools. We're excited to further strengthen the program and augment the seed fund to support the innovation that's emerging out of our student population and our young graduates.

And **fifth**, all of these activities will be supported by UBC's University Industry Liaison Office. Our UILO is one of the most successful tech transfer offices in Canada. That said, it was designed primarily for the commercialization of medical discoveries. So we're reengineering it so that it can serve *all* elements of our innovation strategy, increase our ability to mobilize knowledge, accelerate and streamline the licensing process for all types of discoveries, and steward sponsored research contracts effectively for everyone involved.

I'm sure I sound like a proud parent ... which is why I'm going to turn things over to some other people for a few minutes. Nitin Kawale, president of **Cisco Canada**, formed a partnership with UBC this spring that will undertake a number of energy-focused initiatives over the next five years. Kawale says, "The work done ... on campus will enable vital energy-saving solutions for the university, and [will] also serve as a roadmap for future smart

energy and smart community initiatives not only in Canada but around the world.”

**FortisBC** pledged \$300,000 over the next three years to the Master of Engineering in Clean Energy to support student co-op placement in industry. Doug Stout, Vice President of Energy Solutions and External Relations for Fortis, says, “We’ve heard the call from universities to industry to provide opportunities for skilled workers, and we look forward to seeing these students apply their training to achieve sustainable energy solutions.”

Dr. Vit Gunka with **BC Women’s Hospital** has partnered with researchers from UBC’s Electrical and Computer Engineering team to develop an ultrasound-guided method of epidural needle insertion during childbirth. He says, “This ... method promises to improve the safety of patient care and to accelerate learning of medical [trainees]. Working together [with UBC] stimulates us to generate fresh ideas and develop novel approaches that link

recent technological advances with improvements in health care delivery.”

**Mongolia** has been making headlines as one of the fastest growing economies in the world. Last year, UBC signed an agreement with Mongolia’s Ministry of Education, Culture and Science aimed at promoting best practices in mining. It includes an exchange program with two years of study at a Mongolian university and two years at UBC, resulting in a Bachelor of Applied Science degree. Mongolian national and PhD student Zorig Davaanyam says that degree programs in Mongolia focus more on academics and less on practical applications than western programs. “Without industry connections,” he says, “Mongolian students miss out on the invaluable applied learning that programs like [this one] provide[s].”

Dr. Larry Goldenberg, founding director of the Vancouver Prostate Centre at **VGH**, says, “The holy grail of cancer research is the ability to not only detect cancer at its earliest stages, but to be able

to predict its natural behavior in a particular individual.” Goldenberg is partnering with Electrical and Computer Engineering researchers and the BC Cancer Agency to develop a system of vibro-elastography that detects stiffness in body tissues that may indicate the presence of a tumour. So far, it has been tested for use with liver, prostate and breast cancers. Goldenberg says, “This very exciting collaborative research has already borne fruit as it has progressed from the laboratory to human testing.”

Earlier this year, **Boeing** became the founding industrial member of UBC’s Composites Research Network. The Network includes a node on our UBC Okanagan campus as part of our “innovation in the Interior” initiative, and one of the corporate partners is Kelowna’s own FormaShape. William Lyons, director of Global Technology at Boeing Research & Technology, says, “This collaboration has the potential to generate new applications of composite processing technology not only within Canada’s aerospace industry, but [also] in other fields such as the automotive and resources sectors.”

What could it look like? BC's innovation ecosystem, I mean. If we all chose to adopt those C. D. Howe Report recommendations and committed ourselves to a thriving tech sector economy. The thing is, we're so close. All the pieces are in place. It's the commitment we need now, the common goal, the shared vision.

I want to leave you with one last picture. Now, in order to see this picture I'm going to need you to put on a special pair of glasses. Nope, not Google Glass. Those won't be available until 2014, and besides, they're \$1,500 a pop. No, these are by Recon Instruments, a small 2008 startup founded by four UBC Sauder and engineering grads. They sold their first pair in 2010 and have since moved more than 40,000 units of their ReconSkis and ReconJets for cyclists. They're \$599 a pair, but these are a gift. Please, I insist. Now put them on ... don't worry, you'll still look cool. They're made for athletes. Any second now, they'll baseline your heart rate and elevation. Let's head outside. I want to take you up to campus. Road bike, motorbike, your choice. Your

ReconJets are tracking your heart rate, cadence, speed and distance. Hands free, you synch them with your smartphone, call your business partner back at the office to gloat, upload photos and video of the Burrard Bridge, West 4<sup>th</sup> Avenue, and Jericho Beach as you speed by. After using Buddy Tracking to check in with the rest of the group, you use the nav system to set the last leg of your route, call up your favourite playlist, and ride.

You cross Blanca and speed down Chancellor Boulevard, Pacific Ocean on your right and ancient spruce and cedar and fir trees all around you. You notice that something feels different here. You pull over and ask a jogger on the trail beside you where you are and she says, *Welcome to the living laboratory*. You continue your tour, and notice that this living lab is ringed by residences that are occupied by students, staff, and faculty from all over the world. You're passed by a *péloton* of cyclists racing to their next class. You spot the bike racks—everywhere, it seems—and the electric plant ops vehicles, and the building that creates more energy than it uses. All part of the laboratory. You spot steam emerging from a

grate in the ground and stop a studious-looking fellow to inquire. *We heat the whole campus with steam, he tells you, but we're switching to hot water heating. More efficient, less waste. It's part of the Smart Grid project.* You nod encouragingly. He seems mesmerized by your glasses. *We're expanding too fast for our current electrical system. We need more energy, and we need to produce less waste. The Smart Grid will optimize electricity use in every building, and recycle unused energy back into the system.* It sounds too good to be true, but then, you're the one wearing the magic spectacles.

You step into the green building, slide into a rear seat in a darkened lecture hall, and find yourself in a class the likes of which didn't even exist when you were a student. Civil Engineering Professor Don Mavinic is altering the phosphorus balance of waste water to produce pellets that can be used as fertilizer in soils. Forestry prof Stavros Avramidis is using radio technology—the same thing that powers the AM/FM radio in your Recons—to decontaminate wood. UBC Fisheries Centre's Amanda Vincent

and her team are collaborating with the world's top nature photographers to focus the public's attention on the ocean's the coral reefs. And geologist Michael Hitch is fixing and storing atmospheric carbon dioxide in mine waste rock, claiming that some large mines could fix five million tonnes or more a year. *I don't like waste*, you hear him say, before you duck back out the door. No kidding.

Two students dressed in business suits and dress shoes—clearly from Sauder—walk toward you, alternately texting and checking out your Recons. You preen a little, flattered, until \*ping!\* you realize they've actually hacked your email and sent you a message. *A team of senior Sauder and engineering students has claimed victory at the national Pacific Venture Capital Competition, the message reads, for VenAir, a Ventilated Door. The door allows air to continually flow between rooms while remaining closed and blocking sound. Second place was awarded to another UBC team for SoundIT, a mobile application that lets customers select their own songs at their favourite bars.* You quickly search for SoundIT

and download it to your Recons before reading the last part of the message: *Three Sauder MBA students have established the Surrey Rent Bank, an organization that provides microloans to people facing eviction. At the latest count, the Bank has processed 28 applications and kept 26 individuals and families in their homes.*

You're back on your bike now, navigating your way to University Boulevard, when a man in a white lab coat runs into the street and waves you down—not usually a good sign. *I'm late*, he says, and hops on the back of your bike without further explanation.

*Vancouver General, pronto!*

You're at the hospital within 10 minutes, but instead of waving goodbye, he invites you in. He shows you how CT film images, often in the thousands for a single individual, are being converted from film to digital, allowing practitioners to sort them and navigate to a specific site in a patient's body with a click of the mouse. How automated ultrasound imaging of liver, prostate, and breast tissue takes less than a minute now instead of half an hour; how it can be

done by technicians now instead of physicians; how it's providing a clearer basis for cancer patient outcome analysis; how it's become the standard of care for the BC Cancer Agency, the Vancouver Cancer Centre, and throughout BC. He takes you to view a surgery where ultrasound-guided robots manipulating surgical tools inside the patient are in fact copying the motions of the surgeon's hands outside the patient. Total accuracy, no tremor, and a superb, highly magnified stereo camera view. You're impressed. He's impressed with your glasses. You shake hands, and now you're headed back downtown.

Broadway to Burrard, over the bridge, you lock up your bike, head back to your table in the Hyatt Regency Ballroom ... and you're just about to switch off your Recons radio when you hear this announcement: *UBC scientists have created a computer processor that's just as easy to program as current processors but runs 10 to a thousand times faster.* You slide back into your seat, dazed, and wondering if your new Recons are already obsolete.

[pause]

Welcome back. I called my presentation today “The Future of Innovation” but what I just described is the *present* of innovation at UBC. It’s already *here*. The *future* will be created out of what we decide to do collectively after lunch. At UBC, we want to be an active participant in an innovation ecosystem that’s fast, fluid, streamlined, and effective, every part operating according to its strengths and purpose, and the results—for our economy and for society as a whole—so much greater than the sum of those parts. UBC’s innovation strategy will allow us to do our part. I invite you now to work *with* me and my team, to help get the innovations I described today, and others like them, to market, and to make way for more. Because right now UBC is innovating faster than BC’s tech transfer process can keep up with. But together, we can change that. We must. Thank you.

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