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"Reading the Ripples: Detecting the Future Waves in Higher Education
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PROBUS CLUB, VANCOUVER

- Thank you for the invitation to speak at this interesting gathering. I hope you all know there is a risk in asking an academic to speak, we are hardwired to do so for 50 minutes, and even then we don't stop until a bell rings!

- I am reminded of a condemned man, at the turn of a century, who was brought to be hanged before a judge.

- The judge asked the man whether he wanted to say a few words in the last ten minutes of his life. "No," said the prisoner sullenly.

- From the audience came an academic who said, "Sir, if the gentleman does not want his ten minutes perhaps he can yield them to me".

- At which point the prisoner said, "Pull the rope! I came here to be hung not tortured!"

- Let me say that I will make my best effort to be interesting.

- Ripples and waves. Ripples OR waves.

- Everyone knows how difficult it is to read the future. How can we accurately predict what's coming next for universities – and public can be remarkably unforgiving when we get it wrong.

- Ripples—they signal to us that subsurface tension is building.

- Waves—WHOA! They're here and you had better be prepared to ride them.

- Because you either catch them if you've been reading the ripples right, or they can take you under and wipe you out.

- Who could have read the ripples of technological developments twenty years ago?

- That would be 1990. The ripples that would send us wave after wave of Internet, email, cell phones, blogs, electronic games, Yahoo, Google, Facebook, Twitter, Flicker, YouTube, text messaging, and downloads of all kinds of what used to be protected and valuable intellectual property.

- Did you read those ripples back then and see the tsunami coming that now consumes much of our waking-hour brainpower?—and even more of our children and students?

- So what are the waves we need to be reviewing to understand how higher education will be transformed in the future?

- I was visiting Google's Googleplex in Mountainview California a few months ago. They spend a lot of time scanning the horizon for what's next.

- According to their whiz kids – they are all kids by the way over there - They claim that Machine intelligence will grow more powerful creating "super intelligent agents" that will have capabilities beyond our wildest imaginations.

- Will they make humans irrelevant? So how should Universities change in the face of these revolutions? What kind of talent will the world need? How do we organize ourselves to produce cutting edge knowledge?

Next-Generation Signals and Relationship Workers

- We are in the early stages of a revolution that no one saw coming.

- Until the year 2000, skills acquired through higher education – cognitive skills, mathematics, science, language, etc. helped expand the global economy through massive technological change.

- This resulted in an increase in the employment rate for workers with university degrees for many decades.

- However this trend peaked around 2000.

- Why? Geoff Colvin in his new book "Humans are Under-rated" describes the challenge as follows.

- As technology continues to advance at exponential rates, many jobs are being replaced by intelligent machines or low-cost workers in other countries such as China and India.

- These jobs could be high or low skilled, cognitive or physical, left brain analytical or right-brain emotional -

nothing is sacred. Machines are increasingly outperforming the best human's in areas we could not have imagined, a trend that is accelerating.

- As a result, researchers at the University of British Columbia and York University have found that in the year 2000, the demand for cognitive tasks, associated with high educational achievement, underwent a reversal.

- As a result high-skilled workers have been moving down the occupational ladder and doing work that lower skilled workers are doing. This is a dramatic shift.

- So what skills will our children and grandchildren need in the brave new world?

- We must hone those skills that only humans have – talents that computers will never have?

- These are the deeply human talents that create value through social interaction. In other words the ability to supply something that humans most want from other humans.

- We will go from valuing knowledge workers to valuing relationship workers.

- What do I mean? Let me digress and tell you a story about human relationships that will puzzle most intelligent machines.

- A man flying in a hot air balloon suddenly realizes he is lost. He lowers the balloon and calls out to a guy below. Where am I he says? The man below replies, in a hot air balloon 30 ft above ground.

- You must work in IT says the balloonist. How do you know said the man below. Everything you have told me is correct but of no use."

- The guy below replies to the balloonist "you must be in management"

- How do you know says the balloonist?

- Well says the IT guy, "You don't know where you are or where you are going and you expect me to be able to help you? You are in the same position before we met and now it's my fault?"

- Now that's classic human interaction. Machines won't be able to replicate the emotional bonds of human interaction, which has been honed through millennia of evolution.

- Face-to-face encounters, tone of voice, mannerisms – the capacity to read body language, to gain unconscious information.

- It's these human interactions, cultivated over millennia that have led to human qualities such as empathy, generosity, humor, fairness, reciprocity and inspiration.

- It's now known that it is not our big brains, that have enabled us to survive but our capacity for social interaction. Our big brains have evolved because of complex human interactions.

- Story-telling, something humans do exceptionally well, that has been essential to building our societies, will become even more valued.

- It's how we collectively create value through interaction and engagement in ways that machines cannot- it is this capacity that will remain our competitive advantage.

- These are the skills that employers such as Google have already begun to value.

- Skills that enhance the ability to successfully work in teams, build relationships, facilitate co-creativity, brain-storm, manage diverse employees, make collective moral judgments, exhibit cultural and social sensitivity – right brain skills of social interaction.

- Engineers will always be in demand – but the most valuable engineer will not be the genius in the cubicle but the one who can lead, brain storm and maximize the IQ of the team!

- If we are to cultivate these skills students need to be taught using collaborative platforms, not in time-and-space confined classrooms.

- Engagement will be critical —with professors, with one another, with hands-on research, with community learning and service, with multiple disciplines, and multiple cultures.

- In a dramatic reversal of time-honoured expectations, it's no longer the old wizards, but the techno-savvy whiz kids who are driving many of the ways in which communicate, interact and learn. These are global innovations that swell rapidly from ripples to big, impactful waves.

- They have created not only new enterprises that are global economic drivers, but massive social change. The average next-gener is "wired" and "connected," using as many as

seven to nine pieces of technology simultaneously, while many of their parents can manage barely more than a cell phone.

- The challenge to universities is that these technologies are affecting how next-geners learn, think, connect, and communicate.

- These energetic, inquisitive, technically astute students already have web, social networking, and new media skills you haven't even heard of yet.

- This requires a change in the value proposition.

    - knowledge and degree being replaced by competencies and skills
    - Physical classrooms giving way to interactive platform
    - Standardized curriculum replaced by unlimited choice
    - Faculty presentation by student discovery
    - Fixed calendar versus flexible schedule
    - Faculty-centred versus student-centred
    - Cost-intensive versus cost-effective
    - Buying the "whole package" versus choices of programs from competing institutions
    - One-time presentation with limited interaction versus repetitive presentation with high interaction
    - Universities that ignore the Learning Revolution will, like Rip Van Winkle, wake up in 2050 to a brave new world they do not recognize!

- These shifts will challenge how universities use their physical space, how they recruit and reward faculty and how they are funded.

- Students no longer need a traditional lectures, with a talking head at the front of a 500 student classroom.

- So universities are experimenting with flipped classrooms. Where the students access the lecture on the laptops, i-Phones, or tablets on their own time and the professors are engaged in small groups to stimulate their thinking.

- What do students really want? They want encounters with incredible people who create that "light bulb" encounter. We already have visiting professor arrangements.

- Why not expand that and go to an itinerant faculty model, like concert pianists, actors etc. Identify the best professors in a subject area and have them spend a month at a University, and instead of teaching biology over a term, deliver an intense engagement to students over a month.

- The best professors will command a higher return for their time and universities can shop around depending on their budgets. This model could be revolutionary.

- Sort of an Uber model for universities.

- Professors license their services to several universities for a fixed term to deliver certain courses!

- Given that largest component of a University budget is for salaries.

- The question is how do we maximize this investment for the benefit of students?

- We simply can't replace face-to-face interaction entirely Especially since there is emerging evidence that constant

engagement with technology, diminishes the capacity for humans to do what they do best.

- Geoff Colvin says, in his book Humans are Underrated, predicts what we do best, namely, "To look into someone's eyes – will turn out to be metaphorically and literally, the key to high value work in the coming economy".

- We have a responsibility to ensure that our students understand and hone these human skills needed in the twenty first century.

- We must Nurture the ripples and ride the waves.

Knowledge Revolution and the Creation of Brain Hubs

- We are in the midst of massive technological change. I would argue that universities and knowledge discovery, has accelerated and is responsible for this phenomenon. . It's like 30 Gutenberg moments.

- Rau Kurzweil, a futurist and founder of Singularity University made several seminal observations about the exponential growth of technologies.

- Kurzweil proposes that the driver fueling this phenomenon is knowledge. When any technology or industry becomes fueled by knowledge flow, the price/performance begins doubling annually.

- The first was Moore's Law, which predicts that price/performance of computing power would double every eighteen months or so.

- Finally several key technologies have become knowledge-driven and are following the same trajectory – artificial intelligence, robotics, biotechnology and bio-informatics, medicine, neuroscience, data science, 3-D printing, nanotechnology and aspects of renewable energy.

- DNA sequencing – cost $10M for a single genome in 2007 was $1000 in 2014.

- Drones - $100,000 in 2007 to $700 in 2014.

- Solar $30per KWh in 1984 to $0.16 per KWH in 2014.

- Clearly the price/performance of these technologies are changing exponentially, leading to new industries and disrupting old ones.

- Universities are central to driving these discoveries and for the emergence of "brain hubs" .

BRAIN HUBS

- "Brain hub regions" are magnets for talent, technology and capital that are driving the growth of this new economy.

- Enrico Moretti in his book, the "New Geography of jobs" describes the features of a "brain hub".

- They have a thick labour market, specialized service providers, and benefit from knowledge spill-overs as a result of the presence of great universities.

- The Silicon Valley is an example of a massive "Brain Hub". It leads the world in its innovation activity, attracting a third of all venture capital investment. It is home to some of the world's great universities – Stanford and UC Berkeley.

- Consider Larry Page and Sergey Brin, founders of Google. What began as their Ph.D. research project in 1996 at Stanford University was launched as a company from a friend's garage in 1998.

- Today Google is a massive wave that continues to grow and transform how we access and manage information in ways that were unimaginable less than a decade ago.

- These and other new technologies were invented and advanced by young people barely out of university—if that!

- They have created new enterprises that are not only major global economic drivers, but massive social changers.

- The economic impact has been remarkable. In the US, over ten years, the number of jobs in the Internet sector has grown by 634 pct. 200 times more than the growth rate of the overall number of jobs in the rest of the economy.

- The good news is that this entrepreneurial activity is spreading and accelerating globally, fuelling new "brain hubs" around the world.

- Universities are central to the growth of these brain hubs.

- With the growth in informational technology and the Internet, teams are having a more profound impact on knowledge creation than individuals.

- A recent study of 20 million research papers in 252 fields encompassing science, engineering, social sciences, the arts and humanities, over 50 years revealed some interesting shifts in knowledge creation.

- The study also covers 2 million patents over 30 years.

- In science and engineering, for citations over a 1000, work by a team is 530 pct. more likely to be cited than an individual's work.

- Knowledge creation has undergone a rapid transformation. As knowledge increases and people have mastery over narrower areas team work becomes more critical.

- Yet many universities operate in the same silos that existed 50 years ago.

- Woodrow Wilson, who was President of Princeton before he became President of the US said "changing a university curriculum is trying to relocate a cemetery. You don't know how many friends the dead have until you try to move them".

- Universities that do not develop new structures will fall behind and become extinct. Especially as knowledge creation continues to reward those who excel in bringing together interdisciplinary teams.

- There is plenty of evidence to suggest that exploring and securing new ideas from people of diverse backgrounds is the key to innovation.

- John Sullivan of San Francisco University has studied innovation and concluded that "serendipitous interaction" is essential to innovation.

- Thus even in the information age physical proximity has special power. Companies like Google and Apple know this well and have built their work places so people bump into each other and have "unexpected interactions".

- Universities must dismantle their silos and find a way to enhance this kind of interaction.

- Universities must also ensure that critical infrastructure is a shared resource and not duplicated.

- Scientists who are involved in "Big Science" projects already operate this way. The Sudbury Neutrino Observatory, SNO, which led to a Nobel Prize for Canada for Art MacDonald is an international laboratory. So is CERN accelerator facility in in Switzerland where there was confirmation of the existence of the "God" particle.

- Similarly Astronomers from universities around the world share large telescopes, such as the one in the Chilean desert, ALMA, the largest astronomical facility located in the Atacama desert.

- We must extend this practice further so that all experimental research facilities are increasingly shared.

- Think about Airbnb. It enables individuals to rent spaces in their homes to individuals who normally would have gone to hotels.

- Universities should make available facilities for sharing through such arrangements. This extends the concept of a university as an " Airbnb brain hub".

- But, a university is not enough to produce a brain hub. It requires an eco-system with which it interacts where creativity and collaboration thrives.

- The Silicon Valley is the best example of such an eco-system.

- Ambitious start-ups from around the world go to the Silicon Valley because it attracts talent and ideas which help companies grow into global giants like Google and Apple.

- Among these start ups are companies called Unicorns, not yet public, but valued at a billion or more.

- There are 140 of these world-wide, including in India and China - the largest is Uber in the US valued at $51 billion, the next is Xiaomi in China worth 46 billion.

- In Canada we have Hoot suite, Slack, Kik Interactive, Build Direct and others that are approaching Unicorn status.

- In Vancouver, these start ups have attracted Microsoft, Amazon and Sony Pictures to set up shop locally to attract ideas and talent.

- In Canada, Waterloo is a brain hub, so are Toronto and Vancouver. With oil prices where they are Edmonton and Calgary could emerge as technology drivers.

- The presence of great universities such as UBC, U of T, U of A, University of Waterloo, have been instrumental in the development of talent and spinoffs.

- There are brain hubs developing in Israel in Tel Aviv and Haifa. Brain hubs are emerging in Mumbai and Bangalore, Beijing and Shanghai.

- In India 5 of the 7 largest unicorns were started by graduates of the Indian Institutes of Technology.

- Moretti's statistics suggest that for every high-tech job in a brain hub—namely a scientist, software engineer, designer, digital artist, mathematician—five additional local jobs are created outside the high-tech sector.

- Three of these jobs could be high-paying professional jobs, such as doctors, lawyers and accountants, along with lower-paying service jobs such as yoga teachers and hair-dressers.

- So the future global economy will be based on the growth of these brain hubs.

- Universities must become the seeds for brain hubs where people and ideas intermingle to produce an eco-system that attracts companies and talent.

TALENT, TECHNOLOGY AND THE NEW ECONOMY

- Clearly if Canada is to compete in the new economy, universities have a pivotal role to play in how they educate the next generation, manage talent and create the knowledge that becomes the basis for new ideas, technology and innovation.

- Although the tech. sector is generating only $70b of our GDP, its potential to transform or destroy other traditional sectors from finance, to health care, from education to the auto-sector is where the potential to drive the new economy lies.

- Victor Dodig, CEO of CIBC outlined the three gaps that Canada needs to fill to reach its high-growth future.

- The first is the need to build the intellectual capital and the skills to drive innovation.

- Clearly Canada has top universities producing a well-spring of top talent that has the skills to drive innovation.

- 350,000 Canadians now live in the San Francisco Bay area working for technology companies. Microsoft, Google, Amazon and others are routinely up here recruiting our graduates because we have a reputation for high quality.

- Second, Dodig makes the case for innovative entrepreneurs to attract the early stage and growth capital to commercialize new ideas into valuable products.

- Canadian start-ups quickly discover that it is difficult to grow because they cannot get access to second-round and third round financing. As a result many are bought up by foreign firms.

- If Canada is to grow new global champions Canadian venture capital firms need to step up and fund mid to late-stage companies.

- Shopify's IPO and Hootsuite's impending IPO will be huge boons to Canada's tech community and a shift in our ability to create larger companies.

- David Dodge, former Governor of the Bank of Canada remarked in a recent speech at the BC Business Council that our productivity challenge is related to the structure of our economy. A large number of small companies with low productivity and a lack of a critical mass of fast growth mid-sized and large companies.

- Furthermore our traditional industrial sectors, largely resource industries do not invest enough in research and development, with the result that Canada has among the lowest expenditures on business R and D, BERD, of any developed economy. These trends need to be reversed.

- Canada needs to build the innovation eco-system that accelerates the adoption of new technologies in our traditional industries while nurturing the development of new enterprises.

- We certainly have the right ingredients. Our lower cost, high quality life style, as well as attractive tax credits from the government, have put Canada on the map for both investors and businesses.

- In a recently released report on leading start-up eco-systems, Vancouver, Toronto and Waterloo are in the top 20. Silicon Valley, New York, Los Angeles and Boston ranked as the top 4. Tel Aviv, Berlin, Bangalore and Singapore are in the top 20. Beijing and Shanghai are also significant, since China ranks among top 5 countries with the most success in starting companies.

- All of these cities have universities that rank in the top 100 in the world, many in the top 20. We are building "Brain Hubs".

- It is now time for enlightened public policy and private risk taking to raise our global competitiveness, such that our grandchildren and their children have the quality of life we have enjoyed!