Strand B

Taking Canada's Talent Pool to the Next Level

One of the biggest challenges innovative companies face is attracting and retaining talent. On one hand, global competition for the top graduates in technical fields is fierce and Canadian firms struggle to compete with large multinationals. On the other hand, Canadian graduates generally lack exposure to and experience with business skills such as communications, management, marketing and sales that are essential for innovative firms to scale up and compete globally. Furthermore, traditional academic priorities and culture have been slow to adapt to the fourth industrial revolution, making industry collaboration difficult and therefore denying student exposure to business innovation practices. This session will explore what Canadian educational institutions need to do in order to equip their graduates with the skills, experiences and mindset necessary to work in and lead Canada's innovative companies of the future.

(*in order*) Neal Hill, Bettina Hamelin,
Allison Sekular & Debbie Lawes

Strand B, Panel 1

Rejuvenating the talent pool

Moderator: Neal Hill, Vice President, Market Development, BDC
Bettina Hamelin, Vice-President, Research Partnerships, NSERC
Allison Sekuler, Vice-President, Research (Interim), McMaster University

Youth unemployment (13%) and underemployment (28%) are intolerably high in Canada. In academia, Canada's young researchers have to wait until their mid-30s or early 40s to launch their careers. The vast majority of graduates who pursue careers in industry or government enter the workforce with little or no experiential learning and are ill-equipped for an increasingly service focused economy (now 78% of Canada's economy). How can we transform Canada's postsecondary education institutions to equip Canada's youth with the skills and experiences required to meet Canadian needs in a competitive global context?

Hamelin began by stating the none-too-surprising observation that building and maintaining a talent pool is among the top priorities of NSERC. More specifically, she concentrated on Canadian PhD students, whose population has grown by 50% over the last 15 years, with fully half of them being immigrants. While most of these students enter their respective programs with the aim of establishing a career in academia, less than 20% of them will end up in tenure track positions, with another 30% occupying non-tenure track posts of one sort or another. A significant portion of the rest end up in the private sector, which follows from a growing number of private sector links that are being established at universities across the country. "Our talent pool, when it comes to PhDs or graduate students, they're quite diverse, they're team players, they're entrepreneurial." Of greater concern, she concluded, is whether or not these individuals are finding positions that make full use of their considerable educational background

with jobs in Canada. In light of the decline of R&D employment in many sectors, as described earlier by David Watters, she suggested that it would be helpful to build networks for these students to find the best available opportunities. Finally, she reminded the audience not to overlook colleges, where a great deal of talent emerges. "Colleges have a tremendous talent pool, which is evolving as colleges play much more of a role in applied research and they have the knack for working directly with industry." All that being said, Hamelin concluded that these young people may well have a better idea about what is best for them, making it worthwhile to engage them in a dialogue as to the best way forward.

Sekuler agreed with Hamelin's assessment of the changes that have taken place in the academic world, which lead to many graduate students not ultimately ending up in the academic sector for their careers. Nor did she regard the institutional planning around these changes as being strictly an immediate concern, but something that affects the view 10 or 20 years down the road. "Who are the students who are going to be coming through the system? What educational system do we want to be designing for them? How are we going to be thinking about our position in the world and where do they want to be in the world?" Among the challenges facing Canadian universities is the fact that programs tend to specialize to a significant degree and thereby oppose the growing tendency of students to shift direction in their studies as well as their career ambitions. "They don't necessarily get exposed to a wide enough range of skill sets." Nor did she mean vocational skills sets but more fundamental skills such as communication, critical thinking, or numeracy. "Students should be graduating from their undergraduate degrees ready to do anything. They should be learning how to learn, as opposed to what we normally are doing in the universities in Canada, which is training them to become professors from the day that they set foot on campus. That's not going to happen. Most of them don't want to do that; there aren't the jobs for that. So why are we training people in such a highly specialized manner?"

In this respect, Sekuler does not regard universities as being set up to deal with their own educational future. Although they style themselves as liberal in nature, they are actual quite conservative in practice. "We have the same departments we have today because those are the departments we had 100 or 200 years ago. Does that make any sense in today's world? Absolutely not. But we're loathe to change." Until that change occurs, the goals of ensuring student success will not be realized. As just one example, she pointed to the growing prominence of aboriginal students within the Canadian population, a cohort that is seldom formally recognized. Similarly the growing proportion of immigrant students are treated like any other, despite what are often highly specialized needs. "We can't educate everybody in the same way. We need to have a more personalized education model that takes into account people's interests and skills and backgrounds. We have to become disruptors of the educational system. We have to think more about how do we gear what we're doing not to what was here 100 years ago but to who's coming over the next 100 years. Until we start to do that I don't think we're

going to make as many gains as we would like to see and we're going to fall further and further behind in the world economy."

Sekuler also pointed to her own observations of PhD students she works with, all of whom are acquiring a wide range of skills that would be of interest to any prospective employer, but which are eclipsed by the tendency to view academic accomplishments through the narrow lens of publishing and nothing else. "We don't have to reinvent the PhD, we have to reinvent the way that we're explaining to students how to use what they're learning."

Hamelin disagreed about Sekuler's description of the overly narrow specialization occurring in Canadian universities, although she did concede that these institutions must now answer to students who have a much clearer conception of the standards being set by other post-secondary systems all over the world. She did agree that the prospects of PhD students would benefit from the widest possible cultivation of skills, while also noting the proliferation of professional Master's degrees that help students place themselves with a carefully target skill set.

Sekuler reiterated her argument about specialization, indicating that the most sophisticated of American universities kept students course requirements to a minimum, so as to help them achieve a substantial breadth of education. "We don't have to be this specialized. You can have more breadth and have students do just as well or even better than our students are doing." She added that it is more common for American students to take at least one semester abroad, something that provides them with a better sense of the how the rest of the world functions. Canadians tend not to do so because these foreign programs often do not match the requirements students need once they return to Canada, so they could wind up taking an extra term here in order to be able to complete their degrees. "What we're doing by having such a great number of specialist courses that are required is limiting the skills that students are acquiring, we're limiting their ability to go out and explore the world — and become more interesting people along the way — but also we're limiting their ability to learn how to interact with different people."

Hill echoed Sekuler's observation with the experience of his son, who was already enrolled in engineering at the University of Toronto, but after inquiring about transferring to an American university discovered that he would face far fewer limitations on the kind of program he pursued. Hamelin responded that such flexibility varied widely with the type of degree a student was seeking and she added that Canadian universities are being more creative and pro-active in offering their students the ability to study abroad.

Still on the theme of contrasting Canadian and American educational experiences, Hill asked about the well-observed difference between the two cultures in terms of nurturing risk-takers. Sekuler indicated that by setting much of the system up to prepare students to pass tests, they would be less inclined to confront failure and learn from it, which creates a life-long aversion to risk. She also cited the advantages of working directly

with students to consider how their academic program could evolve to overcome these challenges, something she adopted at McMaster as an initiative called Student Proposals for Intellectual Community and Engaged Scholarship, which invites graduate students to mount projects that may or may not succeed. In this way, she advocated giving students at all levels some degree of control over their learning process, and if their approach fails, at least they should get credit for trying because they likely learned a great deal from it.

For her part, Hamelin disagreed that Canadians are inferior risk-takers; she argued that the nature of the granting system forces people to take the step of carrying out much of their work even before they know that work could be funded. In contrast, Hill pointed to information he had gleaned from Global Corporate Venturing, which deals with corporations become involved in venture capital activities. "They have a list of 1500 companies worldwide that are active in venture right now. Of the 1500, from Canada: three." Sekuler noted that risk-taking in research varies widely from one discipline to another, depending on how individuals are evaluated in their work. NSERC Discovery program, for example, supports a program of work rather than a narrowly defined project, so researchers can adapt their work significantly as they proceed. The US, on the other hand, tends to tie funding to work that has already been demonstrated. She argues this is part of why Canada punches above its weight in aspects of pure science.

A member of the audience asked about the role of collaboration, particularly collaborations between universities and colleges. Hamelin pointed to a number of networks that have been established to promote interactions across provincial lines. Likewise, she envisions a great deal of potential in partnerships between colleges and universities. Sekuler added that such partnerships call for these institutions to transcend their traditional loyalties to their own best interests and help develop a set of higher, common goals.

A second questioner asked about whether there was sufficient data to make sound decisions regarding the future of graduate programs. On a related note, he also asked if the diversity of options within Canada's post-secondary institutions was sufficient to meet the needs of today's students. Sekuler replied that the question of diversity leads back to the idea of personalized education. "We definitely need to be making better use of the data, but we have to be able to know what the right questions are so we can get the right data."

(*in order*) Ted Hewitt, Janet Scholz & Ian McDonald

Strand B, Panel 2

Unleashing innovative talent

Moderator: Ted Hewitt, President, SSHRC
Ian McDonald, AVP, TD Lab and Enterprise Innovation
Janet Scholz, Former President & CEO, ACCT Canada

The traditional paradigm that sees a linear progression from academic research and discovery to industrial innovation has cemented an ineffective system in our postsecondary educational institutions. Faculty and students work on scholarly research, disconnected from university administrators' attempts to commercialize promising results. While companies have evolved toward an open innovation paradigm, whereby diverse players collaborate on finding solutions to specific problems, postsecondary education institutions in Canada have been slow to adapt. How must our institutions evolve to engage faculty and students on relevant work with industry and government and build the relationships and experiences they need to participate and excel in open innovation collaboration?

Hewitt picked up on a point from Dave Watters' talk, specifically the broken linkages between fundamental discoveries made in the academic sector and potential commercial opportunities. Although he could point to many examples of institutions that have made inroads in building partnerships with business, "I'm wondering if we can't go further. What might be a model that would bring out the talent of our young people, provide industry with the support it needs, which would be less cumbersome and more productive. I'm thinking: open innovation."

He offered examples of open innovation platforms mounted by Apple, Google, Netflix, and Toyota. The drug industry, in particular, has concluded that its traditional restrictions on sharing of information has held back discoveries and development, leading many of these companies to work more openly with academic partners. These examples suggest that this approach is more efficient in getting new ideas — and products — to market, something he would like to see happen in the country's colleges and universities.

Scholz responded by describing technology transfer as just one aspect of an extensive continuum of activities that define innovation, starting with basic research and ending with the introduction of a new product in the marketplace. This dynamic is part of a larger ecosystem that includes cultural and environmental processes that determine how well innovation operates. In this light she suggested that open innovation is not as simple a concept as it may appear to be. "One size does not fit all," she added. "It depends on which sector you're working in as to what the proper pursuit and management of disruptive technology looks like. An open innovation system doesn't mean everything's out there for free and everybody's just sharing it all about."

She did agree that the closed-shop model represented by the pharmaceutical industry, which used to define most academic-industry liaisons, is no longer widely embraced. Instead, institutions are examining which sector they are working with and what will work best in each case.

McDonald agreed that many of these more ambitious collaborations were working well in companies such as his. "If we want to be open we need to be open to all levels of collaboration. We need to challenge and reward rule-breakers and at least evaluate those as alternate methods."

Hewitt then asked what colleges and universities could do differently by way of improving this situation. Scholz focused on key performance indicators as her most important criteria, ones that are often misaligned and causing various steps to be less effective. McDonald argued that there is no systemic change to be recommended, but instead examples from individual cases that succeeded, such as academic institutions that were pro-active in asking businesses about what problems need to be solved.

At this point Bruce Rayburn of Agriculture and Agri-Food Canada observed that the discussion revolved around a somewhat dated view that educational institutions should make a priority out of getting their graduates hired into jobs as quickly as possible. Instead, by using incubators and accelerators for graduates to act on opportunities, companies are relieved of the risks of hiring individuals who have yet to prove themselves in a business setting. "They're not hiring people, they're acquiring a spin-

off," he said. Similarly, he added, a business can post real problems for students to solve and gauge their skill level in the resulting responses.

This comment prompted Hewitt to ask about the effectiveness of initiatives such as entrepreneurship on campus, and whether some of the onus for creative solutions to innovation should come from the business sector itself. McDonald outlined how his own firm hires teams of student to engage in precisely these kinds of laboratory-based problem-solving exercises. He noted that it has been much more common for firms to open up difficult problems within industry to the creative thinking found among students as a way of building bridges between sectors.

Scholz corroborated this observation, suggesting that companies are increasingly open to academic overtures from faculty members as well as students. "What it takes is a brilliant scientist to have a vision," she said. "We need to find those academics and help them in their careers." Nor is it a matter of counting patents, she added, but collecting information about the level of participation and what commercial products it has generated. Returning to the notion that key performance indicators are the most revealing way of assessing success, McDonald maintained that there is just as much to be learned when these arrangements fail as when they succeed. In this context, he added, open innovation is highly attractive because one does not have a major investment in IP should the venture not pan out.

Margaret Dalziel of the University of Waterloo pointed out that her institution scores very high in international rankings for promoting entrepreneurship, far higher than any other Canadian school. "The reason is not the IP policy, but the bold experiment of founding the university almost 60 years ago where students were going to do co-ops," she said. At the time this was not seen to be a game changer, but over the long term this strategy has set it distinctly and positively apart. "The reason Waterloo does so well at launching start-ups is because the students are very savvy, every other term being with a company."

Denise Amyot of Colleges and Institutes Canada offered specific measures collected by her organization, which has found that 84% of colleges support student-driven entrepreneurial initiatives, although only about a third of the overall student body engages in such activities. Increasing this proportion might be a worthwhile government policy initiative. She also noted that colleges usually let IP revert to industry partners, which makes them highly receptive to the possibility of open innovation.

With regard to IP, Scholz dismissed it as secondary to the success of innovation, which is a matter of distributing the risk of new ventures in a way that makes it attractive to all participants. "It's not whether it's colleges or universities, or whether it's companies or it's a patent or a copyright; it's not about that, it's about this iterative process that

distributes the risk and we haven't figured out how to do that yet." In the same vein, McDonald insisted that many of these ventures remain stuck in silos, making it necessary to break down these barriers in order to optimize the chances of success.

Philippe-Olivier Giroux, a policy analyst with NSERC, asked whether the open innovation model would begin to take the emphasis of this activity away from specific products and toward nurturing the skills of the participants. "Whether it's related or not to the research product or what was done when these students were in class or working with faculty is not really relevant," he said. "What is relevant is the company and the skills and what it does and its interest for business." In this sense he was advocating for the developing of "pure" entrepreneurship, apart from any final product or service. On a different note, he also asked the panel whether metrics being collected by NSERC and other organizations are in fact of any practical value to companies in the private sector.

Scholz responded that data such as IP should be employed as a proxy for achievement. "It's an indicator of something, but it's not a proxy for success, it's not a proxy for determining if you have a system that's working." She added that there were many other activities — some harder to quantify than others — that could serve as much better indicators of entrepreneurial progress. This list includes student ventures, university spin off companies, and new ideas making their way into the marketplace. "It's a bigger process than just a patent or a licence," she said.

Hewitt added that a great deal of activity still goes unmeasured, such as that in the social sciences, which is only now coming under the purview of Statistics Canada. "So when we start to measure that, guess what, a lot of these social sciences and humanities grads are going to look a lot more important."