Genome Canada

International GE³LS Symposium 2008

Report on May 30 Plenary Session
Knowledge Translation: Making a Difference

Prepared by Marie-Jo Proulx

EXECUTIVE SUMMARY

In May 2008, Genome Canada held its fourth International GE³LS Symposium, in Calgary, AB. Under the title "Navigating the Changing Landscape," the three-day conference brought together researchers, scholars, civil servants, and policy makers from across Canada and beyond.

The closing plenary session, "Knowledge Translation – Making a Difference," explored how Canada's publicly funded research institutions and federal granting agencies collaborate, and at times differ, in their efforts to transform, transfer, exchange, mobilize, share, disseminate, showcase, and commercialize the specialized knowledge they produce. The free-ranging discussion shed light on evolving schemes and partnerships designed to support research communities, foster innovation, create or improve products and services, generate financial returns on investment through commercialization, and ultimately attempt to influence key policy decisions.

The last ten years have seen a flurry of academic publications, scholarly conferences, and institutional initiatives all grappling with the concept and myriad iterations of knowledge translation (KT). Genome Canada, by convening this exchange between researchers and policy makers, engaged in some KT of its own. While the conference itself was a success in terms of attendance levels, the quality of insight provided by presenters, and the number of informal interactions generated, the relative impact of the various KT strategies and projects under discussion remains difficult to measure and compare. Indeed, the sparse nature of the metrics used to evaluate the merits of KT activities was one of the major issues addressed by the presenters.

Genome Canada's GE³LS Symposium this year turned the spotlight on the imperfect practice of knowledge translation (KT). The closing panel discussion and plenary session examined the effectiveness of health researchers in informing policy makers of their findings, the extent to which new information figures in health related decision making, and the obstacles that impede the sharing and development of new knowledge between both groups. As evidenced by the recent literature on KT, designing reliable measuring tools to assess the impact of KT initiatives is an ongoing pursuit. Most presenters offered a glimpse into the work their respective institutions have undertaken to produce, evaluate, and promote their own sets of best practices. But a number of conference attendees and published articles are hinting that the real challenge lies in understanding the imperatives of policy making rather than in refining the art of infusing science in the decision process.

1) PROCEEDINGS:

The plenary session opened with six individual presentations, followed by a panel discussion moderated by Conrad Brunk, director of the Centre for Studies in Religion and Society at the University of Victoria. Half a dozen questions from the audience were then fielded by the moderator and debated briefly by panel members. Approximately 150 people were in attendance.

Dr. Réjean Landry, Chair on Knowledge Transfer and Innovation (Canadian Health Services Research Foundation/Canadian Institute of Health Research) from Laval University began with an overview of current knowledge transfer practices in Canada. He also offered recommendations on how to use knowledge to create value. The following presenters introduced their respective institution's conceptual framework and implementation guidelines for effective knowledge transfer: Keira Torkko, National Research Council (NRC); John Culley, Agriculture Canada; Michelle Gagnon, Canadian Institute of Health Research (CIHR); Linda Murphy, International Development Research Centre (IDRC); Gisèle Yasmeen, Social Sciences and Humanities Research Council (SSHRC).

2) PRESENTERS' KEY MESSAGES:

Réjean Landry, Laval University

"How to Create or Increase Value from the Use of Knowledge?"

Dr. Landry stressed that KT is a process in which knowledge transformation is a key, yet often neglected, component. He broke down this process in four stages: the identification of knowledge-based opportunities; the transformation of those opportunities; communication of the developed knowledge; and the appropriation of the value of the communicated knowledge.

While much of the literature on KT is concerned with the creation of knowledge and the appropriation of returns such as patents, licenses, and spin-offs on research endeavours, the intermediate stage of knowledge transformation has received minimal attention, Landry said. Borrowing a phrase from Branscomb and Auerswald, he called the gap between basic research and its ultimate application a "Valley of Death." He underlined the need for more research into the mechanisms employed to transform findings into actionable information, a process, he said, that creates

additional value. He warned that neglecting to investigate and refine this process can have serious consequences: "Failure to improve the weakest activities may compromise the success of KT initiatives."

Given the complexity of scientific knowledge, Landry invited technology managers to invest in three complementary communication activities: partnership building, knowledge adaptation, and knowledge dissemination. As for researchers themselves, he asked them to focus on real applications as opposed to potential ones, and insisted on a quest for results that would be meaningful "in the real world, not just in the lab."

Landry acknowledged that the comparatively small size of the Canadian research community and market represents a significant challenge. He pointed to a number of telling figures. Canadians produce approximately five per cent of the two million scientific articles published every year in biomedical journals. As for biomedical products, Canada's share of the world market sits at a mere two per cent. Moreover, in 2003, a total research investment in Canadian universities of $7.5 billion produced returns of only $55 million.

Keira Torkko, National Research Council
"Knowledge Translation: How NRC Is Making a Difference"

Ms. Torkko explained how NRC's approach to knowledge translation has evolved and is now producing tangible results for Canadian researchers and the public at large.

She presented NRC's mission as "Enhancing collaboration within the federal Science & Technology community and developing improved approaches for fostering research, talent, knowledge transfer and commercialization among science based departments and agencies, universities and colleges, and the private sector."

Torkko observed that as researchers face declining budgets, they are increasingly expected to work on projects that generate revenues. "Scientists are pressured to be more client focused," she said.

She then outlined NRC's three main objectives: contributing to the competitiveness of Canadian industry in key sectors and to the economic viability of communities, or clusters; making an impact on national priority areas critical to Canada's future; and strengthening Canada's innovation system.

To assist it in implementing this strategy, NRC has created a Central Business Support unit, which provides training and orientation regarding IP and business issues, and offers a list of services in IP protection, management, and exploitation. The CBS also advises on complex business deals and transmits best practices through publication reviews. In line with the NRC's intention to adopt a more industry focused approach, CBS engages in market analysis and technology assessment.

In addition to the CBS, NRC makes available a number of commercialization resources to its researchers, including legal and financial services, the Canada Institute for Scientific and Technical Information, and the Industrial Research Assistance Program.

The recently expanded genomics and health initiative constitutes one of NRC's four comprehensive areas of activity. It was established in 1999 to develop and translate NRC's genome expertise and related research into social and economic benefits for Canada. Currently in its fourth phase, it is an ongoing collaboration with 10 research institutes as well as with partners in other government departments, universities, and the private sector. As a result of the initiative, more than 400 personnel work in five programs, including biorenewable oil for food and fuel, the identification of proteins for diagnostic purposes, and the development of better tools to treat heart disease.

Ms. Torkko pointed to one of NRC's most successful endeavours: the commercialization of the NeisVac-C vaccine for meningitis C, which is credited with saving the lives of millions of infants around the world. It was developed in the 70s by Dr. Harold Jennings with the financial support of NRC. Since it was approved for commercialization in Canada in 2002, the NRC has reaped approximately $20 million in revenues through its licensing agreement with GlaxoSmithKline. This money is being reinvested in other NRC research projects.

John Culley, Agriculture and Agri-Food Canada

"Barriers to Innovation in Canada"

Mr. Culley discussed common barriers to innovation in Canada, and offered recommendations for the elaboration of multi-party agreements between universities, government bodies, and private entities.

Fluid metrics make it difficult to quantify the impact of research, and only measuring results in terms of patents and licenses misses the importance of Intellectual Property (IP) deployment, Culley said. He pointed out that only 3 per cent of publicly funded research leads to commercial products and processes that yield royalties and other

private goods for scientists. But the majority of research endeavours still create knowledge, which, if disseminated properly, can be translated into valuable public goods.

Hence the need for complex agreements that take into account the varied potential of research outcomes, Culley said. Negotiating a multi-institutional deal can be done in as little as two days in cases where universities are dealing exclusively with industrial partners, and when the technology in question is already highly standardized. When multiple parties are involved, and those include the federal and local governments, finalizing an agreement can take up to two years.

Culley noted that KT units in universities often lack the core funding required to see through such a comprehensive approach. He suggested that this process could be streamlined and accelerated with the creation of legislation that would establish a template and define terms of agreement for publicly funded research. A less drastic, yet still effective, way of regulating agreements, he said, would be to establish a policy framework outlining key conditions (such as IP ownership) in collaborative research endeavours. According to Culley, failing to explore either of these options amounts to an acceptance of the status quo in all of its counter-productive discrepancies.

Culley listed a top-ten of IP licensing principles, and offered three general recommendations that apply regardless of the licensing approach adopted by university research teams: develop measurement frameworks; leverage the broader technology transfer community, including the private sector; and build capacity by establishing technology transfer as a recognized profession with accredited training programs.

Michelle Gagnon, Canadian Institute of Health Research

"Bridging the Knowledge to Action Gap: Knowledge Translation at CIHR"

Ms. Gagnon presented the key role KT plays in helping CIHR fulfill its unique mission.

Ms. Gagnon observed that KT is a growing component of CIHR's mandate. The agency refers to it as "knowledge to action" and describes the multi-stage process as one that includes synthesis (inserting new findings within the existing body of knowledge), dissemination (identifying the proper audience and adapting the message to its particular expectations), exchange (integrating the needs of targeted users), and the ethically sound application of knowledge.

KT is instrumental in helping CIHR achieve its stated goals of improving Canadians' health, providing more effective health services and products, and generally strengthening the health care system.

Within CIHR's framework, KT takes place in either of two contexts. The traditional model sees researchers sharing their results, or any significant new knowledge generated by a project, at the conclusion of each research exercise. A more productive, and hence increasingly encouraged, approach has researchers engaging future knowledge users as partners by soliciting their input early on. This requires collaboration and a focus on identifiable solutions.

Gagnon reported that CIHR is currently involved in several initiatives that strive to foster cooperation and close the "knowledge to action gap." Those include the creation of a KT handbook and assessor's guide, the design of educational modules, and the development of curriculum for students and staff. She also underlined CIHR's leading role in the development, implementation, and evaluation of policies such as open access to research outputs, trial registrations, and results disclosure.

Linda Murphy, International Development Research Centre

"Adapting the Linkage and Exchange Model in Global Health Research"

Ms. Murphy outlined how IDRC is seeking to consult a wide range of stakeholders in order to ensure that research serves several purposes and speaks to a plurality of players. "When it comes to telling the research story, one size does not fit all," she said.

Murphy encouraged researchers to establish contacts and maintain relationships with policy makers and civil society representatives in order to identify what benefits each group is hoping to glean from specific research exercises. This collaborative principle forms the basis of IDRC's knowledge transfer and exchange (KTE) approach.

Invoking research by Beyer and Trice, Weiss, Lomas, and Innvaer, Murphy submitted that the level of involvement by decision-makers is the best predictor of the extent to which research results will be utilized. Their input in the conceptualization and conduct of a study will determine whether findings become useful knowledge or remain in the academic realm. She said that allowing policy makers to have a say in the early stages of research design is a core belief at IDRC. She also stressed the benefits for researchers of catering to local differences when advising on clinical or policy decisions, but she acknowledged that not all research lends itself to custom packaging.

Murphy noted that policy-makers often require new information in summary form, and demand clear conclusions that preferably support existing policy positions. This, she explained, means focusing on results, not methods, when presenting findings. Anticipating preferred formats and understanding particular drivers of decisions are essential skills that today's researchers must master, she said.

IDRC houses the Global Health Research Initiative (GHRI), a collaboration with three other agencies (CIDA, CIHR, Health Canada) that funds research teams in over 30 countries. Some of the KTE strategies employed by IDRC across its GHRI programs and grants include investing in multi- and trans-disciplinary approaches, as well as training researchers by organizing internships in the health system so they may learn about its context, vocabulary, communication preferences, and decision processes. Murphy added that throughout all of its activities, IDRC aim to strengthen evidence-informed decision-making by promoting a "linkage and exchange" model that fosters interaction between researchers and policy makers.

Gisèle Yasmeen, Social Sciences and Humanities Research Council

"SSHRC and Knowledge Mobilization: The Case of GE^{3}LS"

Dr. Yasmeen introduced Knowledge Mobilization (KMb) as SSHRC's endorsed interpretation of knowledge transfer. She related how KMb evolved, and how it is currently implemented within existing and new programs at SSHRC.

Drawing on a brief history of the concept, Yasmeen said that KMb emerged in the 90s in the field of education, where it successfully gave rise to non-linear discursive approaches based on a social construction of knowledge. She pointed to open access and data archiving initiatives, as well as to the inclusion of a KMb division within SSHRC's recently created Partnership Directorate as a sign that KMb has entered the mainstream. The division became operational in 2007.

Yasmeen reported that SHHRC's strategic priority for 2008-2010 focuses on "fostering meaningful connections by developing and implementing an updated strategy for Canadian and international partnerships." The challenge for SHHRC will be to conceptualize and measure how it can accomplish this beyond the customary tally of books, journal articles, and citations, she said.

In recent years, SSHRC's approach to KMb thinking and activities has been shaped by GE^{3}LS scholarship. Most notably as of 2006, through a collaboration with Genome Canada, SHHRC has been acting as a "knowledge broker" within ERA-SAGE, a

European Commission-based consortium that brings together nine funding bodies from seven countries.

In the coming years, Yasmeen anticipates that the abundance of activities undertaken by the GE³LS community at large will serve as a "human laboratory" for the development of KMb in the fields of social sciences and humanities.

3) "HARD-TALK" SESSION

Three main themes emerged from the 45-minute "Hard Talk" session and question period: The still fledgling, appreciation of KT and its benefits, the challenges of measuring its impact, and the need to identify and share best practices.

Raising KT's Profile

When called on individually by moderator Brunk, each presenter agreed with Landry's assertion that KT applies to more than the commercialization of products, and must be understood as a complex process that adds value to the human research engaged in by GE³LS practitioners. Landry went on to say that, for productive knowledge translation to occur, researchers need to go beyond learning better communication skills and strategies.

Landry urged his co-panelists and all conference attendees to think of KT as an active transformation of knowledge that allows researchers to innovate and compete in a market where fewer multi-national firms are choosing to come to Canada.

Financial support for KT also needs to be restructured and upgraded, Landry said. After 15 years of rapid technological development, purchasing state-of-the-art equipment is no longer prohibitive for leading institutions, he noted. "We now live in a world where tangible resources have been eclipsed by knowledge resources," he said, predicting that harnessing and combining those resources effectively is the challenge that lies ahead for Canadian researchers. To assist in this pursuit, Landry recommended increasing the KT share of future grant-making budgets by 15 to 20 per cent.

Although nobody disputed these numbers, different solutions were offered to measure the projected gains generated by a funding infusion.

Measuring KT

All panelists agreed that IP, patents, licenses, publications, citations, and other quantitative metrics are inadequate when assessing the level of success achieved by most KT initiatives. Gauging the profitability of research investment with such narrow tools ignores significant contributions and fails to capture more complex effects.

Murphy acknowledged the need for more comprehensive indicators, but argued that researchers must get involved in the development of new metrics and not leave the task exclusively to funding organizations. She noted that how universities recognize their researchers' contributions through the tenure system, as well as institutions' engagement in public debate, might be areas where new thinking would favour improved measuring tools. Murphy named the Canada Research Chairs program as an example of a successful collaborative framework that is encouraging the development of subtler ways of evaluating social innovation.

Torkko posited that each type of project should have its own set of metrics. NRC is developing a "balanced scorecard" that includes client feedback, a category of data which, she said, is difficult to quantify.

Sharing this perspective, Gagnon reiterated that CIHR is committed to building communities of researchers, and busy designing its own mix of quantitative and qualitative indicators.

Peter Phillips of the University of Saskatchewan observed that little data is available on granting institutions' funding of KT activities. Until more information is made available, he said, measuring the impact of different initiatives will remain an elusive task. He recounted his own experience of asking Industry Canada for national data on KT. After multiple requests and months of waiting, he was informed that confidentiality clauses prevented the release of the data.

Culley offered an explanation for this roadblock, admitting that federal agencies sometimes use the cloak of confidentiality to hide the fact that no good data has been collected.

Highlighting the agency's apparent incoherent approach to KT, Phillips added that he has since been asked to conduct a study (on a consultancy basis) on this very topic.

Data access issues are "hugely important" for SSHRC's Yasmeen, who suggested that concerned agencies work together in partnership to bring about more transparency and efficiency.

The question of open source access to KT data was briefly broached. All panelists agreed that, barring IP restrictions and exclusivity agreements with industry, as much KT information as possible should be made available online by universities and granting agencies. Murphy mentioned that this is in line with existing IDRC policy.

David Castle, Canada Research Chair, Science and Society, and conference organizer, predicted that the way institutions set KT policies will adapt and effectively settle for a trade-off between the calculation of quantitative outputs and the recognition of a desired process.

Best Practices:

Presenters agreed that, while a number of KT best practices already exist within respective institutions and agencies, shared standards and national targets have yet to be developed and implemented.

While Gagnon invoked CIHR's multi-disciplinary approach in its efforts to provide best practices, Phillips observed that some universities do not yet have KT offices. Underlining the regional variations in institutional priorities, he remarked that the University of Calgary's KT office deals with more research than all Canadian universities combined.

Landry pointed to what he called "the high complementarity" in patenting, publication numbers, KT, and spill-over benefits. But he questioned the common practice of asking researchers with more publications to work as consultants. This, he said, means that the most productive among them, and arguably the most knowledgeable, end up having less time to teach, which is contradictory to KT's purpose and a loss to students. According to Landry, the wide range of skills involved in KT, including the delivery component of KT activities, need to be explored further before they can be maximized.

Culley acknowledged that discrepancies persist between industry and federal agencies when it comes to negotiating the KT aspects of multi-party agreements. Asked why it often takes longer to close a deal with Canadian agencies than with industry, he spoke of the different procedures in each bureaucracies. He said that consistent laws are in place, but conceded that they are not always applied uniformly.

4) LITERATURE REVIEW

The last decade has seen the publication of a growing number of meta-studies on KT strategies, practices, agents, and impacts. One of the most comprehensive and up to date data analysis is Craig Mitton *et al.*'s "KTE: Review and Synthesis of the Literature" (2007).

Starting with an initial search of eight English-language databases, selected reference lists, publication lists of international research centres, as well as consultations with researchers with a known interest in KTE, Mitton *et al.* identified 4,250 abstracts on KTE and healthcare policy published between 1997 and 2005. After parsing them through additional criteria to exclude research on KTE involving interaction between clinicians, providers, and consumers, a total of 169 peer-reviewed articles were retained for analysis. Of those, more than half had a Canadian lead author, 23 per cent originated in the U.K., 11 per cent were from the U.S., and a handful of the selected studies were conducted in other countries.

Mitton *et al.* acknowledge the difficulties of defining the concept of KTE across various disciplines. Their analysis of the literature nonetheless identifies a number of mechanisms intended to enhance the spread and effectiveness of KTE. The ones most frequently referred to in the studies they considered are joint workshops with researchers and decision makers, interdisciplinary research teams with the input of decision makers, collaborative definitions of research questions, the use of "knowledge brokers", and interpersonal contact between researchers and decision makers.

Mitton's group found that the majority (almost 80 per cent) of published articles focused on organizational frameworks before application, structural barriers and facilitators to implementation, assessments of research input on policy development, and comparisons of stakeholders' perspectives. Even though more than one in five of all retained articles reported on the "real-world" implementation of a KTE practice or strategy, not one was a randomized controlled study designed to measure KTE's impact.

Mitton and colleagues' principal finding is that "despite the rhetoric and growing perception in health services research circles of the 'value' of KTE, there is actually very little evidence that can adequately inform what KTE strategies work in what context." In their view, not enough primary research is being done on KTE, and

established best practices "seem to be based, at best, on anecdotal experience and even rhetoric rather than on rigorous evidence."

While they laud the role played by the Canadian Health Services Research Foundation (CHSRF) in promoting the use of the terms "knowledge transfer" and "knowledge transfer and exchange" by researchers, Mitton *et al.* remain skeptical of the guideline's apparent benefits. They worry that, while it does raise KTE's profile, CHSRF's initiative might have come too soon, that is, before tested tools are in place to measure KTE's real impact.

CHSRF's chief executive officer, Jonathan Lomas, recognizes the need to improve the culture of evidence informed decision making, and acknowledges the distance between the two worlds of research and health services (2007). Lomas suggests that "researchers tend to see decision making as an event" while "decision makers … tend to see research as a product they can purchase…" He encourages a focus on "better linkage and exchange between the processes that create the facts (research) and the ones that incorporate the values (decision making)."

Since 2003, CHSRF has been supporting a network of more than 400 knowledge brokers across the Canadian health system. Their duties include the dissemination of research and the actual bringing together of researchers and decision makers. But in most universities and funding agencies, work of this nature can only be engaged in on a part-time basis.

Mitton et al.'s concern for more transparency and judicious appraisal of KT's impact is also raised by, among others, Newton and Scott-Findlay of the University of Alberta (2007). They call for KT to be considered as "an ethically-bound process" that requires "robust evidence" and increased accountability. They recommend that organizational research strive to produce "more sophisticated analytic work" to foster a better understanding of how institutions within the healthcare system interact.

Mitton *et al.* contend that KTE, as it is currently understood, is incompatible with the complexities of health policymaking, and that conflicting demands on researchers and decision makers continue to impede KTE's success. Turning the question on its head, they suggest that "it may be more beneficial to conduct an evaluation based on whether and how policy was informed, rather than simply the extent to which research was used."

The disconnect alluded to by Mitton *et al.* and Lomas was explored by Bernard C. K. Choi *et al.* of the Public Health Agency of Canada in an article that asked "Can scientists and policy makers work together?" (2005). The answer to their own query

comes in the form of eight questions, or potential paths to bridge the gap between researchers and the shapers of health policy.

They ask whether incentives should be put in place to encourage scientists and policy makers to engage in dialogue; wonder if the biomedical community should define research more broadly; and suggest that policy makers might be accountable to peer reviewed journals just as academics are.

But Choi *et al*. seem to have inspired Mitton and colleagues most in their questioning of the accepted perception of KT as a practice that originates with academics: "Do most of the current 'research to policy' efforts focus on the wrong 'starting point' (that is, the researchers)?" Another line of inquiry they lay down reveals doubts as to the wisdom of expecting policy to be completely, or even largely, predicated on scientific evidence.

Not ready to dismiss the promise of KT altogether, Choi *et al*. mention examples of successful knowledge brokering such as the World Health Organization's Health Evidence Network and the European Observatory on Health Systems and Policies. They also refer to Innvaer *et al*.'s 2002 review of 24 studies conducted with health policy makers, in which the latter named personal contact, timely relevance, and the use of summaries with policy recommendations as the most influential KT facilitators.

Investigating the other side of the KT relationship, Lavis *et al*. surveyed 265 directors of applied research organizations in Canada to collect data on their respective institutions' KT activities (2002). Interestingly, researchers in the health sector had a much higher response rate than their counterparts in the economic/social sector.

Digging into five fundamental aspects of the KT equation, Lavis and colleagues asked what was being transferred; to whom it was conveyed; by whom; how target audiences were being engaged; and whether research organizations explicitly assessed their own KT practices. Lavis *et al*.'s findings indicated that opportunities for improving the quality and impact of KT initiatives in Canada rested primarily in the elaboration of actionable messages for policy makers; in enabling knowledge-uptake skills in selected audiences; and in evaluating the influence of past KT activities.

Brownson *et al*. also list a number of ways a shared, productive outlook can be developed among researchers and policy makers (2006). They invite the former to get involved in the deliberative process, and learn how to convey information more effectively using basic visual tools, data aggregation, spatial data mapping, and case clustering. They also recommend conducting research on policy, and building transdisciplinary public health teams. As encountered by Mitton *et al*. in their

synthesis of the literature, Brownson and colleagues approve the cultivation and use of opinion leaders and political champions in order to garner support for policies borne out of research.

Regarding the financial and labour costs of sustained and long-term KT strategies, Lavis *et al*. found that while most research organizations invested a significant portion of their budget in KT endeavours, only ten per cent of them measured their own KT performance. Moreover, a look at logistical resources revealed that institutional websites and newsletters generally did a poor job of reaching out to the different audiences they tried to engage.

Finally, drawing from the work of Huberman (1994) and Roos and Shapiro (1999), Lavis *et al*. optimistically pointed to the potential for cultural shifts, where researchers and policy makers can, over time, learn to take into account the other group's professional imperatives, and establish mutually benefiting KTE.

5) DISCUSSION

In light of the overwhelming consensus found in the literature and among conference presenters on the need to include policy makers in research decisions, and to foster personal and professional exchanges between researchers and policy makers, it appears that discussions of KT's challenges and potential impact are slowly moving beyond a conversation between researchers and funding partners.

In Canada, the structural barriers between those conducting the research and those whose job it is to make policy decisions based on the former's findings are increasingly being dismantled by ambitious partnership programs at agencies such as IDRC, NRC, CIHR, SSHRC, and Genome Canada.

Six years after the publication of the Lavis *et al*. study, evidence suggests that funding organizations are making better use of web-based communication tools. NRC's homepage offers multiple gateways for researchers, businesses, students, the media, and the public. CIHR presents a "Knowledge Translation [KT] & Commercialization" page that contains information aimed at different stakeholders. SSHRC this year launched *Dialogue*, a quarterly e-newsletter.

Another example of a promising project is CIHR's ongoing work on the creation of two guides to KT for peer reviewers. Still in their development stage, the guidelines for integrated KT and end-of-grant KT cover the following aspects: goals, audience, expertise, strategies, and feasibility. Although grant applicants currently are not asked

to meet explicit KT requirements, a general expectation of dissemination of results is implicit in the agreement with researchers. Following a consultation process that will solicit feedback from a range of stakeholders, including its own peer review committees, CIHR will introduce a KT requirement in its grant application documentation.

In October, The Leslie Harris Centre of Regional Policy and Development at Memorial University will be hosting *Knowledge in Motion 08*, an international conference exploring how higher education institutions contribute to regional development. Like the CIHR website, the conference portal features multiple gateways for representatives of the government, researchers, industry, the community, and students. One session will deal with "outside the box" KT activities such as the creation of a game and the use of theatre to reach wider audiences.

The use of non-traditional methods for scientific communication, with its added benefit of addressing elected policy makers' constituents directly, is growing in popularity. Last year, the Ontario Genomics Institute (OGI) launched *The Geee! in Genome*, Canada's first exhibition on genomics, and a part of a multi-dimensional public education project produced by the Canadian Museum of Nature. The 2,500 square foot, bilingual, traveling exhibition aims to inform Canadians about the role of genomics in nature and human life, and shine a spotlight on the important contributions of Canadian scientists to the field. OGI also sponsors several public outreach events such as Café Scientifique, a series of public talks, and *Ferocious Beauty: Genome*, a modern dance performance presented in the fall of 2007.

However, as pointed out by several speakers at the GE^{3}LS Symposium, and demonstrated by Lavis *et al*. and Mitton *et al*.'s research, measuring the impact of KT activities remains a pressing, unfinished task. The maximization of KT strategies, as discussed in terms of "best practices" during the Hard Talk session, will depend on the elaboration of reliable assessment mechanisms and measuring tools. KT's future success and ultimate relevance will be a function of how much and how well researchers, funding agencies, and decision makers can both anticipate each other's needs and determine accurately whether they are meeting them.

GLOSSARY - ACRONYMS

AAFC: Agriculture and Agri-Food Canada
CBS: Central Business Support (unit)
CHSRF: Canadian Health Services Research Foundation
CIDA: Canadian International Development Agency
CIHR: Canadian Institute of Health Research
GE^3LS: genomic, ethical, environmental, economic, legal, social (implications)
IDRC: International Development Research Centre
IP: intellectual property
KMb: knowledge mobilization
KT: knowledge transfer or translation
KTE: knowledge transfer and exchange
NRC: National Research Council
OGI: Ontario Genomics Institute
SSHRC: Social Science and Humanities Research Council of Canada

REFERENCES

Brownson, R.C. et al. 2006. Researchers and policymakers: Travelers in a parallel universe. *American Journal of Preventive Medicine*. 30: 164-172.

Choi, B.C. et al. 2005. Can scientists and policy makers work together? *Journal of Epidemiol Community Health*. 59: 632-637.

Huberman, M. 1994. Research utilization: The State of the art. *The International Journal of Knowledge Transfer and Utilization*. 7: 13-33.

Innvaer, S. et al. 2002. Health policy makers' perceptions of their use of evidence: A Systematic review. *Journal of Health Services and Research Policy*. 7: 239-244.

Lavis, J.N. et al. 2003. How can research organizations more effectively transfer research knowledge to decision makers? *The Milbank Quarterly*. 81: 221-248.

Lomas, J. 2007. The in-between world of knowledge brokering. *British Medical Journal.* 334:129-132.

Lomas, J. 2000. Using "Linkage and Exchange" to move research into policy at a Canadian Foundation. *Health Affairs*. 19: 236-240.

Mitton, C. et al. 2007. Knowledge transfer and exchange: Review and synthesis of the literature. *The Milbank Quarterly.* 85: 729-768.

Newton, M.S. and S. Scott-Findlay. 2007. Taking stock of current societal, political and academic stakeholders in the Canadian healthcare knowledge translation agenda. Implementation Science. 2:

Roos, N.P. and E. Shapiro. 1999. From research to policy: What have we learned? *Medical Care*. 27: 291-305.