



# THE DR. TONG LOUIE LIVING LABORATORY

Review of BCIT Activities 2006–2008



*The  
Living  
Lab*

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# APPLIED RESEARCH AT BCIT



ADAPTED WORKSTATION FOR PEOPLE WITH DISABILITIES.

Research and development at BCIT is focused on creating useful products, services and applications; developing solutions to industry's technical challenges; and commercializing innovation. Through these efforts, we create practical learning opportunities for our students and contribute to long-term economic development in British Columbia. Research projects conducted by BCIT faculty, research staff, and students typically involve:

- > Design and development of prototype devices, systems, processes, and products
- > Analysis, testing, and evaluation of new technologies
- > Commercialization of new technologies and products.

### BCIT TECHNOLOGY CENTRE

The Technology Centre provides access to BCIT's extensive research and development resources. The Centre has developed several dedicated research facilities, and it employs a team of full-time researchers who work both with industry clients and on grant-funded initiatives. Technology Centre clients range from the independent entrepreneur with a unique prototype idea, to established companies and organizations developing new products and services.

### DR. TONG LOUIE LIVING LABORATORY

Founded in 1997, named after the late Dr. Tong Louie, the Living Laboratory is a unique applied research facility in North America. The lab's mandate is to facilitate better, independent, and safer lives for older adults, persons with disabilities, and health care workers through the creation and evaluation of effective assistive and medical devices, consumer products, technologies, and environments.



BIOMECHANICAL TESTING IN THE LIVING LAB.

# MESSAGE FROM THE DIRECTOR



In November of 2007, the Dr. Tong Louie Living Laboratory quietly celebrated its 10th anniversary. It is known that it can take many years for an original research program/facility to reach its stride. In the case of the Living Lab, we are proud to say for a number of years now we have received national and international recognition for our work. We continue to take on those applied research problems that will not likely ever earn us a Nobel Prize, but may very well make the lives of older adults, persons with disabilities, and other persons' lives just a little bit better. The BCIT Living Lab team is proud of our real world approach to solving problems for our clients. Whether it is a small entrepreneur from Kelowna, BC who needs their prototype bathtub evaluated by persons with paraplegia, or the Public Health Agency of Canada wanting help impacting assistive device stigma in older adults, we put forward our best efforts to come up with solutions that make sense. And as always, we continue to specialize in capturing first-hand input from the users or consumers of whatever technology, device, or process we are researching.

That emphasis on usability and helping products, devices, or technologies be maximally user-friendly has become what the Dr. Tong Louie Living Lab is known for.

The Living Lab is now part of a re-organized applied research cluster at BCIT called the Technology and Product Evaluation Group (TPEG). TPEG is one of a number of research groups that comprise BCIT's Centre for Applied Research & Innovation



(CARI). Applied research and the economic impacts associated with the polytechnic model are now a higher priority for the provincial and federal governments in Canada—this is good for the Living Lab and BCIT. Due to our close ties and long history working with and serving industry, we are particularly well positioned to address the commercialization agenda of Canada's Science & Technology Strategy.

I encourage you to take a few moments and peruse this synopsis of BCIT's Living Lab activities over

the last two years. By all means, please feel free to contact me if you should desire more information about the lab, want to engage in collaborative research with our great multi-disciplinary team, or maybe you have a great idea of a new product, device, technology, or process that might improve the daily lives of older adults, persons with disabilities, or others that work with those key populations.



**James Watzke**, PhD, Dean, BCIT Applied Research, Director, Dr. Tong Louie Living Laboratory  
Email: james\_watzke@bcit.ca Phone: 604.456.1106

## OUR SERVICES

The Living Lab provides a wide range of services:

- > Applied research to evaluate new or existing devices, products, or technologies, including:
  - > product feasibility studies
  - > market and focus group research
  - > product design
  - > prototype fabrication
  - > human factors device testing with target users and
  - > clinical trials.
- > Simulation and ergonomic analysis of occupational tasks or procedures, for example, to impact repetitive strain injuries.
- > Simulation and analysis of training procedures, for example, to teach effective lifting mechanics.
- > Environmental design research, for example, to study the most effective bathroom or kitchen design for older adults and/or persons with disabilities.
- > Assistance in writing proposals to procure funding for research to be conducted in the Living Lab, for example, through the National Research Council's Industrial Research Assistance Program (NRC-IRAP).

# SYNOPSIS OF BCIT'S LIVING LABORATORY APPLIED RESEARCH ACTIVITIES

APRIL 1, 2006–MARCH 31, 2008

Projects are only listed here if BCIT Living Lab or BCIT Health Technology Research Group staff served as a principal investigator, project leader, or co-investigator, and some portion of the project work took place in the Living Lab. *Note: (PR) indicates Peer-Reviewed funding.*

## **Accessibility Projects Roadmap for Mobility Impairment**

(Key collaborator: Neil Squire Society)

**Funded by:** Research in Motion

## **Overcoming Assistive Device Stigma: A Campaign to Improve the Daily Lives of Non-Metropolitan Canadian Seniors**

(Key collaborator: Weber Shandwick Worldwide)

**Funded by:** Public Health Agency of Canada, Population Health Fund (PR)

## **Development and Evaluation of a Model for a Home Care Ceiling Lift Program in British Columbia**

(Key collaborators: Peak Research Inc., Occupational Health and Safety Agency for Healthcare of BC (OHSAH), UBC)

**Funded by:** WorkSafe BC (PR)

## **A Map with Wheels—Prototyping a collaborative online map for use by a community of commuting cyclists**

**Funded by:** BCIT Prototype Fund and the BCIT TEK Grassroots Initiative

## **New Technologies and People with Disabilities Research Alliance**

(Key collaborators: D. Stienstra, University of Manitoba; Neil Squire Society)

**Funded by:** Innovative Economy Program, Social Sciences and Humanities Research Council of Canada (SSHRC) (PR)

## **Observational Study of Participants in a Simulated Bathroom Environment**

**Funded by:** Hollister Incorporated

## **E-Health Go To Market**

**Accelerator—Simulations, evaluations and usability testing of e-health systems to support Canadian vendors and medical professionals in shifting to electronic information systems**

**Funded by:** National Research Council Canada's Industrial Research Assistance Program (IRAP)

## **Remote Rehabilitation through Assistive Cooperative Haptics (R-REACH): Focus groups to assist in the development of an NSERC application**

(Key collaborators: University of Victoria, University of British Columbia, Neil Squire Society)

**Funded by:** Disabilities Health Research Network (PR)

## **Design and Evaluation of an Accessible Bathtub**

(Key collaborators: Anne-Kristina Arnold—Ergonomist, Wendy Tse—Occupational Therapist)

**Funded by:** Aquasure Bath Products and National Research Council Canada's Industrial Research Assistance Program (IRAP)



TOTAL FUNDING DURING REPORT PERIOD  
\$1,025,000

## PROGRAMS

**Effect of Passive Photonic Stimulation Applied to the Soles of the Feet of Adult Hockey Players to Enhance Postural Control**  
**Funded by:** NeuroKineticsTM Health Services (BC) Inc.

**Evaluation of a Bathroom: Recommendations for Adaptable Housing Standards**  
**Funded by:** Office of Housing and Construction Standards, Building Policy Branch, Government of British Columbia

**SOLUTIONS and PROTOgé**  
Programs for post-secondary students to develop and/or explore the commercial potential of assistive technology.  
**Funded by:** Mark Nussbaum Memorial Endowment established by the London Drugs Foundation, NSERC—Regional Opportunities Fund (ROF), BC Rehab Foundation, Dynavox Technologies (2008), and BCIT

**Risk-Based Regulations for Combination Products**  
(Key collaborators: BCIT Natural Health Products Research Group, University of Toronto Biomedical Engineering Program, Canadian Standards Association)  
**Funded by:** Health Policy Research Program, Health Canada (PR)

**Aging Employees with Mobility Impairments; Changing Behaviors to Solve Workplace Accommodation Challenges**  
(Key collaborator: Neil Squire Society)  
**Funded by:** Social Development Canada, Office for Disability Issues (ODI) (PR)

**Disabilities Health Research Network**  
(Dr. James Watzke was Co-founder/Leader of the Network with Dr. Theo van Rijn; GF Strong Rehabilitation Centre)  
**Funded by:** Michael Smith Foundation for Health Research (PR)

**Development of an Improved Vibrostimulation Device for Persons with Spinal Cord Injury**  
(Key collaborators: S. Elliot and GF Strong/Vancouver Coastal Health Authority Sexual Health Clinicians, International Collaboration on Repair Discoveries—ICORD)  
**Funded by:** BC Neurotrauma Fund—Rick Hansen Man in Motion Research Fund (PR)

**Lift Devices to Reduce Musculoskeletal Injury (MSI) among Home Support Workers in BC—A Community Intervention (Phase 2)**  
(Key collaborator: Occupational Health and Safety Agency for Healthcare of BC (OHSAH))  
**Funded by:** Workers' Compensation Board (WCB) of British Columbia (PR)

# HIGHLIGHTED PROJECTS

## IS THERE A CANE IN YOUR CLOSET?



DON HARRON SPEAKS FOR MOBILITY, PHAC PROJECT.

This question addresses the obstacle of stigma, which often prevents older adults who *should* be using assistive devices such as a cane or walker from actually using them. There are many reasons why assistive devices (ADs) are *not* used, feelings of looking frail or vulnerable, and even pride can get in the way. The consequences of not using an AD can be far reaching and may ultimately be life changing.

To address this important issue, BCIT, in collaboration with Weber

Shandwick Worldwide, (funded by the Public Health Agency of Canada) developed, executed, and evaluated a health promotion program (entitled an Assistive Device Anti-Stigma Program) that targeted non-metropolitan communities due to their limited availability of healthcare services. Three communities were chosen based on their size, percentage of older adults, healthcare, and seniors' services: Oliver, BC, Nipawin, SK, and Middleton, NS.

The essential element of this grassroots AD Anti-stigma Program was four Mobility: Now you're Going Places workshops that had as its primary goal converting AD stigma into pride. These innovative workshops were facilitated by older adults for older adults and incorporated personal and community relevance, humour provided by Don Harron (aka Charlie Farquharson), and factual information from occupational or physio therapists.

Following the workshops, research program head, Christine Flegal, and Don Harron were engaged in a media tour in Vancouver, Calgary, Winnipeg, and Ottawa to speak about the stigma associated with AD use. As well, Flegal and the occupational therapist from Nipawin held Train the Trainer workshops which targeted health professionals that work with community-based older adults. Each health professional walked away with their own Mobility: Now you're Going Places start-up kit. It is our expectation that the project will be sustained by having them hold their own workshops for older adults.

This project was awarded the BC Medical Association's Excellence in Health Promotion Award under the Non-Profit Category in June, 2008. Criterion to earn this award:

- > Demonstrated a concern for health and safety through specific actions and/or initiatives
- > Exemplified creativity and initiative in taking action to improve and protect health and safety
- > Brought about changes with the potential for positive, long-term improvement in the protection of health and safety in BC.

# HIGHLIGHTED PROJECTS

## A TUB YOU CAN REALLY GET INTO!

For many people, one of the great pleasures in life is the enjoyment of a long soak in the tub. Yet for many older adults and persons with disabilities, getting into and out of the tub poses such a risk for injury, this favourite pastime no longer becomes an option. Newly designed walk-in tubs, that alleviate the need to climb over and lower oneself into the tub, are currently available on the market but the cost is often prohibitive and the design does not allow the user to recline.

Aquassure Bath Products Inc. based in Kelowna, BC, with assistance from NRC's Industrial Research Assistance Program —IRAP, approached the BCIT Health Technology Research Group (HTRG) and the Dr. Tong Louie Living Laboratory (TLLL) to execute a limited design review and a full-scale human factors evaluation of a prototype bathtub. The tub's special design features include a raised platform on which the tub sits and a sliding door. Thus, users enter the tub by sitting in the open doorway, sliding themselves in, and once situated, they slide the door closed (see photo).

The design review team, including expertise in industrial design, human factors, ergonomics and occupational therapy, provided valuable feedback on the usability and human factors features of the bathtub design, as well as an analysis of fixture placement related to compliance to relevant plumbing codes for North America (e.g. CSA standards). Based on this review, the client was able to incorporate the team's recommendations before production of the full-scale prototype bathtub.

The second phase of the project involved a full scale human factors evaluation that took place in the TLLL. A plexiglass bathroom

was constructed to allow researchers complete visibility from all angles and included the prototype tub. Targeted users of the tub (e.g. older adults and persons with paraplegia) were recruited to evaluate and provide feedback on the usability (e.g. by entering and exiting the tub, assessing fixture and grab bar placement), and commercialization of the tub (e.g. price points, marketing, etc).

With this comprehensive evaluation, and the incorporated design improvements, the tub is currently available on the market.

[www.aquassure.com](http://www.aquassure.com)

USABILITY TESTING, AQUASSURE.



# MEDIA



FILMING FOR THE WEATHER NETWORK.

## PRINT

### ANTI-STIGMA PROGRAM

Frazer-Harrison, A. "Charlie Farquharson is in the House." *The Calgary Herald*. Calgary, AB. March 20, 2008.

Braitenbach, B. "Senior Mobility." *Okotoks Western Wheel*. Okotoks, AB. March 12, 2008.

Hendry, A. "BCIT Workshop Puts the Step Back in Local Seniors." *Alaska Highway News*. Fort St. John, BC. February 22, 2008.

Polachic, D. "Harron Lends Humour to Hush Seniors' Cause. Video Series Fights Stigma of Using Mobility Aids." *The Saskatoon Sun*. Saskatoon, SK. June 17, 2007. *The Nipawin Journal*. Nipawin, SK. April/May/June, 2007.

"No Shame in Using a Cane." *The Chronicle Herald*. Halifax, NS. April 4, 2007.

## OTHER PRINT

Shaw, G. "BCIT Living Lab." *The Vancouver Sun*. Vancouver, BC. February 16, 2007.

## TELEVISION

### ANTI-STIGMA PROGRAM

Interview with Christine Flegal and Don Harron. *News Break*. Shaw TV. Winnipeg, MB. March 27, 2008.

Interview with Don Harron and Anita Meszaros. *Ottawa Morning*. A-Channel. Ottawa, ON. March 27, 2008.

Interview with Christine Flegal and Don Harron (as Charlie Farquharson). *News at Noon*. CTV. Ottawa, ON. March 27, 2008.

Interview with Christine Flegal and Don Harron. *Breakfast Television*. City TV. Winnipeg, MB. March 25, 2008.

Interview with Christine Flegal and Don Harron. *Good Morning Canada*. CTV. Winnipeg, MB. March 25, 2008.

Interview with Don Harron. *News Break*. Shaw TV. Calgary, AB. February 22, 2008.

Interview with Christine Flegal and Don Harron. *Noon Hour News*. CTV. Calgary, AB. February 21, 2008.

Interview with Don Harron. *Studio 4*. Shaw TV. Vancouver, BC. February 20, 2008.

Interview with Christine Flegal and Don Harron. *Breakfast TV*. City TV. Vancouver, BC. February 19, 2008.

Interview with Don Harron (as Charlie Farquharson). *News Break*. Shaw TV. Vancouver, BC. February 19, 2008.

Interview with Don Harron and Anita Meszaros. *News Break*. The Weather Network. Vancouver, BC. February 19, 2008.

## RADIO

### ANTI-STIGMA PROGRAM

Interview with Christine Flegal and Don Harron. CBC Radio Ottawa. Ottawa, ON. March 25, 2008.

Interview with Christine Flegal and Don Harron. *Radio Noon*. CBC. Winnipeg, MB. February 19, 2008.

Interview with Don Harron. CJNE-FM. Nipawin, SK. June 14, 2007.



# DISSEMINATION ACTIVITIES

## SPEAKING AND PAPER PRESENTATIONS

“Overcoming Assistive Device Stigma: A Campaign to Improve the Daily Lives of Non-Metropolitan Canadian Seniors.” Festival of International Conferences on Caregiving, Disability, Aging and Technology (FICCDAT) conference, Toronto, Ontario, June 16–19, 2007.

“Aging Employees with Mobility Impairments: Changing Behaviors to Solve Workplace Accommodation Challenges.” FICCDAT conference, Toronto, Ontario, June 16–19, 2007.

“Accessibility & Public Information Communication Technologies.” FICCDAT conference, Toronto, Ontario, June 16–19, 2007.

“Development of a Vibro-Stimulation Device for Persons with Spinal Cord Injury.” FICCDAT, Toronto, Ontario, June 16–19, 2007.

“The Dr. Tong Louie Living Lab.” Presentation to Hollister Incorporated, Vancouver, British Columbia, June 5, 2007.

“The Dr. Tong Louie Living Lab.” Presentation to the Kwantlen Interior Design Students, Vancouver, British Columbia, April 5, 2007.

“The Dr. Tong Louie Living Lab.” Presentation to Providence Health, Vancouver, British Columbia, April, 2007.

“The Dr. Tong Louie Living Lab.” Presentation to 2008 Health Technology Forum, Vancouver, British Columbia, March 7, 2008.



A FOCUS GROUP SESSION WITH OUR DIRECTOR.

“Is There A Cane In Your Closet? A National Public Service Campaign to Encourage Positive Use of Assistive Devices by Canadian Seniors and Veterans.” Steady As You Go: Seniors Falls Prevention Conference, Halifax, Nova Scotia, March, 2007.

“The Dr. Tong Louie Living Lab.” Presentation to Industry Canada, Vancouver, British Columbia, January 26, 2007.

“The BCIT Approach to Applied Research: From Big Ideas to Solving Industry’s Problems.” Presentation to the CIDA—China Western Roads Development Project, BCIT, Burnaby, British Columbia, November 22, 2006.

“The Dr. Tong Louie Living Lab.” Presentation to the Emily Carr Institute of Art and Design, Vancouver, British Columbia, October 31, 2006.

“The Dr. Tong Louie Living Lab.” Presentation to Research In Motion, Vancouver, British Columbia, October 5, 2006.

“The I-Brator (Thanks Jeremy!): From Vibrator Concept to Commercialization.” Presentation to the ICORD Annual Research Meeting, Morris J. Wosk Centre, Vancouver, British Columbia, October 3, 2006.

“Developing & Evaluating Home-Based Technologies and Products for Persons with Disabilities: Trials and Tribulations from the Dr. Tong Louie Living Lab.” Presentation for the Canada Mortgage and Housing Corporation, Vancouver, British Columbia, September 22, 2006.

“The Role of Product Evaluation: A Human Factors Approach.” Presentation for 29th Conference of the Canadian Medical and Biological Engineering Society, Vancouver, British Columbia, June 2, 2006.

“Applied Research at BCIT.” Presentation to Liaoning Delegation, BCIT, Burnaby, British Columbia, April 25, 2006.

## PUBLICATIONS

Goelman, Ari. “Changing Work’s Boundaries: Information Technology and the Extension of Radiology Work in Time and Space.” Forthcoming in *The Journal of Architectural and Planning Research*.

Neufeldt, A., Watzke, J., Birch, G., Buchner, D., (2007). “Engaging the Business/Industrial Sector in Accessibility Research: Lessons in Bridge Building.” *The Information Society*, Vol. 23, No. 3.

Stienstra, D., Watzke, J., Birch, G. (2007). “A three-way dance: The global public good and accessibility in information technologies.” *The Information Society*, Vol. 23, No. 3.

Ripat, J., Watzke, J., Birch, G. (In press). “Development of the public information and communication technology assessment tool.” Forthcoming in *Disability and Rehabilitation: Assistive Technology*.

INDUSTRY WORKERS AND SENIORS LEARN ABOUT ASSISTIVE DEVICES.



# VISITORS TO THE LIVING LAB FACILITY

Tri-Nation Health Tech Forum  
*(March 7, 2008)*

RCMP—BCIT Forensics  
*(March 6, 2008)*

Dr. Tony Rahilly (Director  
General), Rizwan Kheraj (ITA),  
and Julia Rylands (Director),  
NRC-IRAP  
*(December 11, 2007)*

Dr. Richard Smith, SFU and  
Dr. Kendall Ho, UBC  
*(December 4, 2007)*

SFU Post-Doctoral Students  
*(August 10, 2007)*

Minister of Western Economic  
Diversification, Minister of  
Industry, and Guests  
*(July 5, 2007)*

Tech MED  
*(May 16, 2007)*

Kwantlen University College  
Students  
*(April 5, 2007)*

Susan Fortier, President, Natural  
Sciences and Engineering  
Research Council of Canada  
*(March 12, 2007)*

National Research Council—  
Industrial Research Assistance  
Program (NRC-IRAP)  
*(January 22, 2007)*

David Emerson, Minister of  
Industry and International Trade  
*(December 8, 2006)*

Emily Carr Students, Instructor  
Anne Kristina  
*(October 31, 2006)*

Research In Motion  
*(October 5, 2006)*

Australian Study Nurses  
*(May 15, 2006)*

Kwantlen College Interior Design  
*(April 3, 2006)*

VISITORS TO THE LAB.





# OUR STAFF

The Living Lab has a staff of highly qualified and experienced researchers, including expertise in electrical, mechanical, biomedical, and clinical engineering. Additional areas of expertise include: robotics, gerontology, human factors, medical device design and evaluation, and prototype production. The Lab team also has access to the various faculties and resources throughout the BCIT and SFU campuses and researchers from other universities and health care settings.

## **BCIT LIVING LAB CORE STAFF**

**James Watzke**, Dean, Applied Research, Director, Technology Centre and Dr. Tong Louie Living Laboratory (Gerontology, Product Evaluation)

**Christine Flegal**, Research Head, (Gerontology)

**Angie Wong**, Research Assistant (Electrical Engineering)

**Farrel Hamm**, Administrative Assistant

**Silvia Raschke**, Project Leader (Prosthetics, Orthotics and Assistive Devices)

**Ari Goelman**, Project Leader (Urban Studies and Planning)

**Yvette Jones**, Research Associate (Human Kinetics)

## WE GRATEFULLY ACKNOWLEDGE THE GENEROUS CONTRIBUTIONS OF THE FOLLOWING ORIGINAL BENEFACTORS TO THE DR. TONG LOUIE LIVING LABORATORY:

- > The Tong and Geraldine Louie Family Foundation
- > Dr. Rix Family
- > Vancouver Foundation
- > British Columbia Medical Services Foundation
- > British Columbia Ministry of Education, Skills and Training
- > British Columbia Ministry of Municipal Affairs and Housing
- > Canada Life Assurance Company
- > Shoppers Drug Mart
- > Armstrong World Industries Canada Ltd.
- > United Carpet—Richmond
- > Interface Flooring Systems (Canada), Inc.

### OUR RESEARCH PARTNERS

- > Neil Squire Society
- > Canadian Standards Association (CSA)—Standards Development (Health Care and Community Safety Program)
- > International Collaboration on Repair Discoveries (ICORD)
- > Occupational Health and Safety Agency for Healthcare in BC (OHSAH)
- > Simon Fraser University—Gerontology



*The  
Living  
Lab*

[bcit.ca/appliedresearch/tpeg](http://bcit.ca/appliedresearch/tpeg)



BRITISH COLUMBIA  
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