



INSTITUTE OF  
HEALTH ECONOMICS  
ALBERTA CANADA

# A “Living Laboratory” in Alberta – Backgrounder for Roundtable Discussion

February 19th, 2013, 11:00 am to 2:30 pm

Matrix Hotel, 10640-100 Avenue

Edmonton, AB

## Institute of Health Economics

The Institute of Health Economics (IHE) is a not-for-profit organization with key competencies in health economics, health technology assessment, decision-analytic modeling, and dissemination of research findings. Its core objectives are to:

- Support decision making in health policy and practice with evidence from research in health economics and health technology assessment.
- Assess the medical, economic, social, and ethical implications of both established and new health practices, procedures, and technologies.
- Facilitate discussions and partnerships among government, academia, industry and healthcare providers to address important issues in health care.

The IHE is governed by a Board of Directors led by Dr. Lorne Tyrrell and CEO, Dr. Egon Jonsson. Board members include five who represent the Government of Alberta and public agencies/authorities, eight who represent the Universities of Alberta and Calgary, including the faculties of pharmacy and medicine, and five members from the innovative pharmaceutical industry.

The Institute is a member of the International Network of Agencies for Health Technology Assessment (INAHTA) and the World Health Organization's Health Evidence Network (WHO HEN) and hosts the secretariat for Health Technology Assessment International (HTAi) [www.htai.org](http://www.htai.org).

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The roundtable and background research  
was supported through a partnership with Eli Lilly Canada

## Summary

- A living lab is an environment that fosters technologic innovation that is of value to the end-user; living laboratories are increasing in popularity and emphasize the collaboration of multiple stakeholders.
- The living laboratory supports health research and technology evaluation and will leverage multiple assets across the health system.
- A living laboratory in Alberta is intended to improve health system performance and health outcomes to benefit the 4 million Albertans it would serve.
- The living laboratory will also provide economic opportunities by facilitating innovation through an enhanced platform that promotes the development and commercialization of technology, and industry partnerships with the health system.
- Work on the data infrastructure to support the laboratory is already well underway. The province's core health data holdings are being linked through a portal between the Ministry of Health and the health care delivery system, Alberta Health Services (AHS), which will provide access to researchers in the two medical universities (University of Alberta and University of Calgary).
- Further linkages will be developed with the goal of providing integrated access to comprehensive research assets on health and health care utilization across the entire population.
- Living labs are intended to benefit all sectors of society. Key beneficiaries must be engaged to successfully implement a living lab, including:
  - Patients and Providers
  - Government
  - Industry
  - Research Community
- Alberta is strongly positioned to develop a living lab model. There already exist strong links between academic, government and business communities.

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## Introduction

The Institute of Health Economics (IHE) is supporting the Government of Alberta in developing a vision for a “living laboratory” in relation to its health system strategy. The living laboratory is a platform for health research and evaluation, providing an environment for *improving health* with a “learning” health care system that leverages data holdings across the province’s single integrated health care delivery system serving nearly 4 million people, together with its single-payer public insurance plan. It also provides *economic opportunities* by providing incentives for innovation through an enhanced platform that facilitates the development and commercialization of technology, and industry partnerships with the health system. (See Box 1)

### Box 1: What are the Benefits of a Living Health Laboratory?

#### Health

- To improve the health of Albertans, efficiency in health service delivery, and growth of Alberta’s health industry.
- To test and validate innovation in medicines, technologies and models of health care delivery in real-world health settings.
- To determine best practice in health care delivery and to transfer that knowledge across the health system to ensure consistent, high-quality care in the province, from primary through tertiary care.

#### Wealth

- To foster collaborative partnerships and investments to support the commercialization of Alberta’s innovative sector.
- To position Alberta to become a leader in the collection and mining of data to support the implementation and evaluation of best practice and new standards of care.
- Improved infrastructure including data infrastructure and capacity building for the knowledge economy.

(Adapted from presentation to Board of Directors, Alberta Research and Innovation Authority, October 2012)

The public sector and the single health authority – Alberta Health Services (AHS) – have management responsibility for integrated health delivery for the entire population. Development of a living laboratory is being spearheaded as a partnership between Alberta’s Ministry of Health and the Ministry of Enterprise and Advanced Education. The IHE in Edmonton is providing the impetus for the initiative by convening a roundtable for the two key Ministries, select senior government officials, health service executives, leading academics and industry leaders to review the concept and some experience in other jurisdictions, and develop a common understanding of key elements of the living laboratory agenda for Alberta, and commit to move forward.

Work on the data infrastructure to support the laboratory is already well underway. The province's core health data holdings are being linked through a portal between the Ministry and AHS, which will provide access to researchers in the two medical universities (University of Alberta and University of Calgary). Further linkages will be developed with the goal of providing integrated access to comprehensive data on health and health care utilization across the entire population. The platform will be coordinated with a province-wide approach for approval of clinical trials and other health research through the province's two medical schools, as part of the "Campus Alberta" initiative.

The goal is to position Alberta as a global leader and preferred partner in promoting and applying health care research and evaluation to improve both the health and prosperity of Albertans. The laboratory will support the development of AHS as a learning health system, including development of new areas of measurement such as value of innovation and broad measures of return on investment in health services. It will support government in policy and resource allocation, through more-robust measures of population health needs and return on investment in current and potential new interventions. It will enhance opportunities for Alberta researchers, in clinical services as well as health policy and economics, including health technology assessment (or comparative effectiveness research). And finally, it will support external partnerships, including attracting private-sector investment in co-innovation and new kinds of research, such as post-market surveillance in addition to traditional clinical trials.

## **The "Living Lab" Concept**

The origin of the living laboratory concept stems from the need for environments that best foster technologic innovation and benefit the end-user; it is originally a term used in developing computing-based technologies. In addition to a focus on user-centric innovation, living laboratories emphasize the collaboration of multiple stakeholders and have been more recently promoted with renewed interest in developing user experience within the "experience economy" (B. J. Pine & Gilmore, 1998; B. J. 2nd Pine & Gilmore, 2001).

The concept is not a new one, as there has been a longstanding recognition of the value of a "learning" environment in creating policy within health care and other social sectors (Campbell, 1969). There has also been a longstanding recognition within the field of technology assessment that technologic development will lead to maximum societal benefit through upstream collaboration between developers and end-users, a concept called "constructive technology assessment" (Schot & Rip, 1997).

Despite a longstanding recognition of the value of collaboration and evaluation with a focus on the patient, real opportunities to implement a "living laboratory" within a health system have only recently emerged due to several factors: 1) The participation of industry with evaluative

processes for health technology decision-making (e.g., such as health technology assessment); 2) Increased availability of computed interpretation, automation, and digital reporting driven by health system needs for reduced human resource costs, coordination across the continuum and reducing hotel costs for chronic disease management and extended care; 3) The emergence of bioinformatics, biobanking and other information technology-driven applications of technology stemming from investments in genome-based research; 4) The desire for economic growth driven by academic-based technology creation within the knowledge economy.

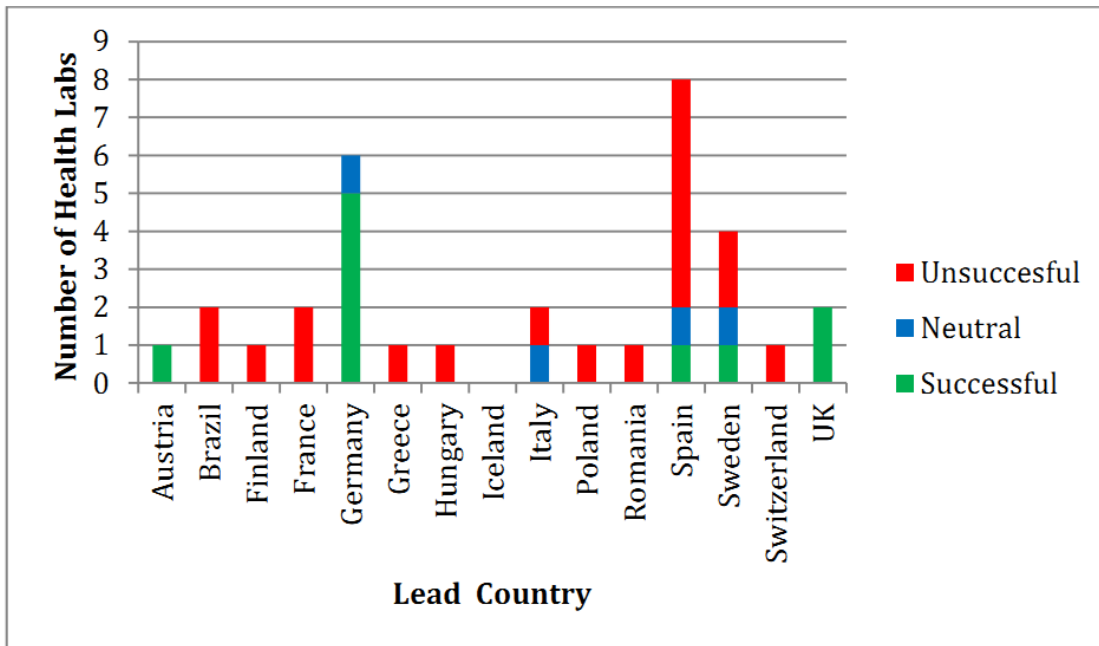


Figure 1: Outcomes of 33 Health related Living Labs. Approximately 30% of all health-related living labs may be considered an ongoing success. (Adapted from Planitz, Hanlen, & Suominen, 2012)

Living labs have been developed at local, regional, national and supranational (e.g., European Union) levels. While not commonplace in health care, living laboratories are emerging. A review of 33 living laboratories (see Figure 1) in health revealed successful labs in Austria, Germany and the UK which “have well-defined, ongoing projects (research interest).

Additionally, they continue strong community and end-user engagement (including media); are funded by notable organisations/businesses; are well-managed and have significant research citations”.

Unsuccessful living labs were associated with “vague or no project outlines” and dominated by “academic applications” (Planitz, Hanlen, & Suominen, 2012).

Examples of current living labs (operating or in development):

- In Austria, the entire city of Scwechat is “committed to act as ‘Living Lab’, an innovative community open to explore possibilities brought on by new technologies”. Projects include testing of home self-monitoring for chronic disease management (<http://www.softcare-project.eu/>) and the development of a smart shoe intended to monitor risk of falls and improve activity (<http://tiny.cc/panesw>).
- The CASALA living laboratory located in Northern Ireland (<http://www.casala.ie/casala-living-lab.html>) has many ongoing projects related to smart home technology and creating outpatient living arrangements for the elderly.
- The Australian National eHealth Living Laboratory (NELL) is a “user-driven open innovation system based on a partnership between industry, citizens, health professionals and government.” It is focused on capturing innovation in bio- and biomedical informatics; medical devices; systems biology; and eHealth technologies.

### *Advantages of living labs*

Health care spending in Canada is rising faster than the rate of economic growth. This raises concerns about the sustainability of Canada’s publicly funded health systems. Health technology and new capital expenditures (e.g. construction, machinery, equipment, software for healthcare facilities) represent the fastest growing areas of spending. Innovation in health is not only new drugs or device technologies, but new service delivery models, information technology, care pathways, medical procedures, and administrative and management practices. Innovation should be viewed as something positive and valuable. Innovation is invention that is intended to improve health system sustainability while also improving health system quality, accessibility and productivity.

In the adoption of new pharmaceuticals, evaluations are done almost entirely before launch (*ex ante*) based on research data provided to regulatory authorities, often with limited available evidence on the effects in certain populations (e.g., the elderly, those with multiple conditions, or children). Reimbursement decisions for drugs are therefore based on *proposed* average effects, rather than taking into account *measured* effects and individual preferences.

For medical devices, data requirements for regulators are often insufficient for reimbursement decisions. Device manufacturers also rely more heavily on access and reimbursement as they require incremental approach to innovation, creating new and frequent generations of technology based on feedback from care providers and users. Rising costs and barriers to entry are risk factors for the current business development model for innovative devices and technologies.



Uncertainty about adoption decisions can lead to wasted health care resources. Because these health care resources could have been put to better use (either in health or in other sectors) with better information, societies must explicitly acknowledge the *value* of information in purchasing decisions. Information that is gathered after launch poses particular challenges; first, there are significant challenges in quickly operationalizing an evaluation (See Box 2) after adoption; second, it is generally acknowledged that eliminating a new product or service after launch poses significantly more challenges for decision makers than delaying adoption.

**Box 2: Differences between test-beds and living labs**

Living labs can be distinguished from test-beds or field evaluations and other ad hoc processes that seek to evaluate the impact of a technology after its launch. These *ex post* evaluations require extensive consultation, resolution of ownership and development of information resources and research protocols (Menon, McCabe, Stafinski, & Edlin, 2010). In a test-bed process, problem framing, methodologic approaches, and reporting are an academic exercise developed by scientists/technical developers and seeking patients or patient communities to evaluate.

Living labs, on the other hand, resolve ownership and governance issues up front, with technology developers and patients (end-users) collaboratively developing the design and conduct of assessments. This more nimble approach allows for earlier recognition of the value of innovation and recognition of disruptive or “game-changing” innovation; education, business and science communities need to coordinate and participate for this to occur (Christensen, Grossman & Hwang, 2008).

Living health labs reflect the principles outlined in the Institute of Medicine’s report on improving health care system performance through implementation of a “Learning Healthcare System” (Institute of Medicine, Olsen, Aisner & McGinnis, 2007). They provide opportunities to reflect and provide information to patients, providers and administrators in order to improve system performance.

## Alberta's Advantage

Alberta is strongly positioned to develop a living lab model. There already exist strong links between academic, government and business communities. Alberta Innovates already bridges economic development and research sectors. Notably, Alberta has:

- Campus Alberta – a single advanced education system;
- Alberta Innovates – a single research and innovation system; and
- Alberta Health Services – a single health system.

In addition, the governance of the Alberta system – a single payer and a single delivery system – allows for significant flexibility in payment and financing along with the needed political support for improving healthcare. Alberta is small enough that a living laboratory to capture innovation will lend itself to coordination and awareness across the system, yet large enough that the results of testing will not be considered “chance” findings.

Several initiatives recently developed in Alberta will also strengthen the development of a living lab. These include initiatives underway in research ethics harmonization and support for existing disease registries (e.g., Alberta Kidney Disease Network, Alberta Diabetes Surveillance System). Additionally, with the newly established strategic clinical networks (SCNs), there are new opportunities for developing health system priorities and outcome targets for upstream collaboration with technology developers.

## Who Needs to Be Engaged?

Living labs are intended to benefit all sectors. But key beneficiaries must be engaged to successfully implement a living lab:

### Patients and Providers

First and foremost, living labs are intended to foster user-centered innovation through end-user engagement. This means patients and the providers making decisions on their behalf must be fully engaged, so that they understand the need for a living lab and its benefits.

### Government

A living health lab uniquely bridges the health, research and economic development sectors and requires engagement across all sectors of government and the communities they serve.

### Industry

Access, time to access, and understanding health system priorities are important to industry partners. In addition, the needs of industry stakeholders vary widely, and the national and international consequences of a living health lab will also require consideration.

## **Research Community**

There are numerous and increasing approaches to involving users in the innovation process. There are also numerous design principles and international standards that speak to human-system interaction. These must be coupled with new epidemiologic approaches that form the basis of outcomes research, assessing value-for-money and the informatics and analytics that must inform them. The research community, including both university- and industry-based scientists, will play a key role in creating standards for evaluative approaches.

## **Data and Data Sharing**

A living health laboratory will rely first and foremost on data that can be readily used and analysed. It will also provide incentives for further development of datasets and information technology intended to capture patient experiences. It will also strengthen capacity in information technology research and development.

Alberta will need to consider whether the resources and methods required to acquire, store, retrieve, analyze and report information are sufficient for a living laboratory and what standards will be required to develop and maintain future information technology developments. There are opportunities to further leverage the Alberta Netcare Electronic Health Record system into other applications, such as public health and biobanking.

Recent advances in evaluative approaches that do not require anonymized data may facilitate data analysis without the ethico-legal implications of data sharing (Wolfson et al., 2010).

## **Concluding Remarks**

With a single health system and coordination of the research and commercialization sectors, Alberta is in a stronger position than ever before to capture innovation through the development of a living lab. Implementing a living laboratory will require a clear and consistent understanding of what it intends to achieve, how we might get there, and how we will know when we have successfully implemented the living lab. By creating an environment that captures the value that innovation has to offer, the living lab represents an opportunity to improve the health and wealth of Albertans.

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