CANARIE Users’ Forum 2013: Summary Report

Overview

CANARIE welcomed 93 members of Canada's research, education and innovation communities to its annual Users’ Forum, held on October 29, 2013.

The participants included:
- 33 from higher education
- 20 from the private sector
- 24 from digital infrastructure partners
- 16 CANARIE staff

Colin McKay, Head of Public Policy and Government Relations for Canada at Google, was the morning keynote speaker and provided the audience with insight as to how Google creates an innovative culture and information on some of the initiatives Google is working on.

Dr. Steve Liang from the University of Calgary was the afternoon keynote speaker, and explored the notion of “small science”: the collection and aggregation of many small data streams. He walked through the development of a map application that uses crowdsourced data to provide a richer collection of information to users of the application.

Following the keynote speakers, discussions focused on the evolution of higher education, the research and education network, digital infrastructure and Canada’s knowledge economy over the next ten years, and how CANARIE could spur and support that evolution.

Feedback from each of the discussion groups was focused on two questions: what would the future environment look like and what concrete steps could CANARIE take to prepare for that future?

These discussions were the kickoff to CANARIE’s broad community consultation in support of the development of its strategic plan for 2015 – 2020.

Summaries of these discussions follow.
Track 1: Higher Education

What will higher education look like in 2023?

- There will be hybrids of colleges/universities/collections of universities, offering – in-class study, MOOCs, co-op education and overseas study and driving a wider experience overall.
- Government’s role will evolve to push incentives for process efficiencies and institutional specialization, – driving better affordability.
- Greater focus on higher education, rather than higher learning.
- Context of learning / access will be different.
- Moving from a rote knowledge to usable knowledge
- We won’t be talking about accessing knowledge, but a critical evaluator: how to think. (this needs to start in K-12)
- Evolved balance point between structure and self-learning
- Post graduate studies will be similar to today, but early years of degree will change.
- The current system may not see many changes as it is still only 50 years old – not everyone has attended university.
- Institutions are at the limit now, close to the wall in scaling in their traditional model, due to delayed infrastructure upgrades
- Universities will be institutions that foster scholarly pursuits versus high-end vocational learning.
- Students will be enrolled in global university, rather than from 1 location, accessing a diverse collection of courses versus a program design).
- Funding: provincial governments will have complete responsibility for education. (Fiscally, their responsibility is weakening).
- Driver for distance learning is “that is what they expect” vs “it is cheaper to deliver”. Could it become more cost-focussed?
- Reason provincial funding is dropping is healthcare costs. No reason to see this improve by 2023. (The amount of money being collectively spent per student is rising).
- Real-time feedback on lecture streams, analytics between student and lecturer and Mining information available to do a better job.
- Access wherever and whenever is key.
- Universities get out of the Wi-Fi business toward eduroam. Potential to meld with the LTE network?
- Rural schools are funding their own last mile connection since it is cheaper than using the “regular” ISP. (CANARIE should not fund access to ISPs).
- Move to more modularized approach, across institutions – in class, online education– CANARIE and the ORANs enable that model
- University is still a research hub – “research is a contact sport” and people need to be together
  - Students still want the community experience of the university
• Ongoing industry involvement with research
• Demand for lifelong learning continues to increase – role for institutions to participate
• Number of citizen scientists will increase – students will have enhanced access to large science facilities
• A move toward student-centred education
• Melding between university and work experience
• Monetizing of education services leads to less small institutions, less specialized education.
• More blended learning models need more technical expertise, and application standards to interconnect (institutions are not prepared, need help)
• Further differentiation of institutions to serve diverse requirements

Side Questions Raised
• What will people want to learn? For jobs, for their own needs, or just-in-time access of information.
• Side issue: what is the network’s role in social cohesion? Does this lead to a much more individualistic society?
• Will you accept a future where Wikipedia is the only reference?
• Will there still be grades?
• What should be protected in the current environment model with new learning approaches and technology?
• Will universities be seen as accreditation institutions as opposed to teaching ones?
• Shift has been from provincial funding to tuition increases. Will companies start funding courses, or badges that the employer pays for?
• How many versions of Phy 100 are being delivered simultaneously across the country?
• A degree meant one could be counted upon to conform, as a reliable citizen. Is that still the intent?
• Whose responsibility is universal access in a province?
• Will more links be made available between institutions?
• Will we have more undergraduate institutions? Private institutions? Move away from brick and mortar opens up other players. Private, for-profit versus not-for-profit. As funding decreases there is a pull towards private (as tuition increases). What is CANARIE’s role in this?
• In 10 years are things fundamentally different?

How can CANARIE prepare for the future of higher education?

• CANARIE/NREN options:
  - 1) retraction to research network
  - 2) expand to a serious provider of research services
• Future of CANARIE cannot be viewed in isolation; ecosystem is large. Collaborative model should win over other models.
• Funding for local development in addition to backbone?
• With provinces owning education, ability for CANARIE to influence this is limited, unless really innovative.
• Provinces will have control over their regional networks. Distributed learning will mean CANARIE must be a more active part in the eLearning process.
• Canadian institutions building International campuses – could connect through CANARIE and use CAF to engage with students
• Interprovincial institutional collaborations need NREN to collaborate
• Research middleware could be used to support multidisciplinary research
• CANARIE could fund cross-disciplinary research the way NSF does in the US or press the granting councils to fund cross-functional research
• Is there a set of common tools that allow for local specialization (i.e. security services, CAF) that CANARIE can deliver?
• Need clear messages from CANARIE as to what the opportunities are and what the cost per unit of these services are, i.e. a service catalogue
• Institutional IT teams are facilitators, not barriers
• Back-office functions bundled and offered
• Research commercialization – CANARIE could focus on ICT research to drive that sector forward
• Get rid of series of mandates
• Strengthen the NREN, continue on research and more on education involvement.
• Canadian learning network. (Not a technical challenge).
  - Student/user centric network which leverages access.
  - Our moonshot.
  - NREN is the Saturn V
    ▪ Stronger relationship between CANARIE and ORANs
    ▪ Don’t let funding model be an impediment
• Change in attitude, policy to make it happen
• CANARIE to expand its relationship with industry
• Increase CANARIE's role in supporting education (in addition to its support for research)
• CANARIE could host a national learning objects repository
• Open up CANARIE network to enable citizens to contribute citizen science data and engage with scientific data
• CANARIE could develop a directory/catalog/marketplace of researchers and research data- facilitating access to a wide range of research data
• NREN must reach the student
  o Make interactivity available between education stakeholders anytime
• Localize/nationalize Net+ (or even figure out general joint procurement)
• Joint procure network equipment for the NREN
Track 2: Digital Infrastructure

What WILL CANADA’S DIGITAL Infrastructure look like in 2023?

- Mobility: what’s after LTE?
- Wireless is the extension of the fibre network
- Global thinking - needs to look like a GREN
- Internet everywhere & nomadic researchers
- Devices talk to each other
- Ubiquitous access to services. Virtualization.
- Evolution from DI "just works" to DI is a commodity
- Greater concentration of compute, storage, & services
- Network usage will accelerate, leading to unlimited capacity - needs and economically based not equity
- Global host of research compute and data
- CANARIE continues to level the playing field - providing services
- What does CANARIE look like? Vehicle for input of info?
- Ubiquitous network access where infrastructure performance is not a constraint
  - Decoupling of devices and network
  - Authentication and access on demand
- Users, devices and applications choose infrastructure on demand
- Infrastructure is open and application-specific
- Green infrastructure
- Move computing power to data rather than moving data to computing infrastructure
  - Data is self-identifying
  - Devices are all thin-clients
- Digital infrastructure should inform/push government policy
  - Data repurposing is not inhibited by legal restrictions
- Software is contextually aware and anticipates our needs
  - Agents to look through and sift data for researches
- Should policy be linked with digital infrastructure?
- Integrated to the user
- Active access & proper data preservation and curation
- Available for any user
- Expand the user base
- Federated access
- Security protocols
- Meta data ease of use & applicable to both small and large data
- Data modelling with the standardization that is required
- Community has expanded
- Ubiquitous wireless access
• Dramatically different than commercial suppliers: fully seamless and integrated
• Ubiquitous - will not require presence at an institution, will not be institution bound
• Pervasive and seamless - access to "everything"
• Smart - goes beyond reaching out and collecting - includes analytics
• Personal - meets the needs of individuals, organizations, groups, etc. multipurpose
• Significantly supported by human skill - there will people there to aid in its use at every point
• Consistent and predictable funding
• Goal = increase productivity of researchers leading to greater innovation and effectiveness within society to the greater good of Canadians
• Invisible, omnipresent - has to be a given (similar to electricity), available to everyone
• Standards-based interoperability - easy to access, use, exploit
• Using metaphors to describe DI in 2023
  o Similar to traditional currency, the DI infrastructure allows the free movement of data
  o Continues to be a nation building asset but built with international standards

HOW CAN CANARIE PREPARE FOR THE FUTURE OF CANADA’S DIGITAL INFRASTRUCTURE FOR RESEARCH, EDUCATION AND INNOVATION?

• Create a ubiquitous, open access network
• Drive from a mindset of scarcity to one of abundance
• Make services basis of competition, not infrastructure (infrastructure is public)
• Advocating for policy changes to enable repurposing of rich data
• Advocate open by default option to close (privacy on ALL data)
• Build a model application of how distributing data and computing might work
• Perhaps CANARIE will want to broaden out the customer base to industry as well
• If CANARIE no longer needs to prime the researchers, then...
• In 2023 Research & Education will be even more important
• Role for CANARIE in providing leadership to transform content delivery to support education
• CANARIE remains as the vehicle that invests in & supports R&E
• CANARIE infrastructure becomes global rather than national
• CANARIE will be deploying services nationally
• CANARIE develops new/additional partnerships – Google, Amazon. (e.g. infrastructure & services) commercial providers and content providers
• CANARIE must maintain & continue Federal presence (fundamental) and pan-Canadian perspective.
• Maintain agility and flexibility.
• In conjunction with its partners, make the east/west link a reality
• CANARIE will ensure network is always there and continues to meet the needs of the community
• Support federal government policy development
• Continue to participate, promote and nurture the collaboration among the various stakeholders, partners, participants, etc.
• Continue to advance the creation of the middleware layer of DI
• Exploit national infrastructure, develop tools to support generic functions of research data management
• Develop or fund standards for data management
• Develop or fund management layer above the infrastructure
• Leadership role
• Investment strategy to reach desired state and achieve sustainability
• Evolution of NEP / RPI
Track 3: Network

WHAT DOES CANADA’S RESEARCH AND EDUCATION NETWORK LOOK LIKE IN 2023?

• Ubiquitous, unconstrained network access anywhere
• Implications for support of research tools on mobile devices
• Shared services infrastructure for research and education across Canada
• Need for an integrated national vision for IT infrastructure – network, HPC, storage, tools
• Bold objective – extend shared IT services available to all Canadians –using the infrastructure to address major economic, health, social issues
• Software-defined network, transparent, ubiquitous, quick, simple, integrated.
• Canada should be in a leadership position!

How can CANARIE prepare for the future of research and education networking?

• Barrier: The vision is there but the challenge is people and vested jurisdictional/institutional demands
• Need to solve the dichotomy between long term vision and short term funding models at the political level – Industry Canada leadership
• Pre-requisite for CANARIE, ORANs, Compute Canada to collaborate, develop a shared vision, investment priorities and implementation model
• Present a unified position to stakeholders (funders, users)
• Funds are available to enable the investment required but need to overcome the challenges
• New processors & architectures (e.g. neural chips): will require new network architecture to have devices using these processors communicate?
• Keep doing what we do: the current 10G network will need to be a TB network
• Integrate compute, network, storage
• Need to change the governance structure
  o Improve provincial boundaries, service integration/delivery/management could be better. Could have common service management despite provincial entities.
• Provide world-class networking in the North
  o Focus on priority should be K-12 and PSE in the North. Making sure that the education component is well deserved
Track 4: Knowledge Economy

WHAT WILL CANADA’S KNOWLEDGE Economy look like in 2023?

• Canada will need to invest adequately in the three basic pillars of success in the knowledge economy: (1) education (2) infrastructure and (3) innovation
• A regime of “open innovation”: create a bridge to take raw data into information/knowledge
• Seamless collaboration through machines that are at least 100X more powerful than today
• Universities have made interdisciplinary projects a priority
• Ultimately, future is about enabling people-to-people connections and lowering barriers to collaboration and innovate together
• Canada has built strong linkages to emerging markets
• Digital infrastructure is viewed as public infrastructure for public good
• Citizens have access to data anytime, anyplace
• Globally connected
• Canada is primarily an advanced services economy
• Manufacturing is highly specialized and disaggregated

HOW CAN CANARIE CONTRIBUTE TO THE EVOLUTION AND DEVELOPMENT OF CANADA’S knowledge economy?

• CANARIE should be the medium that allows institutions to make their knowledge available to Canadians (and not just the research community)
• Support development of tools (above and beyond middleware) to transform raw data into knowledge
• Be the nexus between academia, private sector, and government
• Facilitate discovery of knowledge (i.e. introduce a national directory of data repositories, etc.)
• Help institutions develop more uniform security and privacy policies
• Launch a “CANARIE KickStarter” for Canadian projects
• Advocate for Open Data and Open Access
• Increased support for leading-edge industries such as advanced robotics and 3-D printing
• Facilitate creation of a global metadata for data referencing
• Increase awareness of CANARIE and the crucial role it plays in the creation of a knowledge economy
• Expand CANARIE’s user base – for example, connect all business incubators
• Work more collaboratively with other stakeholders for expand infrastructure and to develop policy positions
• Provide funding to increase data storage capacity