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Strengthening Research Through Scientific Platforms: Highlights from the 5th Canadian Network of Scientific Platforms (CNSP) Conference

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ABSTRACT

The most recent national [Canadian Network for Scientific Platforms \(CNSP\)](#) Scientific Platform Meeting was held from November 20 to 22, 2023, at the [Montreal Neurological Institute](#), “The Neuro,” affiliated with McGill University. This conference, attended by 114 representatives from 44 scientific platforms, was structured around three themes. Day 1 focused on open science, emphasizing transparency and the free sharing of scientific discoveries to enhance research efficiency. Discussions included panel talks on initiatives and resources related to open science and featured award presentations for 2023 CNSP National Platform Scientist Award winners for both the Platform Administrator Award and Platform Scientist Award. The day concluded with a conference dinner. Day 2 highlighted the critical role of scientific platforms in advancing research by providing essential infrastructure and expertise by hearing about different successful national and international networks. This day featured a poster session and a networking reception. Day 3 offered a professional development workshop and tours of McGill University’s leading scientific platforms, showcasing the expertise within the scientific platform community.

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DAY ONE: SCIENTIFIC PLATFORMS AS A ROAD TO OPEN SCIENCE

Link to watch and listen: [SPM 2023: Day one on YouTube](#)

Welcome remarks

Canadian Network for Scientific Platforms (CNSP) President Claire Brown kicked off Scientific Platform Meeting (SPM) 2023 by welcoming its members to The Neuro for the first in-person SPM conference since 2018. Brown reflected on the changes in science in Canada since the pandemic and the opportunities that lay ahead for the growing importance and role that scientific platforms play in advancing Canadian research.

What is an open science institute?

Gabriel Pelletier, the open science alliance officer at the [Tanenbaum Open Science Institute](#) (TOSI) and The Neuro, discussed the concept of open science: why adopt open science principles as an institute and how to put them into practice. Pelletier further discussed TOSI’s Alliance of Open Science Institutes. This alliance fosters neuroscience research institutes in sharing resources like patient samples, best practices, training, and research

results. They explained how institutes can join the network to benefit from shared knowledge, funding opportunities, partnerships, and support frameworks. Pelletier emphasized the potential for a network of research institutes committed to open science in facilitating collaborations and accelerating discoveries in life sciences.

Open science and drug discovery

Thomas Durcan, director of the [Early Drug Discovery Unit \(EDDU\)](#) at The Neuro, uses patient-derived stem cells to create functional neurons for developing discovery assays and three-dimensional organoid models. These models are used for personalized medicine, aimed at diagnosing and treating neurological disorders. The EDDU's team of 30-plus researchers focuses on applying novel stem cell technologies, including gene editing and organoid models, to understand complex neurodegenerative and neurodevelopmental disorders. As part of The Neuro's open science platform, the EDDU collaborates with other institutes and industries by sharing resources like their biobank of induced pluripotent stem cells and offering training. Their goal is to develop long-term strategies for accelerating new therapies.

Utilizing the Open Science Framework for reproducibility: A case study

Nadja Oertelt, strategic partnerships manager at the [Center for Open Science \(COS\)](#), shared insights into COS's mission and operations. COS, a non-profit organization founded over 10 years ago, aims to promote open research practices that democratize access to research, include various stakeholders, and improve research integrity. Oertelt acts as a liaison between different groups like consortiums, librarians, and policy makers, helping them engage with COS. COS has three main products: (1) research software tools, (2) community action and culture change education, and (3) metascience and research tools to evaluate reproducibility and improve research efficiency. Oertelt does a live tutorial of Open Science Framework, a free online platform designed to enhance research transparency and sharing. Open Science Framework helps researchers plan, collect, analyze, and share their work with customizable features.

Panel discussion on open science and scientific platforms

Moderated by Marie-Eve Paquet (CNSP Central Canada representative), Drs. Pelletier, Durcan, and Oertelt explored the tangible benefits and challenges of open science. They emphasized the significance of metrics such as the growth in open science institutes, data sharing, and open access publications to track the movement's impact. The Neuro plans to use these metrics for benchmarking against larger institutions, suggesting that open science principles have bolstered recruitment of highly qualified personnel. The discussion also tackled the cultural shift needed in academia's "publish or perish" mindset, advocating for greater support of open-access outputs, with mentions of some funding bodies aiding early career investigators. The panel highlighted a trend in which private US funding agencies mandate open-access outputs, potentially shaping future public funding policies in Canada. Additionally, the complexities of managing open science institutions were addressed, noting the requisite substantial initial investments and the iterative process of

refining administrative structures. Lastly, the integration of open science with artificial intelligence was discussed, particularly the need to balance data accessibility with security, anticipating regulatory shifts for sensitive data akin to patient information management.

YCharOS: Antibody characterization through open science

Carl Laflamme, an academic associate at The Neuro and the Structural Genomics Consortium, introduced [YCharOS](#), a Canadian open science platform aimed at characterizing commercially available antibodies for every human protein. Laflamme addresses the antibody “reliability crisis” and explained that antibodies are crucial for medical research, but 40% to 60% do not perform as intended, leading to incorrect scientific conclusions and wasted research funding, estimated at two billion dollars annually, because of poor quality control. YCharOS collaborates with pharmaceutical companies and neuroscience partners to nominate antibodies for study. The platform works with commercial antibody companies to test antibodies for various applications. Characterization results are consolidated into reports and published. Laflamme emphasized the importance of ensuring stringent quality control before commercialization. YCharOS is part of the Structural Genomics Consortium, an open science initiative focused on generating high-quality protein reagents, with each group specializing in areas like protein structure, drug discovery, and antibody development.

Image informatics training and education: Canadian resources and the BioImaging North America Automated Image Management and Metadata Annotation user group

Judith Lacoste, founding president of [MIA Cellavie Inc.](#), highlighted the Automated Image Management and Metadata Annotation group’s commitment to fostering automated, open, and reproducible science in alignment with [BioImaging North America](#) and Quality Assessment and Reproducibility for Instruments and Images in Light Microscopy standards. She stressed the importance of FAIR science—findable, accessible, interoperable, and reusable—and noted that Canadian institutions must develop consistent research data management (RDM) strategies. These strategies should be implemented throughout the research ecosystem both before and after publication to ensure that research data is well preserved, is reproducible, and meets national standards. Lacoste emphasized that the current variability in RDM practices between institutions needs improvement for better, more efficient data management across the country. She discussed the Recommended Metadata for Biological Images process, which provides a framework for managing microscopy data and ensuring FAIR practices. Lacoste also showcased Canada’s efforts to improve national RDM through the [Digital Research Alliance of Canada](#), which offers resources for data storage, research computing, and software development. She concluded by mentioning that the cloud-based image data management platform OMERO has now been implemented on a national platform with Canada BioImaging using Digital Research Alliance of Canada resources to facilitate data sharing and infrastructure access.

Open systems neuroscience

Adrien Peyrache, associate professor at The Neuro, shared his journey into open science, starting with a traditional neuroscience laboratory that faced challenges in storing and sharing complex neural data. His research focuses on how neurons communicate to form memories, and to this end, his laboratory must tackle highly complex data. Taking inspiration from the astronomy tool FITS (Flexible Image Transport System), his group has been involved in the creation, development, and adoption of a common format called Neurodata Without Borders (denoted as format .nwb). This format enabled the breakdown of data into different modalities and made it compatible with common data recording software. In 2022, Peyrache's team launched [Pynapple \(Python neural analysis package\)](#), a lightweight toolbox for handling physiological and behavioral data using the .nwb format. Pynapple employs object-oriented programming to package data into smaller components, simplifying data analysis and making it possible to easily share analytical scripts and make them reusable and flexible. Peyrache demonstrated how Pynapple works with his own data and outlined future expansions including collaborative libraries (Pynacollada), data visualization (Pynception), logging management (Pynalog), and parallel computing (Pynapples-on-fire).

CNSP National Scientist Award (2023): Platform Administrator Award

Brooke Ring, manager of operations and facilities at the [Queen's CardioPulmonary Unit \(QCPU\)](#) at Queen's University, discussed her background and experience managing the QCPU core facility. The QCPU offers unique translational medicine services, bridging research from bench to bedside. The facility is divided into two parts: a clinical site at Kingston Health Science Centre, offering echocardiology and pulmonary function testing, and a state-of-the-art research facility providing next-generation sequencing, microscopy, flow cytometry, cell culture, histology, and advanced imaging technologies.

CNSP National Scientist Award (2023): Platform Scientist Award

Nhu Trieu, an electron/confocal microscopist from the [Microscopy and Microanalysis Facility](#) at the University of New Brunswick, emphasized the importance of being a generalist in science, highlighting the longevity and success of her platform. Despite using aging equipment, including electron and light microscopes acquired 30 to 40 years ago, the facility continues to serve the university and global collaborators. Trieu credits its sustainability to the dedication and resourcefulness of its founders and research staff, who have maintained the platform's relevance through technical skills, flexibility, and passion.

DAY TWO: ACCELERATING SCIENCE THROUGH SCIENTIFIC PLATFORMS

Link to watch and listen: [SPM 2023: Day two on YouTube](#)

Keynote lecture: Institutionally supported scientific platform and career path

The keynote lecture was supported by the University of Laval CERVO and the Azrieli foundation. Renee Whan, head of the Biomedical Imaging Facility and Executive Director of the [Mark Wainwright Analytical Centre \(MWAC\)](#) at the University of New South Wales, Sydney, discussed the importance of institutionally supported centers in accelerating research. At the University of New South Wales, all research infrastructure is centralized within MWAC, spanning six locations and supporting the entire university. The center houses over 300 instruments worth 120 million Australian dollars (AUD) and employs 120 staff members. It operates 23 core units, with the university providing 17 million AUD annually to maintain operations. MWAC also generates around eight to nine million AUD from cost-recovery fees and research grants. With 2,500 researchers using the facilities, the center produces about 1,500 publications annually.

Whan shared the strategic planning behind MWAC's success, starting from its establishment in 2007. A key initiative was the introduction of internal infrastructure and network facilities grants, allowing any researcher to apply for funding to establish "expertise focused" cores. The center also created a structured promotion pathway for staff scientists, offering bonuses for additional responsibilities. The cost recovery model varies across centers, including hourly rates, block rates, and subscription models. Whan highlighted their custom-designed booking system, which manages everything from sample submissions to linking with staff scientists' electronic laboratory books, enhancing the center's operational efficiency and future capacity planning.

In the final part of her presentation, Whan highlighted three key facilities under MWAC: the Solid State & Elemental Analysis Unit, the Electron Microscopy Core, and the Light Microscopy Core. She also addressed the future challenges MWAC faces, including the management of facility growth, ensuring adequate staff support for both short- and long-term projects, improving staff retention, and increasing industry partnerships. Additionally, she outlined MWAC's equipment replacement process, retiring four instruments annually, and securing 7 million AUD per year for five years to replace aging infrastructure.

Platform science for brain research: A national strategy's key to success

Jennie Z. Young, Executive Director of the [Canadian Brain Research Strategy \(CBRS\)](#), discussed Canada's fragmented approach to brain research, highlighting the absence of a unified strategic plan. The CBRS aims to consolidate patient advocacy groups, charities, professional groups, government initiatives, and industry partnerships to advocate for a national brain and mental health initiative. Despite Canada's progress in fields like artificial intelligence and quantum computing, it lags in brain research funding and strategy compared to other countries. The CBRS proposes leveraging Canada's strengths—such as open science, diversity, neuroethics, and brain-artificial intelligence interfaces—while emphasizing the role of platforms in providing equitable access, sharing expertise, and optimizing funding. The strategy aims to shift from project-specific

funding to building a comprehensive research ecosystem. The next steps involve creating a national strategy blueprint and engaging the government.

Leveraging short-term support for long-term strategy

Krystle Van Hoof, managing director and CEO of the [Healthy Brain, Healthy Lives program](#) at McGill University, described leveraging short-term support for a long-term strategic vision to make McGill a global neuroinformatics center by 2026. Funded by the Canada First Research Excellence Fund, Healthy Brain, Healthy Lives' main focus is on capacity development, establishing nine core facilities with continual evaluation on international collaboration, talent retention, and research excellence. Initiatives such as sustainability workshops and business support aim to enhance operational viability by transitioning to fee-for-service models, extending operating hours for broader access, and optimizing fee structures. Despite these measures, there's an ongoing need for increased financial support, better industry connections, and effective advocacy for fair wages and funding, highlighting the necessity of a flexible management approach that promotes resource and expertise sharing for sustainable growth.

University Health Network research and innovation cores: Modus operandi

Luke Brzozowski, Executive Director of the [Translational Research and Core Facilities at University Health Network \(UHN\)](#) in Toronto, oversees Canada's largest network of core research facilities, boasting substantial resources that includes over 300 personnel and \$50 million in funding. UHN integrates 21 core facilities as independent business units under a department called UHN Research and Innovation Cores, a unique setup that allows each to operate autonomously yet cohesively and synergistically. These cores, managed by staff scientists rather than principal investigators, handle their own budgets and governance, with a scientific advisory board for each. Financially, the majority of their funding comes from internal users, supplemented by external academic and industry contributions, achieving a significant recovery of operational costs through a dual financial model. This model supports extensive services like sequencing and imaging and fosters significant industry collaborations, positioning the cores as central to a cultural shift in research infrastructure management.

Panel discussion: Accelerating science through scientific platforms

Moderated by Marie-Eve Paquet, this panel discussion focused on the strategies and challenges of managing core facilities in research institutions. Luke Brzozowski detailed the role of core facilities in enhancing research quality at UHN, emphasizing the importance of a "heavy resume" and geographical benefits in CFI applications and the strategic involvement of core facility managers in equipment decisions. The panel also debated the benchmarks for sustainability in core facilities, agreeing that it varies but generally involves breaking even financially. The importance of centralizing resources to subsidize less profitable cores was highlighted, with profitable cores retaining a significant portion of their revenue to encourage growth and sustainability. On the topic of business acumen, the panelists discussed the need for external business

management support versus cultivating business skills within scientists, with opinions varying on the best approach to merging scientific and business practices for effective core facility management. The discussion also covered strategies for core facility profitability and the importance of training and collaboration with corporate partners to ensure efficient operation and maintenance of core facilities.

Plenary talk: Canadian Science Policy Centre

Mehrdad Hariri, president of the [Canadian Science Policy Centre \(CSPC\)](#), discussed the role and impact of the CSPC since its establishment in 2009. As a non-partisan, non-profit organization, CSPC aims to bridge the gap between science and policy, fostering a community that supports Canadian innovation and well-being. The organization emphasizes inclusive engagement, convening a diverse network of stakeholders, including a significant contribution from volunteers and science policy trainees. This network has been pivotal in organizing events like the annual conference and initiatives such as “Science Meets Parliament,” in which young researchers engage directly with policymakers.

In his talk, Hariri highlighted the historical disconnect between research institutions and policymakers in Canada, which the CSPC aims to mend. The decentralized nature of Canadian governance has led to significant policy disparities across regions, creating challenges that CSPC addresses by leveling the playing field for all science stakeholders. Hariri also pointed out the self-sustaining funding model of the CSPC, avoiding potential conflicts of interest by eschewing government funds, which has allowed for independent operation and growth.

Hariri also provided a critical overview of Canada’s current standing in global research and development (R&D), indicating a lag behind the Organisation for Economic Co-operation and Development (OECD) average, with R&D investments at only 1.54% of gross domestic product compared to the OECD’s average of 2.47%. Despite this, there are signs of progress in areas such as multidisciplinary research and policy coordination. The broader implications of these shortcomings are profound, with potential impacts on Canada’s economic diversification and international standing in key research areas. Hariri stressed the urgency of matching the OECD average in R&D investment to bolster Canada’s research output and influence in global science and technology.

Infrastructures for Research and Development Network: Quebec portal to cutting-edge infrastructures in advanced materials

Sébastien Garbarino from [PRIMA Quebec](#) discussed the role of the [Infrastructures for Research and Development Network](#) in supporting Quebec’s material sciences sector. PRIMA Quebec, a non-profit hub, enhances research and innovation across three categorized sectors: basic materials, finished and semi-finished products, and process and instrumentation, aimed at funding collaborative research projects involving industrial partners. Since 2015, PRIMA Quebec has facilitated over 181 projects with a combined funding of \$47.5 million, collaborating with more than 250 industry partners and academic institutes, which has led to the

creation of 97 pieces of intellectual property, 402 publications, and the training of 789 highly qualified personnel. The Infrastructures for Research and Development Network under PRIMA Québec notably supports the material sciences ecosystem by matching industry partners with academic facilities and expertise, promoting high-quality science and sustainability to both the industrial and academic R&D community.

Building the Canadian deep tech ecosystem

Marie D'Iorio, president of [Deep Tech Canada](#), outlined the transformative potential of “deep tech”—a challenge-focused approach that leverages advanced technologies to address global issues, create new markets, and disrupt existing ones. Projected to impact various sectors by \$3.73 billion by 2032, deep tech aims for efficiency by directly solving specific problems rather than navigating competitive and traditional funding. Deep Tech Canada's strategy is to establish Canada as a leader in this area through collaborative innovation, emphasizing the development of a competitive, adaptable ecosystem. D'Iorio's strategy involves enhancing Canada's global competitiveness, fostering cross-disciplinary training, catalyzing impactful projects, and expediting the commercialization of emerging technologies. She stressed the importance of building long-term connections that lead to economic success and shared how their approach includes strategic planning, technology scouting, and organizing challenge-based workshops and networking events, all contributing to a culture of innovation driven by community and patience.

Creating a vibrant and sustainable semiconductor industry in Canada

Gordon Harling, president and CEO of [CMC Microsystems](#), introduced his organization, founded in 1984, as a pivotal provider in advanced technologies such as microelectronics, photonics, and quantum technologies. CMC offers a broad spectrum of services classified into CAD, FAB, and LAB, which facilitate simplified access and cost reductions for academia and industry, supporting over 10,000 partners across 68 institutions and fostering 12 start-ups in 2023 alone. Their Virtual Incubator Environment is crucial for start-ups needing access to high-level software and equipment, enabling the creation of 483 prototypes in 2023. Highlighting the strategic role of Canada's semiconductor sector and exciting developments like a Canada–US semiconductor corridor, Harling underscores CMC's integral role in advancing Canada's technology landscape globally.

Panel discussion: Partnership with industry

During a panel moderated by Derek Oliver (CNSP secretary), Drs. Sébastien Garbarino, Marie D'Iorio, and Gordon Harling discussed the unexpected challenges their networks faced as they grew. Harling noted the rapid pace of technological advancement in the semiconductor industry, while D'Iorio highlighted political obstacles that impede growth, especially the reluctance of provinces to invest in national solutions. The panel shifted to discuss government funding disparities for education levels, with Harling and D'Iorio suggesting industry involvement to introduce technology to students earlier. Garbarino mentioned preliminary discussions about expanding Prima Quebec to pair industry with institutional core facilities. They also shared funding strategies for network creation, with Harling recommending the exploration of new business opportunities and D'Iorio

emphasizing the need for a solid financial model. Finally, they addressed the integration of social sciences in deep tech, noting that incorporating diverse perspectives in discussions could mitigate concerns surrounding technology, such as those related to artificial intelligence advancements.

DAY THREE: PROFESSIONAL DEVELOPMENT WORKSHOP

Link to watch and listen: [SPM 2023: Day three on YouTube](#)

Power skills in academic environments

Pierre-Jean Alarco, knowledge mobilization and community engagement officer at Polytechnique Montreal, led a three-hour workshop focused on professional development within academic environments, emphasizing the importance of “power skills”—a term he uses to describe essential non-technical skills traditionally referred to as soft skills. Drawing from research conducted by the European University College Association, Alarco identified critical skills for success in scientific fields, including problem-solving, collaboration, and communication, among others. He presented a 2021 study that identified six key power skills for research teams: communication, leadership, resiliency and adaptability, professionalism and integrity, collaboration and promotion, and problem solving. The workshop included group activities that allowed participants to apply these skills to real-life scenarios, fostering discussion on potential solutions.

In the second part of the workshop, Alarco introduced the Polytechnique Montreal–led Natural Sciences and Engineering Research Council Collaborative Research and Training Experience grant initiative, [OPSIDIAN](#), which aims to equip trainees with essential power skills through interdisciplinary and diverse training programs. The program focuses on skill acquisition and application in authentic situations, promoting an understanding of how skills evolve over time. Participants engaged in a case study regarding the construction of a nuclear storage site at Chalk River, debating the merits and drawbacks of the project in small groups. This exercise not only highlighted the application of power skills but also demonstrated the importance of collaboration and communication in arriving at consensus, with all groups ultimately reaching similar conclusions despite their varied perspectives.

Closing remarks

CNSP President Claire Brown wrapped up SPM 2023 by outlining several key initiatives for CNSP in 2024, including planning the next SPM, hosting regional events, and continuing advocacy for scientific platforms and platform scientists at a national level. She also mentioned the development of the 2025–2030 CNSP strategic plan. Brown expressed her gratitude to the CNSP executive members for their hard work in organizing the conference and extended special thanks to the events and logistics coordination teams from The Neuro and Curly Dog Communications for their contributions to the successful execution of the event.

SCIENTIFIC PLATFORM TOURS

Several scientific platforms at McGill University were showcased by guided tours for small groups of CNSP members. One group toured chemistry and material structure sciences platforms at the Downtown Campus including (1) [The Facility for Electron Microscopy Research](#), (2) [McGill Nanotools Microfab](#), (3) [McGill Institute for Advances Materials](#), and (4) the [McGill Chemistry Characterization Facility](#). The second group toured life sciences platforms within the Bellini Life Sciences Complex that included the (1) [Advanced BioImaging Facility](#), (2) [Metabolomics Innovation Resource](#), (3) [Single Cell Imaging and Mass Cytometry Analysis Platform](#), and (4) [Flow Cytometry Core Facility](#).

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Figure 1

CNSP Scientific Platform Meeting attendees in the lobby of the Neurological Institute “The Neuro” in Montreal, Quebec, Canada. A total of 114 attendees represent 44 scientific platforms across Canada.