2025/02/03

SEF Meeting: Executive Director's Update

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Executive Director | SNOLAB

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Land Acknowledgement

SNOLAB is located on the traditional territory of the Robinson-Huron Treaty of 1850, shared by the Indigenous people o f the surrounding Atikameksheng Anishnawbek First Nation as part of the larger Anishinabek Nation. We acknowledge those who came before us and honour those who are the caretakers of the land and the waters.

Notable SNOLAB Visitors

Minister Nolan Quinn and

MPP Bill Rosenberg recently visited SNOLAB

Reaching New Heights, Deep Underground

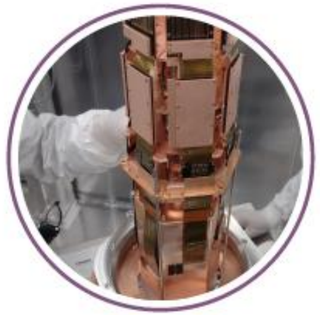
2023–2029 Strategic Plan

SNOLAB

Three core pillars drive our Strategic Plan.

Excellent Science

GOAL: Drive breakthrough discoveries at the frontiers of underground science



Cutting-Edge Infrastructure

GOAL: Continuously improve our research infrastructure to remain state of the art

Skilled People

GOAL: To foster and develop diverse talent in an inclusive environment

Our core values underpin our vision and goals.

Safety | Excellence | Teamwork | Accountability | Diversity

SNOLAB

1

Excellent science

Drive breakthrough discoveries at the frontiers of underground science.

Expected outcomes:

- Cementing of Canada's leadership in deep underground science
- A stronger, more competitive Canada in scientific discovery
- More Canadian researchers positioned as global leaders

3rd International Summit on Future 0νββ Decay Experiments

- Held in Heidelberg, Germany @ Max Planck Institute May 26-27.
- Strong Canadian presence: ISED, CFI, NSERC, SNOLAB, nEXO2.0

Readout from 3rd International Summit on Future 0νββ Decay Experiments

Statement from first JOG meeting (1)

The international funding agencies and laboratory directors who attended the 3rd International Summit on Double Beta Decay (the stakeholders) re-affirmed that the science of neutrino-less double-beta decay remains one of the most compelling and important in contemporary physics. The summit meeting summarised the state of the field, including recent developments in different technologies. The stakeholders congratulate the double-beta community for the substantial progress made since the last summit meeting, in a resource restricted environment.

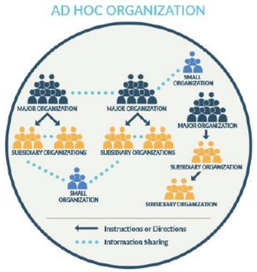
The stakeholders recognise that the best chance for an unambiguous discovery is an international campaign with multiple isotopes and more than one large tonne-scale experiment implemented in the next decade. Following the 2nd International Summit, a Working Group was struck and charged with exploring possible governance structures to support this objective. The Working Group reported back at this meeting, with a recommendation for a ‘hybrid’ governance structure to retain flexibility, agility and a forum for maximising impact of available funding.

Statement from first JOG meeting (2)

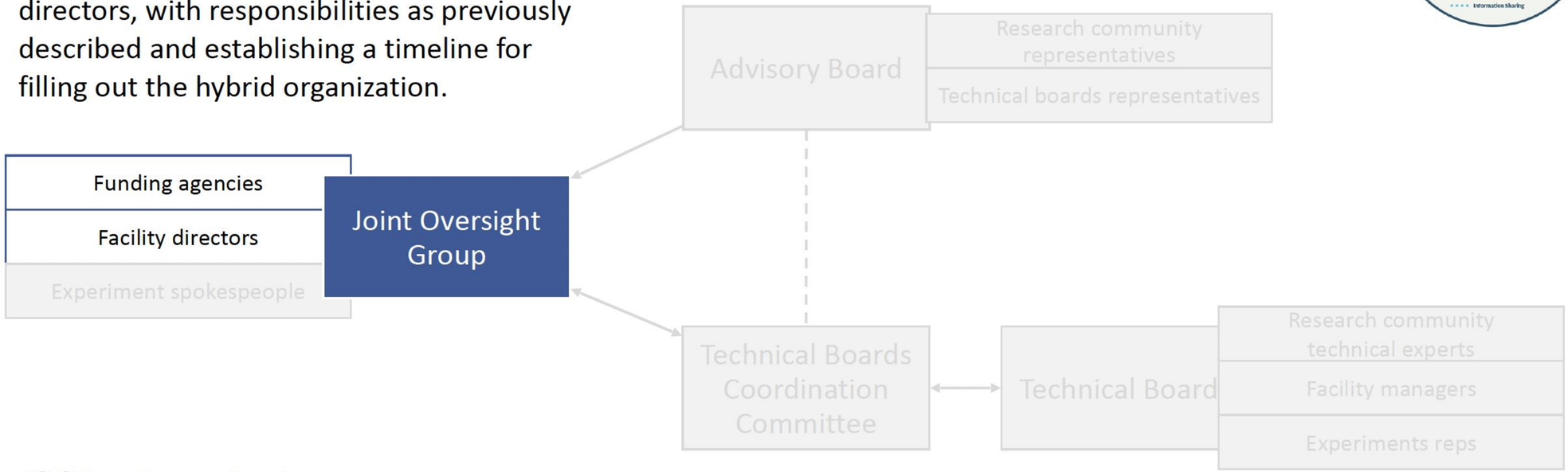
The stakeholders endorse the recommendation of the Working Group, whilst recognising the change in funding environment since the previous summit. It was agreed that the intention is to phase the development of the hybrid governance model. Phase-I is the formation of an initial Joint Oversight Group comprised of interested funding agency representatives and facility directors to ensure a forum for communication and discussion, and, if applicable, coordination by the funding agencies, for deployment of tonne-scale detectors in North America and Europe.

The 3rd Summit meeting closed session on Day 2 was viewed as the initial JOG kick-off meeting where the funding agencies and laboratory directors met under the umbrella of the JOG to discuss the terms of reference and operational mode.

Joint Oversight Group - Phase 1



Initially, the JOG would be the primary forum for convening funders and facility directors, with responsibilities as previously described and establishing a timeline for filling out the hybrid organization.



JOG has been struck
Nigel Smith has been appointed as interim chair
Expanded Working Group will carry forward governance structure within six months
Interested agencies should connect the JOG through the interim chair

Objective 1: Increase the understanding of the particles and forces that shape the universe.

Strategic plan calls for the integrations of next generation tonne-scale 0νββ decay and/or a third-generation dark matter experiment into the SNOLAB life-cycle process.

- SNOLAB continues to support nEXO 2.0 at the level of 1 FTE, a project manager to assist in scoping the cost and personnel required to transition the experiment to Canadian leadership. SNOLAB is working with the collaboration, various funding agencies, and ISED to understand a path forward.
- SNOLAB has joined the international 0νββ JOG that was initiated at the summit.
- SNOLAB continues to develop its relationship with the XLZD collaboration. We sent a project manager and project engineer to the XLZD July collaboration meeting to assist in technical discussions of the SNOLAB site. XLZD has submitted an LOI to SNOLAB for a project to produce a conceptual design of the XLZD detector in SNOLAB.

Planning for the Future

CFI requests SNOLAB to produce a 15-Year Operations and Maintenance Plan

- Three budget scenarios by September 15, 2025.
    1. Maintaining current levels of operation
    2. Fully supporting the needs of the Canadian research community
    3. Increasing global competitiveness.
- Engagement with SNOLAB staff (Dec and Jan).
- Roth consulting on asset management plan and JLR & EXP consulting on architectural estimates.
- Engagements with SNOLAB community.
    - February 4th SEF meeting
    - Future Projects Workshop at SNOLAB, Apr 29 – May 1
    - Town Hall at CAP June 13
    - Presentation of findings at the MI meeting, Aug 6 - 8

Three Scenarios: Working Definitions

Maintaining current levels of operation

- Current laboratory at 100% occupancy
- New modest surface building offsite: *“Lively Campus”* or remodel of current building.

Fully supporting the needs of the Canadian research community

- Expand underground laboratory with new ladder labs to meet increased demands for space and capabilities.
- New larger surface building offsite: *“Lively Campus”.*

Increasing global competitiveness

- Expanded underground laboratory with new ladder labs and large cavern to potentially host a beyond tonne-scale 0νββ beta decay, a beyond 3rd generation dark matter experiment, or something else
- New *”Lively Campus”* with expanded facilities (hostel, cafeteria, …?)

Future Project Workshop: many ideas for potential experiments

- Deep Underground Biology
- HeLIOS (superfluid He)
- Small-scale Experiments for light dark matter
- Cryogenic solid-state detectors for Dark Matter detection
- Skipper CCDS and related efforts
- Liquid Noble Bubble Chambers
- 0νββ decay w/ bolometers
- R&D for normal hierarchy

- Beyond SNO+ Te
- ARGO, ARGO-lite, Darkside-LM
- nEXO 2.0
- NEXT
- XLZD
- Theia at SNOLAB

**This list is illustrative. It is not exhaustive, nor does it indicate SNOLAB approval or space allocation.*

***The Community Report resulting from this meeting will be available soon on aXiv.*

Expand Capabilities & Facilities to Support Future Experiments (1)

Capabilities Identified:

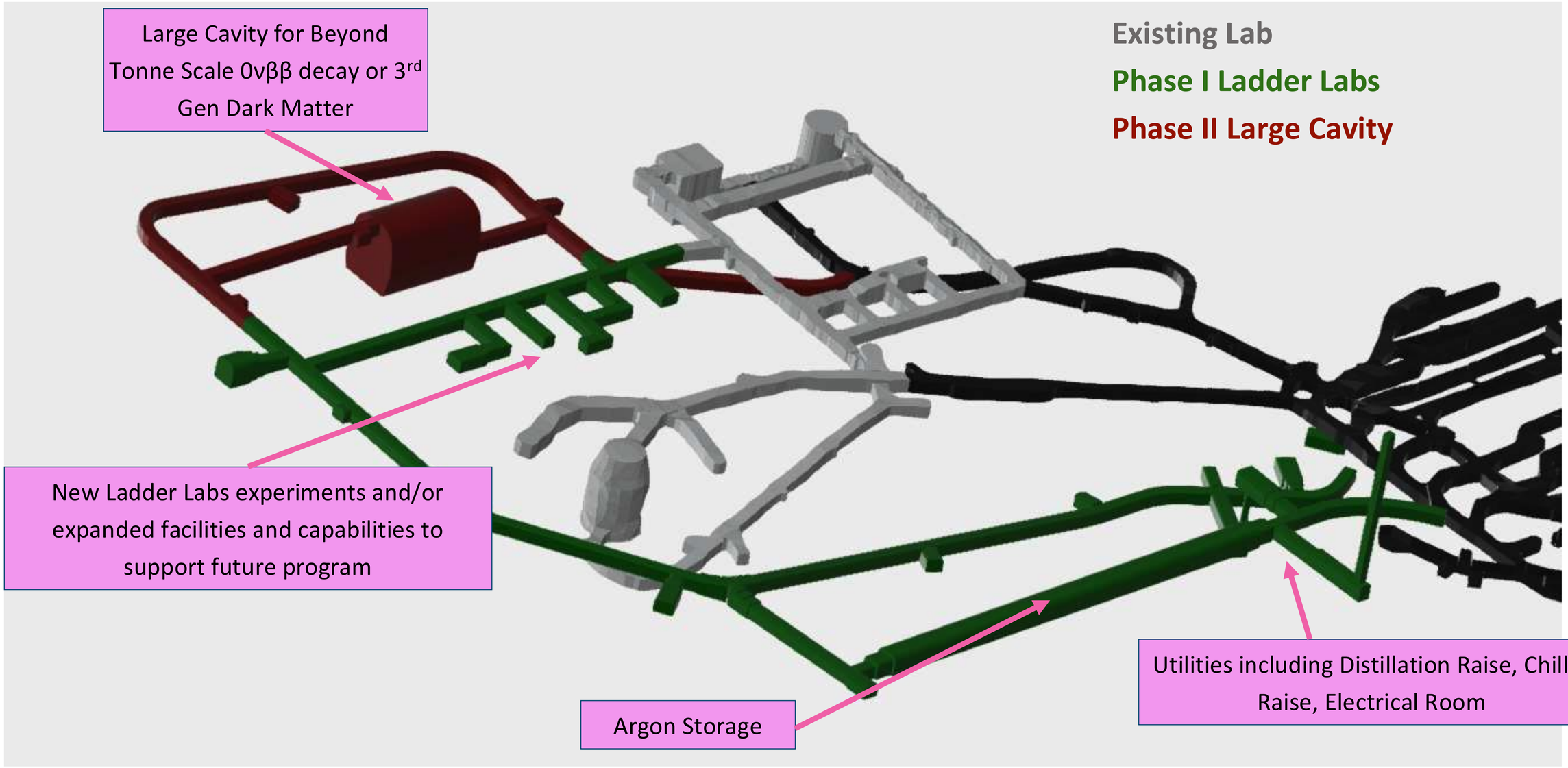
- Increased LN production
- Increased capacity and greater sensitivity of instrumentation for assay and material characterization
- Level III biohazard capabilities (requires separation of current biology/chemistry lab)
- Upgrades to the existing chemistry facility, including a dedicated setup for radon removal and noble liquid target purification,
- Capability and capacity to advance chemical and physical concepts for normal-ordering sensitivity in 0νββ decay experiments
- Underground materials fabrication
- Cryogenic distillation column of sufficient scale and throughput to be of use in both future argon and xenon programs
- More HQP staff especially engineers, scientists, and project managers who can support experiment needs
- More staff who support the operations of the facility

Expand Capabilities & Facilities to Support Future Experiments (2)

Facility Improvements:

- Storage areas and laydown space both on surface and underground
- At least four new surface laboratories including dedicated chemistry lab, cryolab, material science/chem lab, and multipurpose lab
- Assembly space both on surface and underground
- Expanded drys both on surface and underground
- Increased machine shop capabilities
- More areas w/ reduced radon air
- More underground cryogenic facilities for hosting small devices and quantum technologies and/or computing
- Underground argon and xenon storage and recovery areas
- More and larger water shields

New Underground Lab Space



New Lively Campus

New surface building key features:

Scenario 1
- Located outside the industrial controlled zone
- Auditorium space large enough to accommodate current staff, collaborations, and SuSi programs, kitchenette
- Training space
- Additional surface lab space
- Additional office and collaboration space

Scenario 2
- Expanded surface lab, meeting, and office spaces
- Warehouse
- Visitor Center

Scenario 3
- Hostel
- Day Care
- Cafeteria

Remodel of existing surface building to include additional “drys”.


SNOLAB
COMMUNITY CONSULTATION
CANADIAN ASSOCIATION OF PHYSICS:
JUNE 2025
15 YEAR PLANNING
& REVIEW UNDERGROUND COMMUNITY NEEDS
TO SUPPORT CANADIAN MAJOR RESEARCH FACILITIES
SCIENCE STRATEGY INCLUDES:
INCREASE UNDERSTANDING OF PARTICLES & FORCES THAT HAVE SHAPED OUR UNIVERSE
COLLABORATION: DEEP UNDERGROUND
PURSUE EMERGING AREAS OF UNDERGROUND SCIENCE
AN INTELLECTUAL HUB
OPTIONS:
Maintain current levels of operation
Fully support Canada's research needs
Increase global competitiveness
• CURRENT LAB @ 100%
• NEW MODEST BUILDING OFF SITE
OUTSIDE INDUSTRIAL CONTROLED ZONE
NEW LIVELY CAMPUS
• EXPANDED UNDERGROUND LADDER LABS
• LARGER OFFSITE eg. TRAINING SPACE
• EXPAND: NEW LADDER LABS & LARGE CAVERN eg. beyond tonne-scale 0νββ beta decay, beyond 3rd gen dark matter experiment
LARGER
Daycare, HOSTEL & more
THEMES:
MRFs + MORE CAPITAL
EXPERIMENTAL INFRASTRUCTURE & FACILITIES
ADVANCED INSTRUMENTS & DETECTION CAPABILITY
SCIENCE & TECHN. EXPANSION
PEOPLE & EXPERTISE
IDEAS FOR FUTURE EXPERIMENTS
• DARK MATTER
• NEUTRINOS
• QUANTUM SCIENCE
• LIFE SCIENCES ENVIRONMENTAL MONITORING
Q. HOW CAN SNOLAB TURN TO LARGER, NATIONAL STRATEGIES TO INFORM ITS DECISION-MAKING?
NEW: LARGE CAVITY
NEW
EXISTING LAB
IDEAS
eg. ARGON STORAGE
UTILITIES
Q WHAT MIGHT SNOLAB SPEED UP?
→ RESOURCE ALLOCATION FOR EXISTING EXPERIMENTS AS WELL?
HALO
NEWS-G
PICO
SNO+
Q STAFFING CAPACITY WILL BE KEY TO ANY OF THE SCENARIOS
eg. ELIGIBILITY expanded to PAY people directly for research, new partnerships, etc
SENSEI
SENSOR
DEAP 3600
UNDERGROUND IN SUDBURY, WITH 1200+ USERS
LIVE GRAPHIC RECORDING: DRAWING CHANGE

What is next?

- July 14: Plan was sent to a subcommittee of the SNOLAB board for their review and comment.
- Week of July 28: Plan sent to an external reviewer (from SAC) for comment
- August 6 - 8: Final presentation of plan to the SNOLAB community at annual MI meeting
- August 27: Final plan submitted to SNOLAB board for their review and approval
- September 8: Final plan submitted to Queen's
- September 15: Final plan submitted to CFI
- After September 15: Produce a 15-year vision based on plan for public dissemination.

Thank you!

Questions?