

2021-06-11

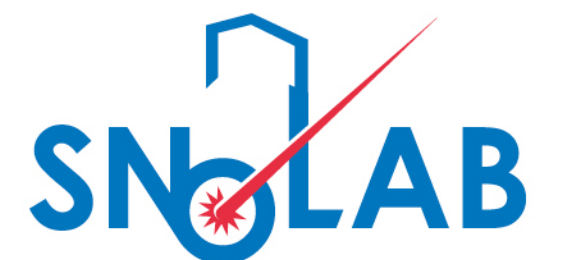
# SNOLAB Update

## CINP-IPP Joint Meeting

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Clarence Virtue

*Interim* Executive Director



# Evolution

# Governance & Leadership

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- ❖ Nexit accomplished – Nigel “relieved” of duty / safely delivered to TRIUMF
- ❖ ED filled on interim basis – search gearing up
- ❖ SNOLAB Institute Board
  - Ken Ragan → past Chair
  - Kim Strong → Chair
  - Aksel Hallin → Vice-Chair
- ❖ Have recently received a *Review of the Governance of the SNOLAB Institute*
  - Recommendations to be considered and acted on in concert with the Board

# The SNOLAB mandate has developed over time



## Initial SNO experiment:

Site operations only  
Project delivery within universities

Experiment Site

## Initial SNOLAB construct:

Develop multi-use facility  
Project delivery within universities

Infrastructure

Facility

'National' Laboratory

## Long range objective:

Full role in research ecosystem  
Role in science delivery  
Major engagement in project delivery  
Oversight with all stakeholders  
Develop international networks

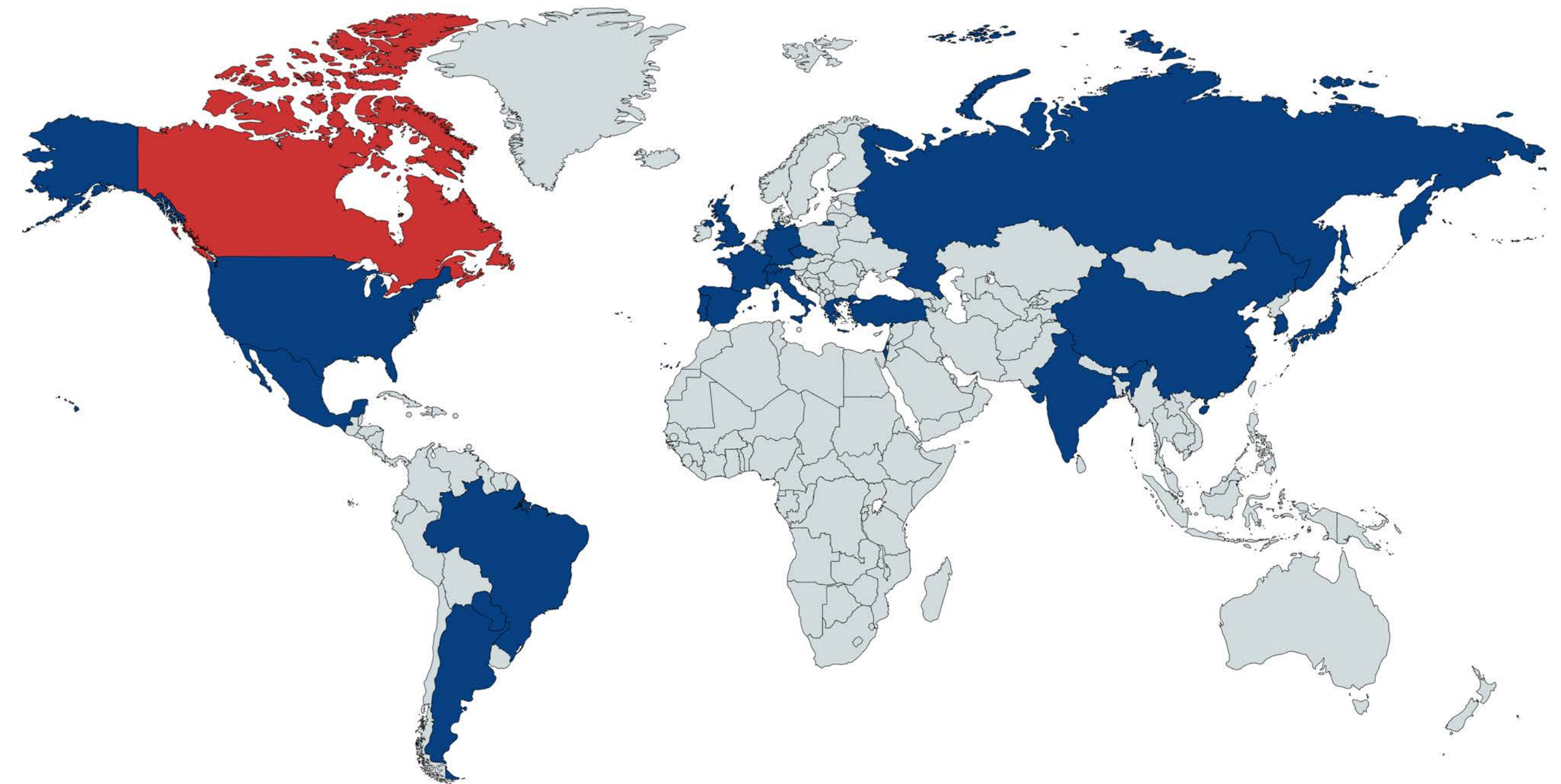
## Current status:

Providing substantial support to project delivery  
Held accountable for science delivery  
Developing project oversight

# Staffing & Users

~ 1015 users from  
128 Institutes and 23 countries

Competency / Group	Current Staff Level	Target Staff Level
Directorate	5	5
PA/Admin Support	4	5
Corporate Services	22	23
Engineering Office	9	9
Scientific Support	9	9
Project Management	16	20
Scientific Research	11	11
Students	17 (8.5 FTE)	(10 FTE)
Programme Integration	16	18
Programme Operations	37	38
<b>TOTAL</b>	<b>137.5</b>	<b>148</b>



**Table 2:** Staffing levels of SNOLAB groups, and (current) CFI budget staff level

## Building the next CFI MSI application

- Strategic Plan 2023-2029 in final stages
- Implementation Plan 2023-2029 well advanced
- Everything is a “project”
- External (Science Programme)
- Internal (Facility Development)
- Everything is project managed with PMO
- Periodically reviewed by Project Oversight Group
- Built into Financial and Staffing Plans
- Feeding projections for the MSI application

SNO LAB

Strategic plan  
2017 - 2022

SNO LAB

Implementation plan  
2017 - 2022

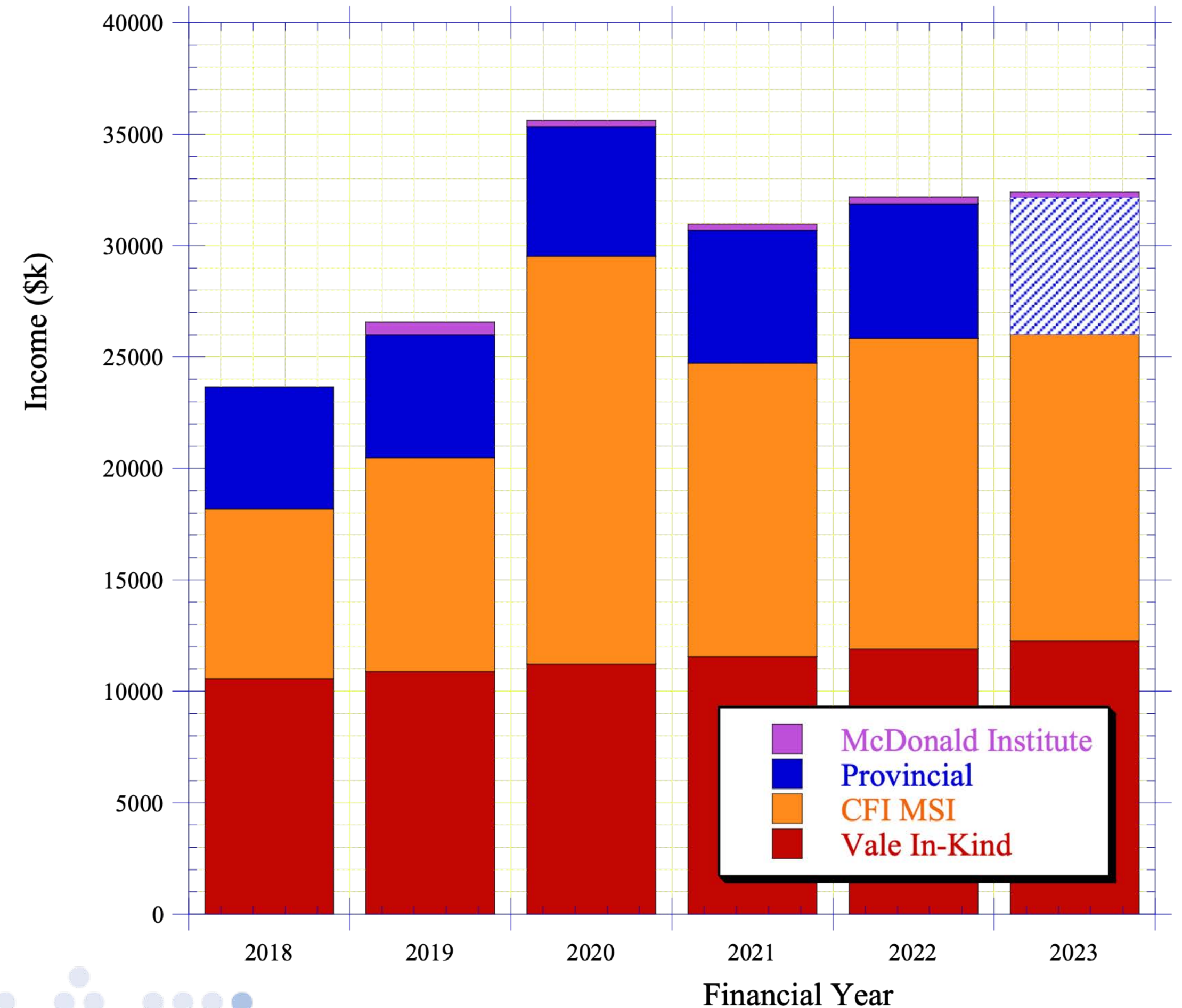
# Funding

# CFI MSI Evolution

- Full requested CFI support awarded 2020-2023
- Provincial funding got out of phase
- Need to secure FY2023 provincial contribution
- CFI MSI NOI due September
- Application due November

<b>Extension of funding</b>				
<b>Project No.</b>	<b>Facility</b>	<b>Funding decision</b>	<b>Approved CFI contribution 2017-18 to 2019-20</b>	<b>Approved CFI contribution 2020-21 to 2022-23</b>
35435	SNOLAB	Full funding	\$35,524,933	\$40,890,089

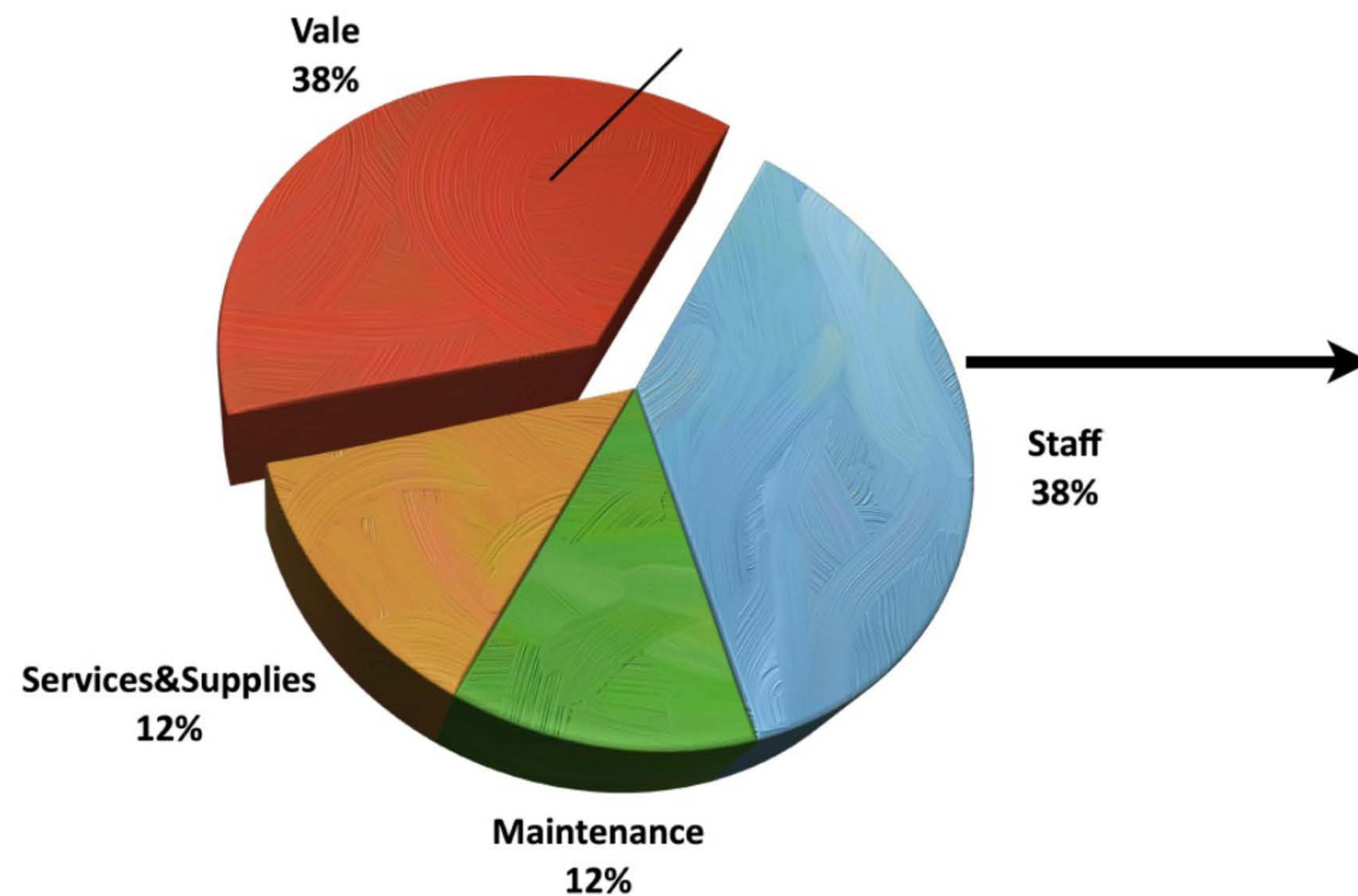
**SNOLAB M&O Income Categories**



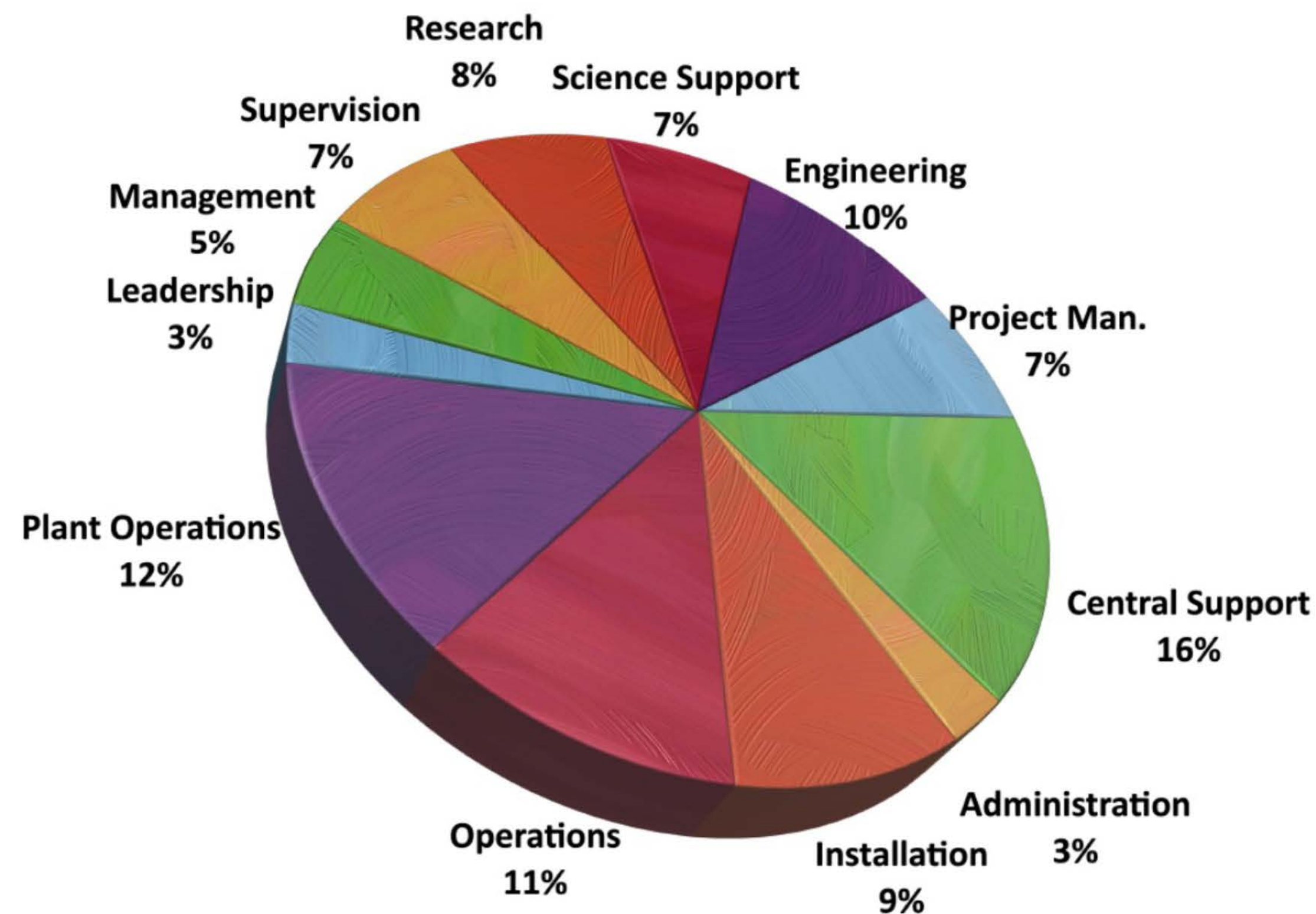


# SNOLAB by the numbers

Vale is in-kind shaft operations



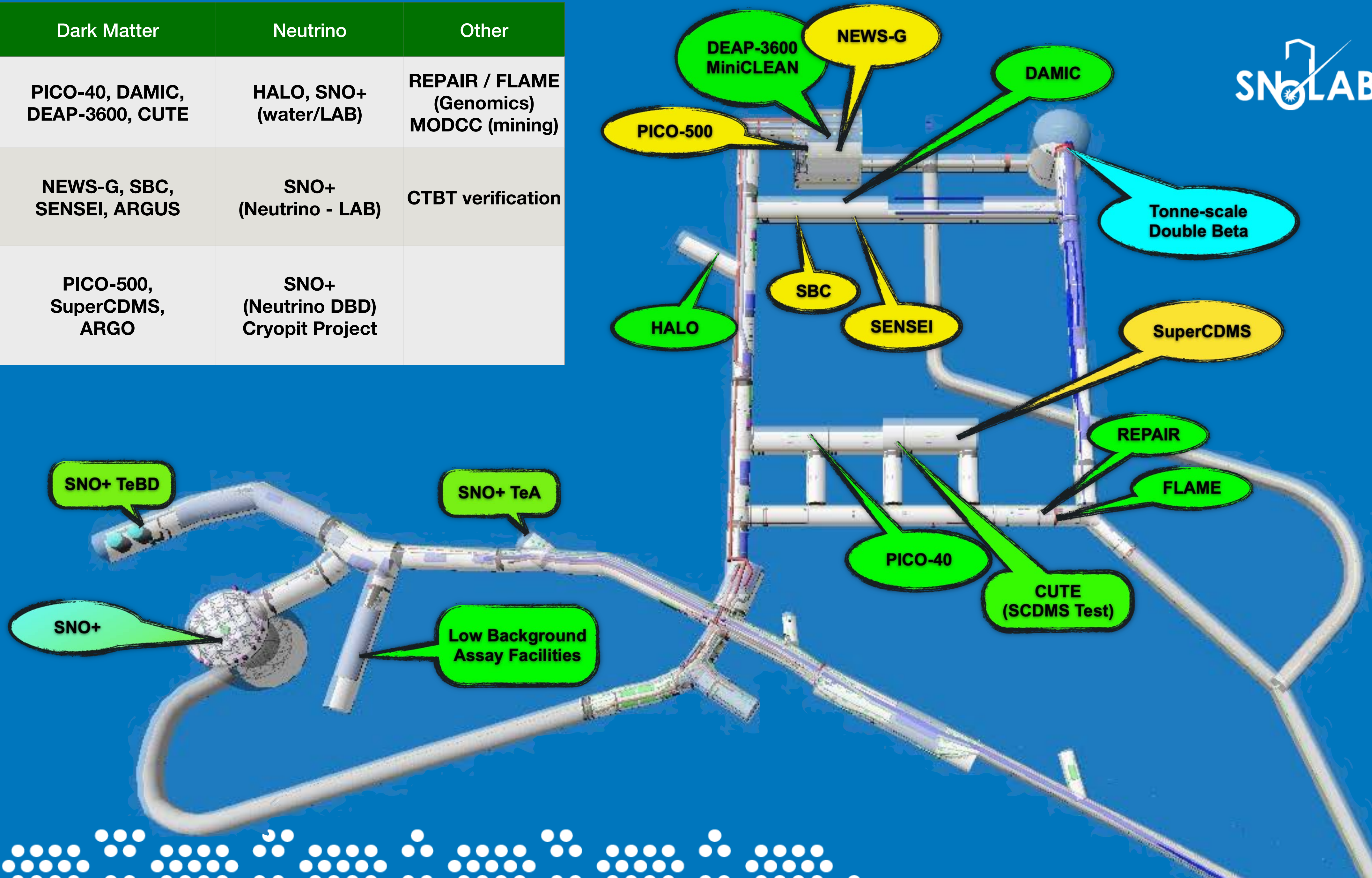
\$30 MCAD/year including Vale in-kind support



2021: 137 staff

# Programme

	Dark Matter	Neutrino	Other
Current	PICO-40, DAMIC, DEAP-3600, CUTE	HALO, SNO+ (water/LAB)	REPAIR / FLAME (Genomics) MODCC (mining)
2021 Start	NEWS-G, SBC, SENSEI, ARGUS	SNO+ (Neutrino - LAB)	CTBT verification
2021+	PICO-500, SuperCDMS, ARGO	SNO+ (Neutrino DBD) Cryopit Project	



# Priority setting

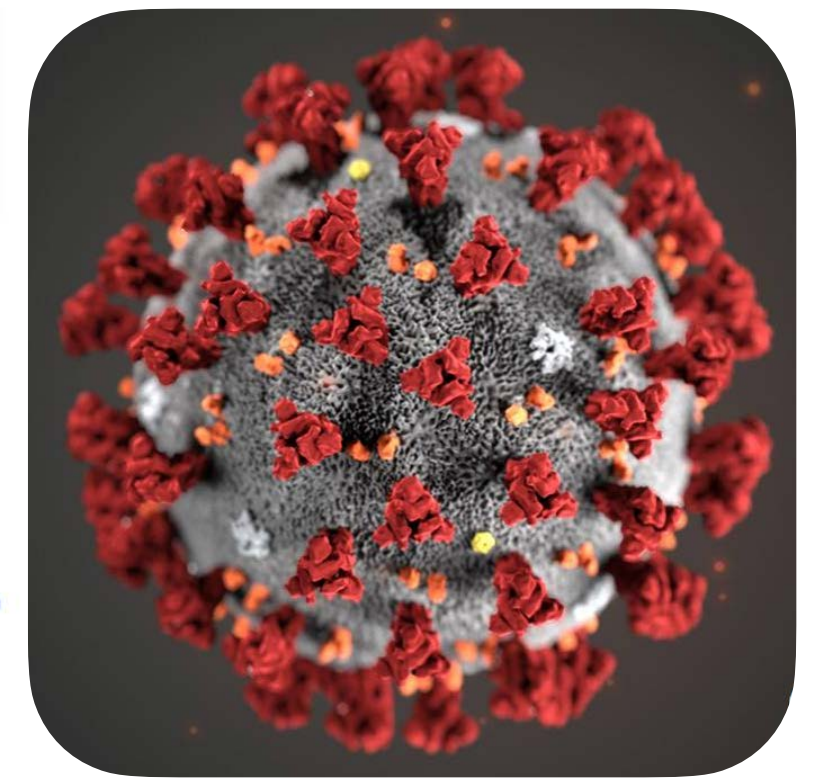
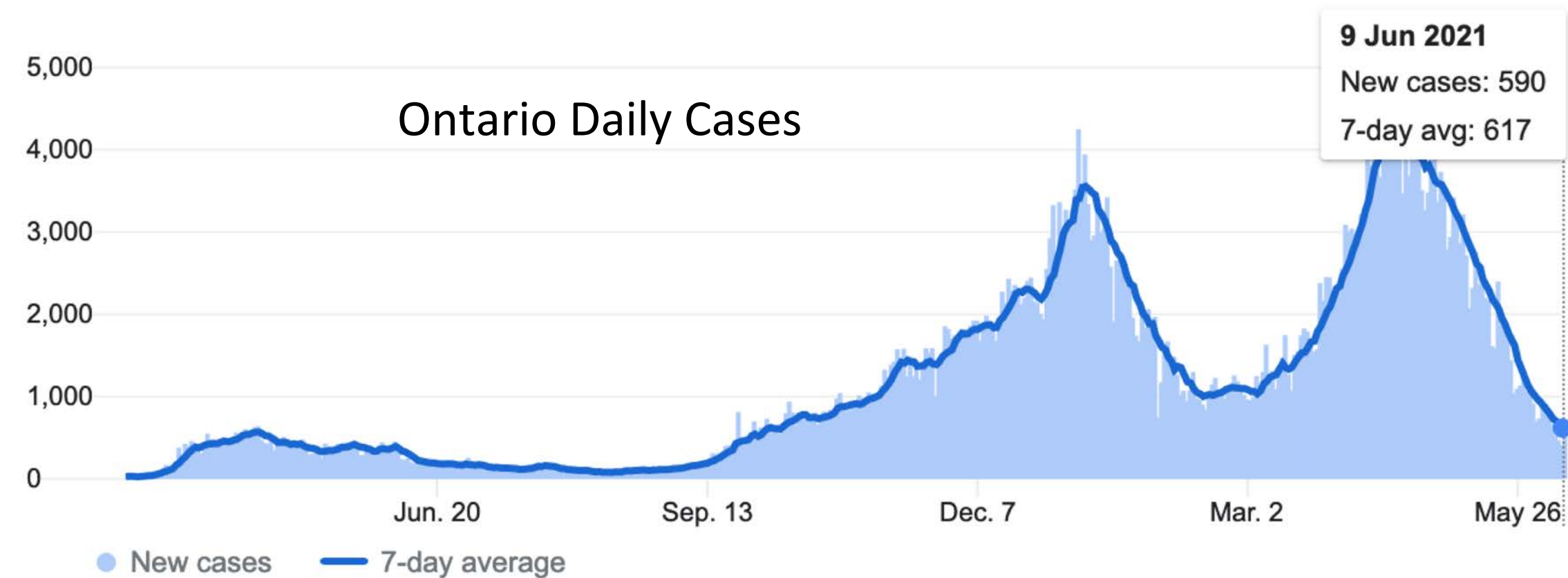


RESOURCE CONFLICT MATRIX of PRIORITIES			
PRIORITY #	STRAT PLAN OBJ	POG PROJECT #	GATEWAY
00-SP4		Imminent Safety Issues and Facility Emergency Repairs	
01-SP4		Facility Operations	
02-SP4		Executive Requirements	
03-SP1		Experiment Operations (HALO, CUTE, DAMIC, FLAME, REPAIR, Xe-Still, SNO+)	GW-3
04-SP4	2020-09	Strategic Plan	
05-SP4	2020-01	ProSapien IIR/NCR Management Software	
06-SP4		Internal Process Continuous Improvements: Sharepoint, Dynamics, Information Security	
07-SP2	2018-02	Surface Generator Plant	
08-SP2	2021-03	Chilled Piping Upgrades	
09-SP2	2021-04	MPC Breaker Upgrade	
10-SP2	2019-11	Primary RO Replacement	
11-SP1	2018-06	001 SuperCDMS	GW-2
12-SP1	2018-04	013 SNO+ LAB	GW-3
13-SP1	2019-02	032 nEXO	GW-0
13-SP1	2019-03	037 LEGEND-1000	GW-0
14-SP1	2018-14	047 SENSEI	GW-2
15-SP1	2018-03	038 NEWS-G	GW-2
16-SP1	2021-06	019A PICO-40	GW-3
17-SP1	2020-06	020 DEAP Upgrades	GW-2
18-SP1	2020-08	053 ECUME	GW-0
20-SP1	2020-07	052 CTBT Counter	GW-0
21-SP1	2021-05	049 SBC GW2 Deliverables	GW-1
22-SP2	2019-12	Second Phase LN2 Plant GW2 Deliverables	
23-SP2	2018-17	Underground Combustibles Storage	
24-SP2	2018-10	BAR/TAD Concrete and Air Lock	
25-SP2	2019-04	Surface Facility Refurbishment	
26-SP2	2019-18	Swipe Access Cards	
27-SP2	2020-02	Underground Facility Refurbishment	
28-SP2	2020-10	Seismic Monitoring System	
29-SP2	2019-06	Cosmic Ray Demonstrator Units	
30-SP2	2020-11	Liquid Noble Gasses Cryogenic Testing Facility	
31-SP2	2020-03	Surface Workshop Refurbishment	
32-SP2	2018-19	Facility Expansion (Conceptual Design Phase)	
33-SP1	2021-01	045 PICO-500	GW-1
34-SP1		013B SNO+TBD	GW-1
35-SP1		013A SNO+TeA	GW-2
19-SP1	2019-16	023 MiniCLEAN	GW-4
36-SP2	2019-17	SNOLAB VR	

	Responsive Requirements
	Facility Developments
	Science Programme

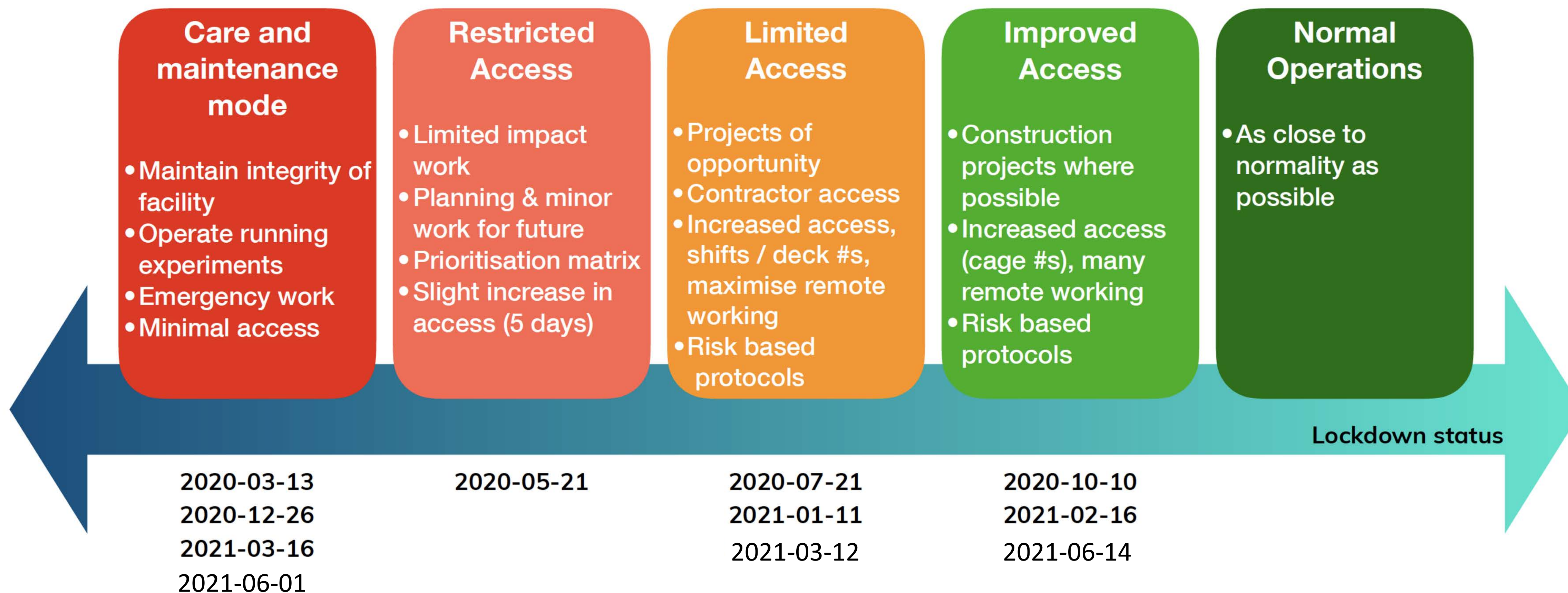
# COVID and other challenges

# COVID's Impact



- SNOLAB has been operating under its Emergency Response Plan since March 2020
- Following provincial and Vale site-specific requirements for PPE, screening, tracking, travel, etc.
- Restricted surface and underground occupancy, cage travel limits
- Difficulty traveling between Public Health zones, not to mention international travel, has meant a slowing of progress on experimental construction, and a shift to progressing on internal projects
- 45% “lost time (person.shifts)” in last year (reduced lab presence wrt normal occupancy)
- Ontario entered Step 1 of its Re-opening Plan today

# Restart Philosophy



# USW 6500 Strike

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- Contract expired without negotiated agreement at midnight on May 31<sup>st</sup>
- SNOLAB is a neutral party desiring ongoing good relationships with both sides
- SNOLAB premises however inside picket lines
- Started 5-day live-in rotations of skeleton crews (3-4 people) on May 31<sup>st</sup>
- Union following new playbook cf past strikes and allowing unfettered access
- Possibly related to proximity to scheduled July Preventative Maintenance Period
- Tentative resumption of SNOLAB surface and underground access starting Monday, day shift only
- No indication presently of possible length of strike... 2009 strike lasted 361 days

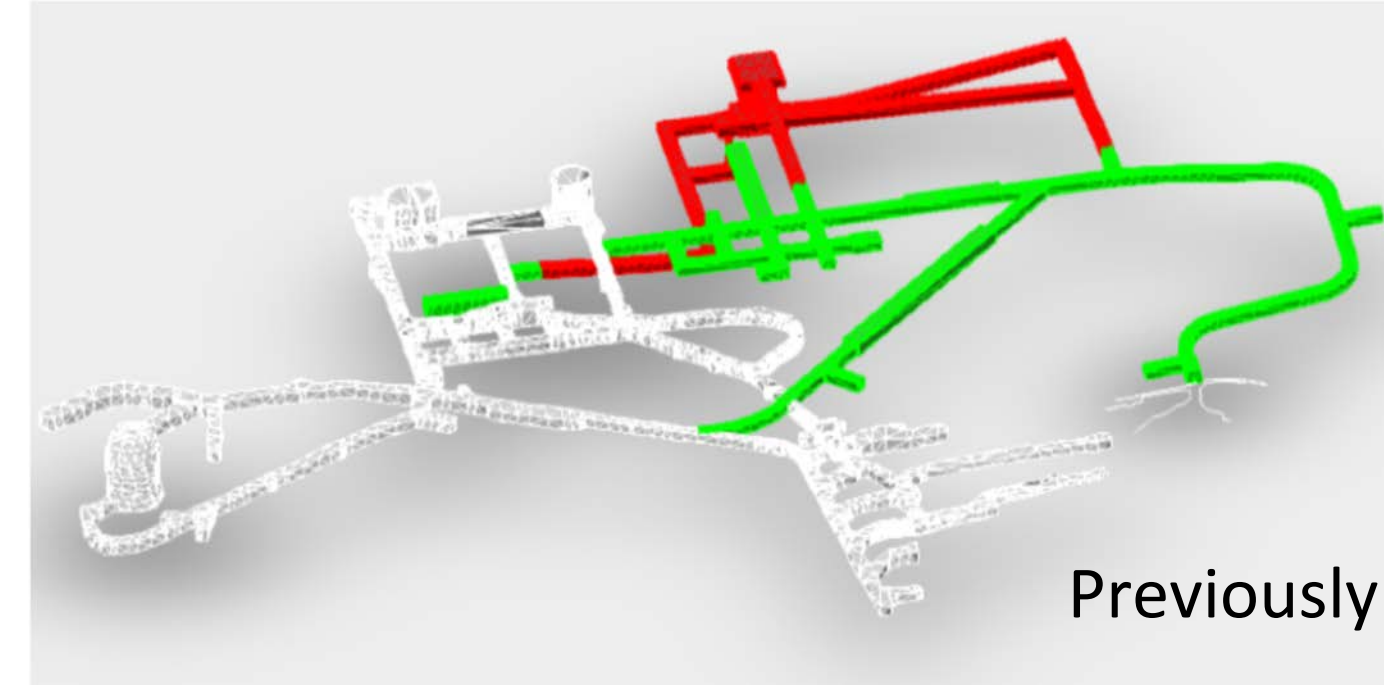


# Laurentian Insolvency

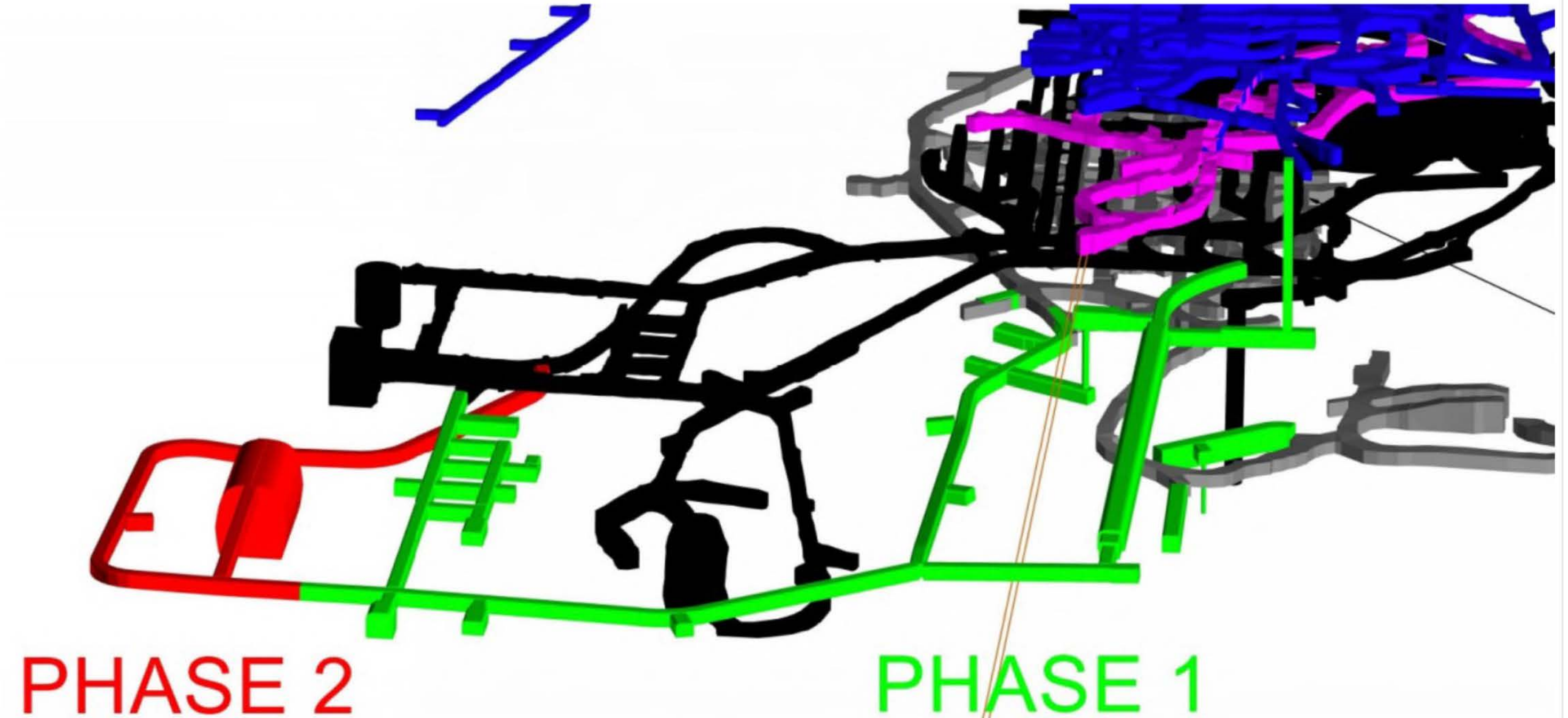
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- Filed under Companies Creditor Arrangement Act (CCAA) on February 1<sup>st</sup>
- a brutal process...
- ~ 1/3 of faculty and staff terminated on April 12<sup>th</sup> (over 200 individuals)
- ~ 70 academic programmes cut including:
  - BSc in Physics
  - BSc Biomedical Physics
  - BSc Radiation Therapy (run by Physics)
  - MSc in Physics
  - But not our PhD (Material Science) programme – filled with Astroparticle Physics students!
- Absolutely overwhelming community support in finding places for our students and affected faculty - huge thank you to SNOLAB and McDonald Institute for their roles!
- There are no direct effects on SNOLAB per se in many senses
- We are working on scenarios to "build back better" because there is a need

# Potential future expansion



- Expansion study conceptual, phased design complete
- Estimated CAD \$200M, 5 years
- No current path for funding, and would require demand from the research community
- **Expect space to be constrained over the 2023-2029 period, rotating experiments through existing floor space**

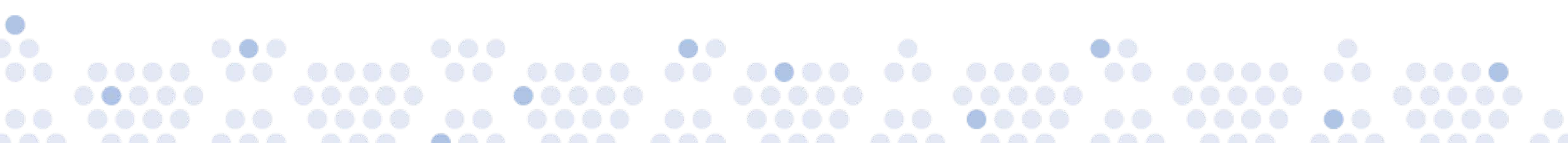


# Recent progress on experiments

- SNO+: Uses existing SNO detector. Heavy water replaced by scintillator loaded with <sup>nat</sup>Te.
  - ( $^{130}\text{Te} \rightarrow ^{130}\text{Xe} + e^- + e^-$ )
  - Recent papers from water phase: neutron-proton capture; JINST Detector, Scintillator and Optics papers
  - LAB fill complete!! AV recirculation being commissioned; PPO addition underway
  - TeA plant commissioned, TBD plant well advanced, TDR by year end
- DEAP-3600: Single phase Liquid Argon using PSD
  - Modification funded in last CFI-IF progressing / awaiting lift of lockdown
  - Papers on DM-nucleon effective couplings, and Pulse Shape, and PSD against LE <sup>39</sup>Ar  $\beta$  decays
- PICO-500: C<sub>3</sub>F<sub>8</sub> bubble chamber
  - Fabrication contract of pressure vessel under final negotiation
  - miniCLEAN removed from Cube Hall providing space
  - Working through some technical issues with PICO-40

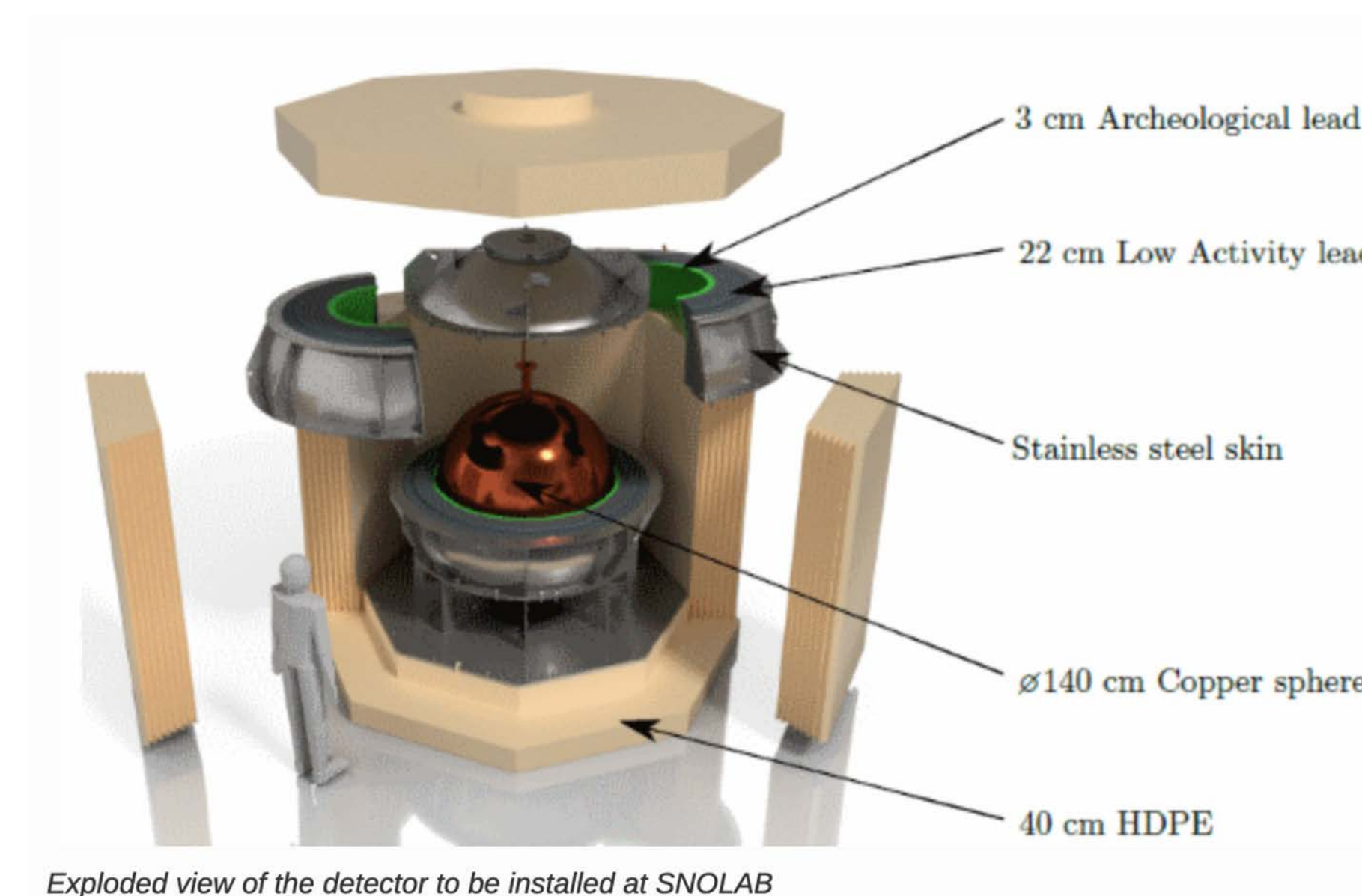
# Recent progress on experiments

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- SuperCDMS: Dark matter Si / Ge crystals with ionisation / phonon readout
    - Cleanroom and shielding water tank work progressing
    - Outer Cryostat Vessel fabricated and test assembled
      - July / August delivery?
      - Canada – US border closure affecting personnel / plans
  - CUTE: Cryogenic Underground Test Facility
    - Routinely running to test components for SuperCDMS and other detectors



# Recent progress on experiments

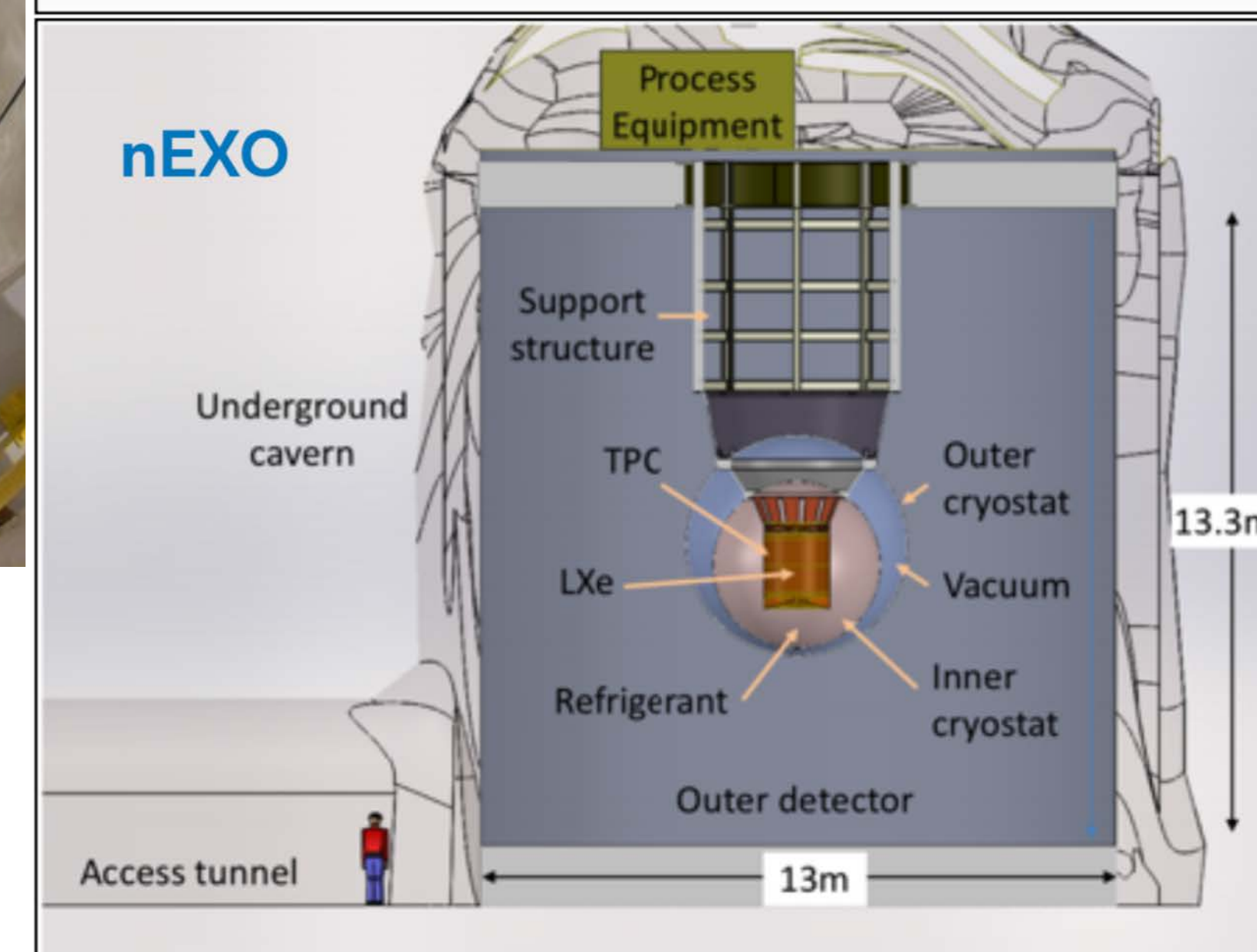
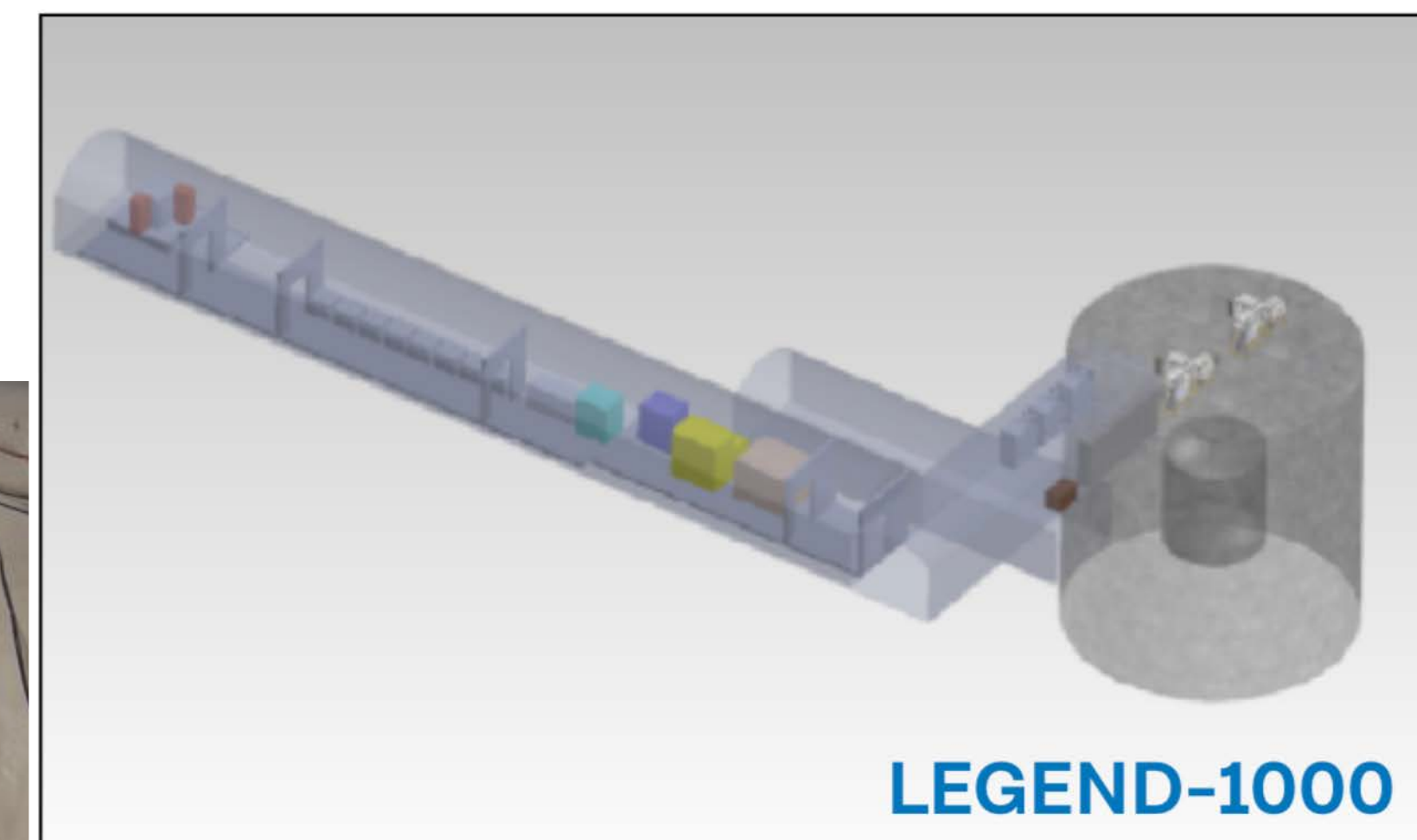
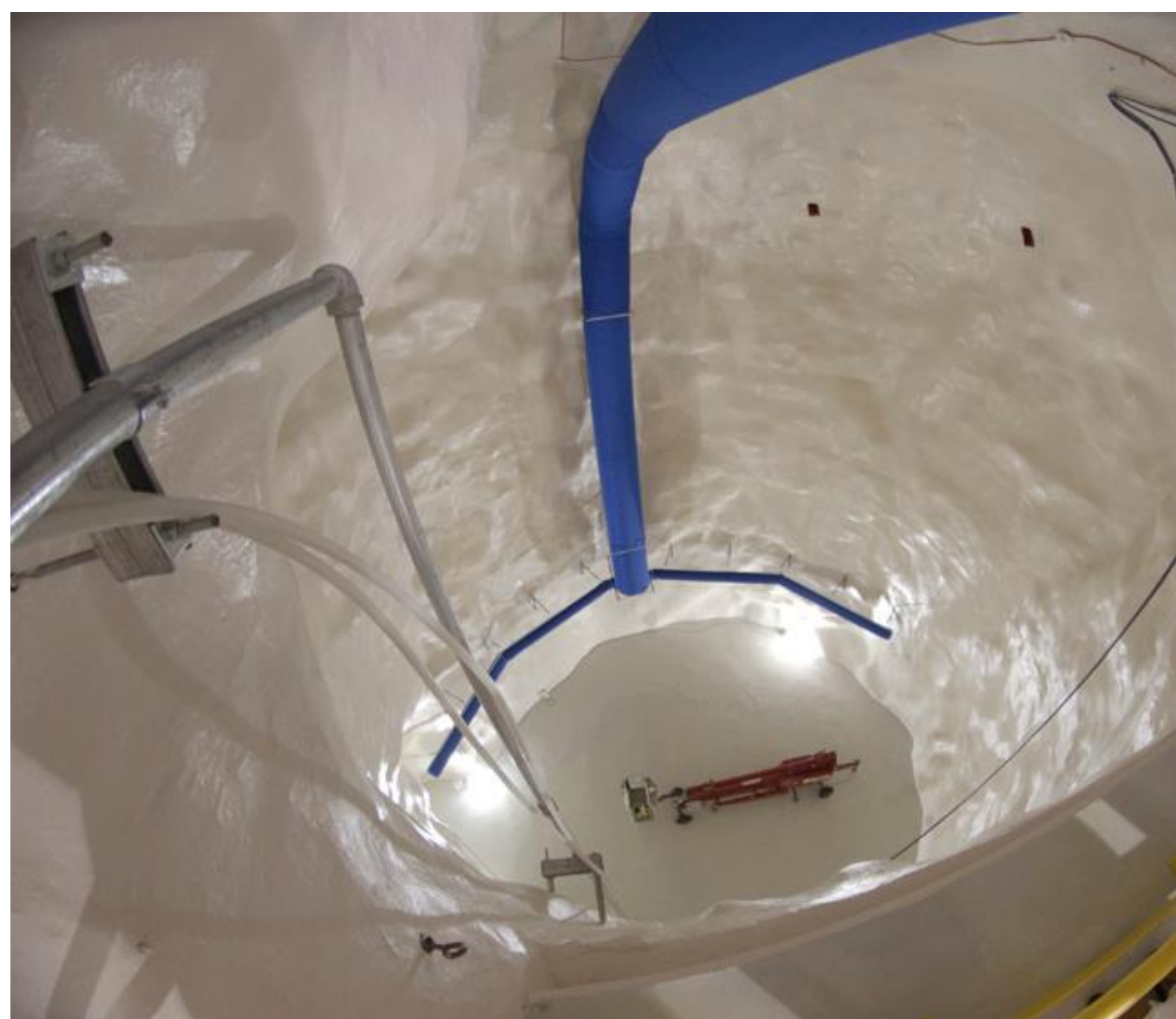
- NEWS-G: Spherical Proportional Chamber for low mass Dark Matter
  - Construction in Cube Hall almost complete
  - Commissioning and data collection soon
- SENSEI: next Gen CCD Dark Matter search
  - Cryostat received @SNOLAB
  - Shielding and detector assembly nogoing
- DAMIC - HALO - REPAIR - FLAME: all taking data



# Future Programme

# nEXO / LEGEND-1000

- Tonne-Scale  $0\nu\beta\beta$  "mission-need" established by DOE Nuclear Physics CD-0 December 2018
- Cryopit allocated to Tonne-Scale  $0\nu\beta\beta$
- DOE Portfolio Review in July
- Fall meeting of potential international partners coming
- Discussions ongoing with ISED, CFI and NSERC on Canadian point of contact
- Funding decision later...
- SNOLAB has stepped up planning and capabilities to support either selected project.
- This will become our highest priority science project at that point, given near-term world-leading potential



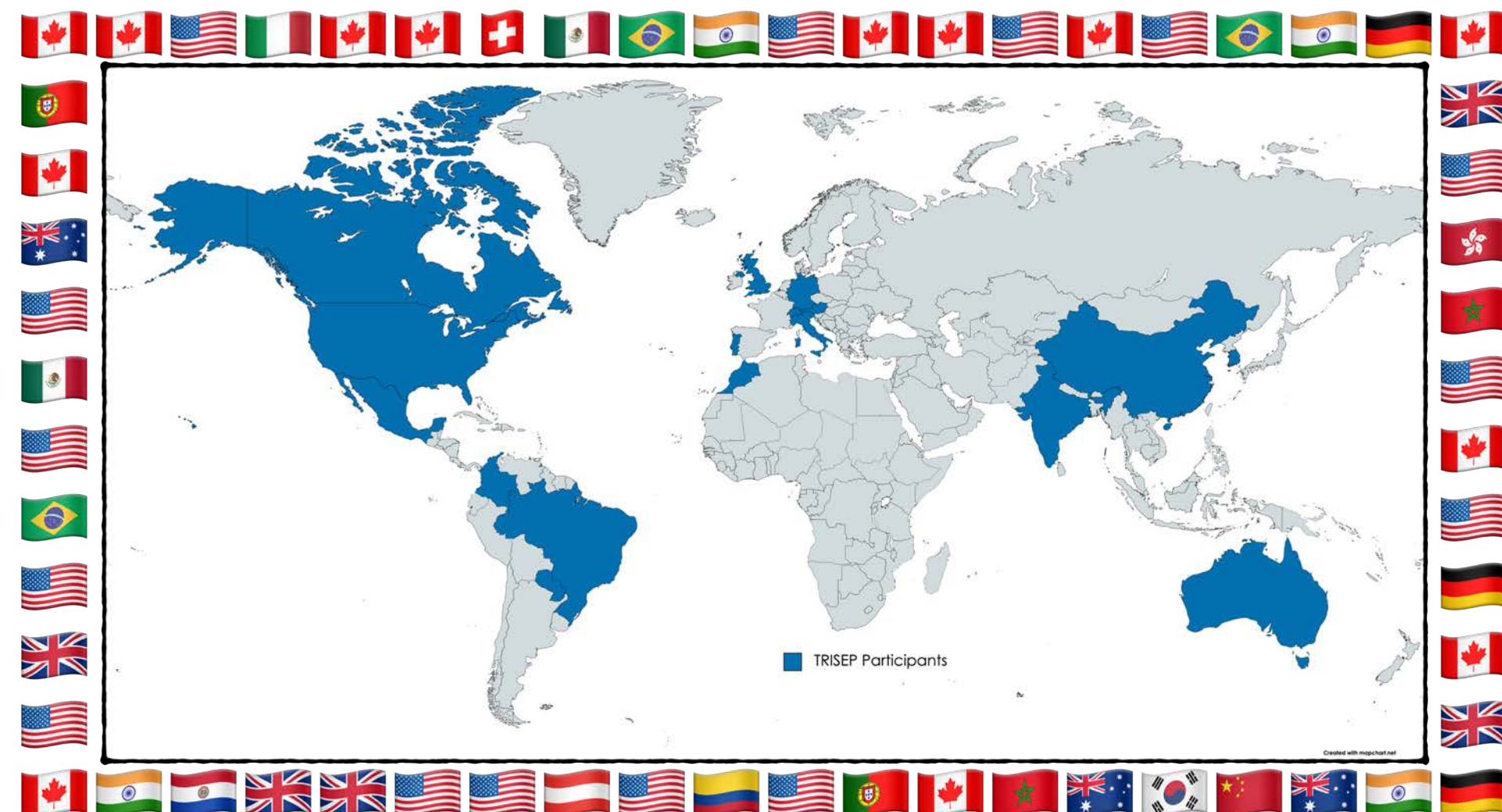


*Questions?*





- TRISEP-2020 was postponed due to the global pandemic
- TRISEP-2021 is fully online, which has challenges and benefits, **starts Monday**
- 104 Applicants, 80 Participants from 18 Countries
- Virtual Dinner, Game Night, Colloquium, and Group Projects
- Using Zoom and Gather.Town as platforms



## 2021 | SNOLAB | ON | CANADA

