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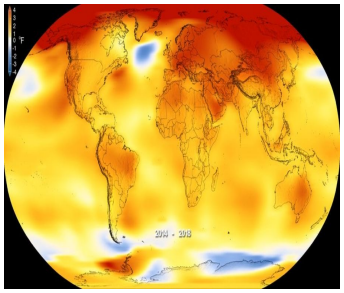
Toward a vision and strategy for Canadian permafrost knowledge

Northern needs

Stephan Gruber, David Moore – and many more that have contributed

THE NWT ENVIRONMENT



- Climate change represents a serious infrastructure challenge for the Northwest Territories (NWT) and its people.
- Impacts to infrastructure design requirements, viability and sustainability
- Gaps in knowledge, research and monitoring requirements. Innovation is critical.
- Resources (financial and human) are limited.
- Climate change and its impacts will continue into the foreseeable future; an ever green approach is required.

NWT INFRASTRUCTURE SNAPSHOT

- 2438 km of all-season highways (paved or gravel surface) in the NWT
- 1435 km of public winter and ice roads
- 19 communities with all-season road access, 10 communities with winter access; 4 fly-in only.
- Over 115 bridges and 253 bridge-culverts
- Department of Infrastructure operates and maintains:
  - 27 NWT airports
  - 50% of all freight entering the NWT is by rail
  - approximately 800 government building assets
  - Marine assets including barges and tugs

Dempster Highway (NTGS photo)

Tlicho Highway

MVH Highway Bridges

A Peak into the Future

- The North is key to Canada's future and the world
- $ Billions of Strategic Infrastructure Investments planned including:
  - Mackenzie Highway : A supply chain to the north
  - Slave Geologic Corridor: Access to critical minerals essential for the future
  - Taltson Hydroelectric Development
  - Many other projects such as the Inuvik Airport Runway and Terminal : supporting NORAD and Canadian sovereignty

MVH


NORTHWEST TERRITORIES
HIGHWAY SYSTEM
Paved Highway
Gravel Highway
Winter Roads
Future Roads
Ferry Crossing
Gateway Hub
Regional Hub
Community Airport
Sachs Harbour
Tuktoyaktuk
133 Km
Aklavik
136 Km
Inuvik
Km 272
Fort McPherson
Km 85
Peel River Ferry Crossing Km 150
Arctic Red River Ferry Crossing Km 143.0
Tsiigehtchic
Km 143
Mackenzie Valley Highway
Paulatuk
Ulukhaktok
Fort Good Hope
Km 417
Colville Lake
165 Km
Yukon
Norman Wells
Km 1026
Tulita
Km 938
Deline
105 Km
Great Bear Lake
Nunavut
Wrigley
Km 690
Mackenzie
Ndulee Ferry Crossing Km 551.8
Fort Simpson
Km 471
Liard River Ferry Crossing Km 457.2
Nahanni Butte
24 km
Jean Marie River
27 Km
Fort Liard
Km
Sambaa K'e
126 km
British Columbia
Fort Providence
Km 3
Kakisa
Hay River
Km 3
Enterprise
Km 84
Alberta
Gamèti
194 km
Wekweèti
212 km
Whati
35Km
TASR
Behchokǫ̀
Km 245
SGP
Yellowknife
Km 339
Dettah
Great Slave Lake
Lutsel K'e
Fort Resolution
Km 90
Fort Smith
Km 267
1 Mackenzie Highway
2 Hay River Highway
3 Yellowknife Highway
4 Ingraham Trail
5 Fort Smith Highway
6 Fort Resolution Highway
7 Liard Highway
8 Dempster Highway

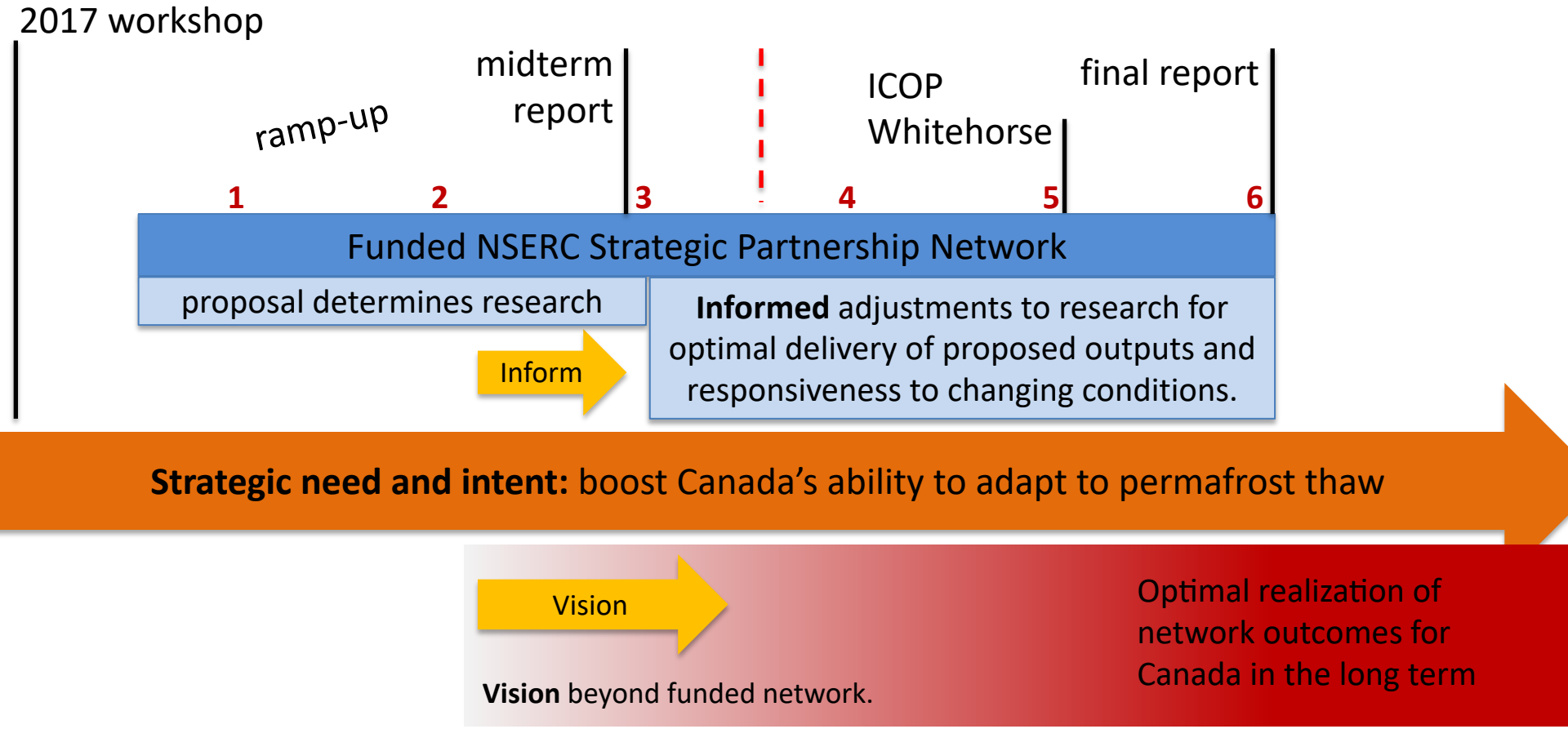
OUR APPROACH

- Improving Knowledge & Embracing Innovation
- Building Resilience and Adaptation
- Collaboration and Engagement

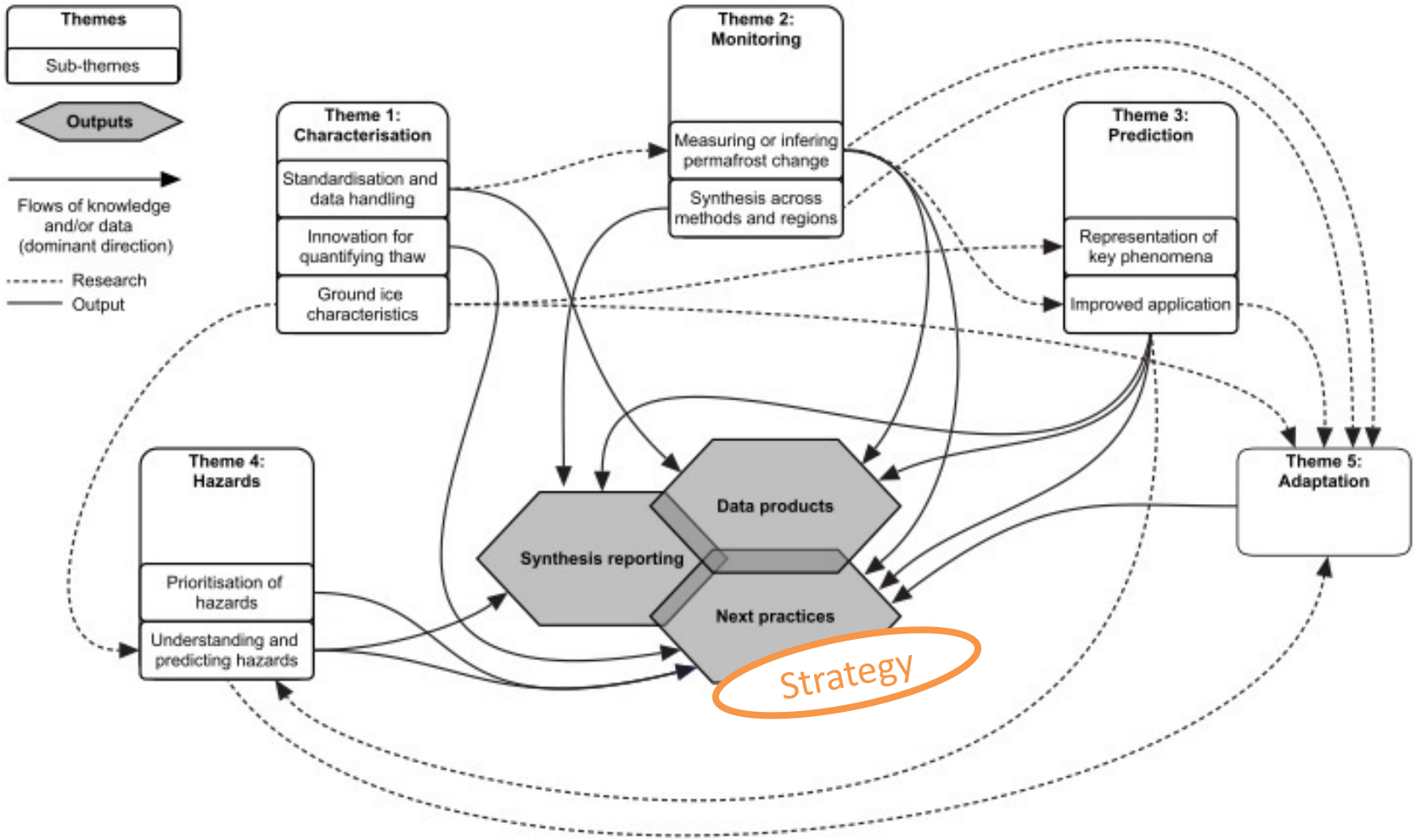
Permafrost Knowledge is Key

- We need data and the tools to interpret it
- Pure Science but also applied sciences and engineering
- Public awareness
- Ongoing collaboration between academia and governments and communities and many others.
- Services and capacity
- A strategy and vision to maintain momentum

Our continued arc of engagement



Network outputs and outcomes



Network outcomes:
understanding, methods, experts, community

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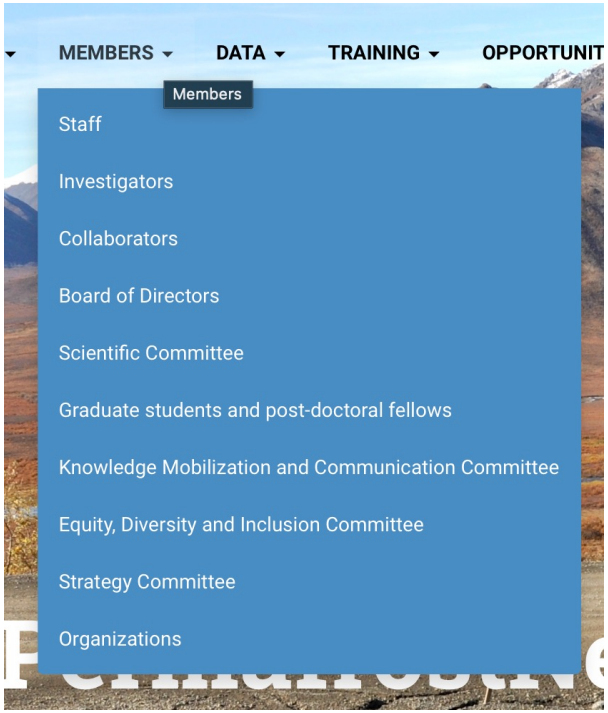
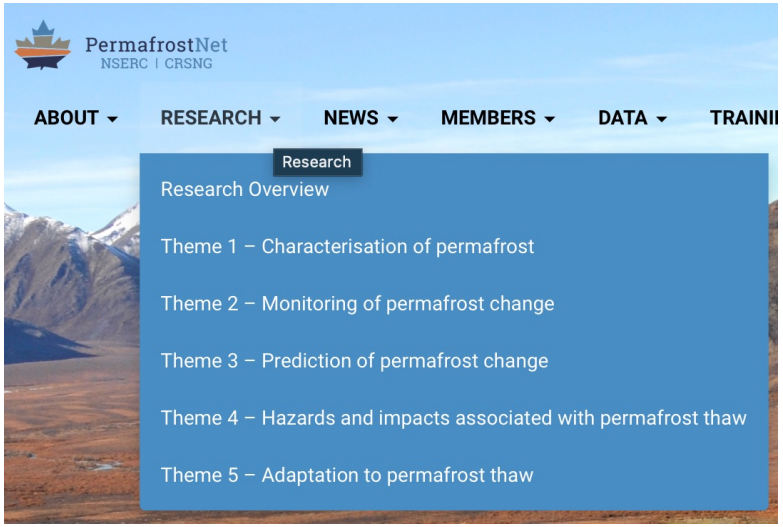
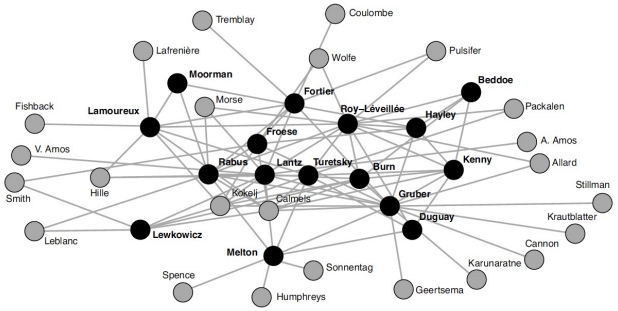
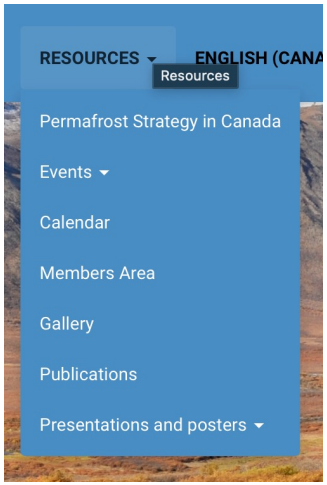
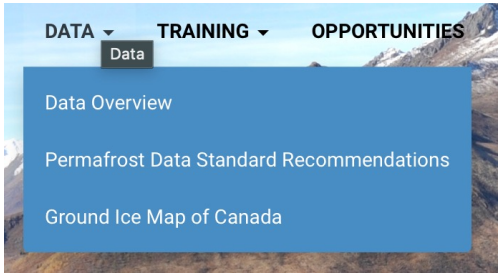
The network has many facets

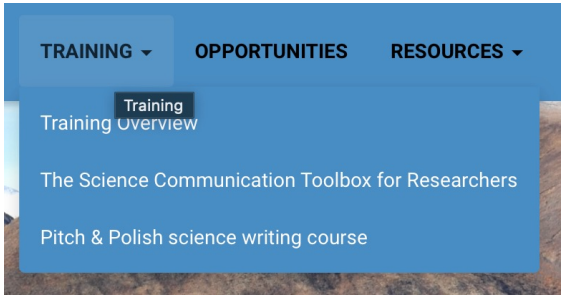












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Strategy Committee and initiative

- In July 2021, the Board recognized the merits of a visioning and strategy exercise for the network, partners and wider community.
- In November 2021, the Board accepted the Strategy Committee Terms of Reference
  - Purpose: to support the NSERC PermafrostNet Board of Directors in leading or **catalyzing** an **open and inclusive** strategic thinking exercise for the future of Canadian permafrost research.

The role of the Board is to give feedback, make recommendations, and to champion the cause.

How can we turn permafrost knowledge into action?

Version 1, August 2022, permafrostnet@carleton.ca

Canada's northern land and communities are shaped by permafrost – ground that has been frozen for thousands of years. Permafrost thaw is changing the land, damaging infrastructure, and threatening the Indigenous ways of life. We have a chance to build a more sustainable future on changing permafrost lands. Our vision is to braid western and Indigenous knowledge systems with existing networks and stakeholders to collectively find solutions for existing and new challenges.

Webpage with more information

Here are examples of groups affected by permafrost thaw. Everyone has their own problems to solve and unique knowledge and experiences they can contribute to adapting to permafrost thaw. When we all connect and collaborate together, we can find solutions for living with permafrost thaw. **This infographic is a starting point to get your input and feedback to help all of us on this journey. Please feel free to add, delete, and edit this infographic.**

Federal, provincial, and territorial policymakers

What are the key problems? What promising solutions exist?

We make policies to incentivize action and standards to ensure quality.

Northern government and communities

What changes to expect in the next 80 years?

We know how information can be turned into action locally.

Research in academia and government

What are the priority questions where science and engineering can make contributions?

We make computer simulations of climate change and its impacts, monitor changes in-situ and remotely, and develop new technologies.

Professional and academic training

What new skills and knowledge are needed and proven useful?

We train experts and develop new practice.

Land-use and infrastructure planning and design

What conditions to plan with for the next 80 years?

We know how climate and geotechnical conditions affect land use and structures.

Private sector (mining, transportation, energy, communication, consulting, insurance)

What new practices will I need to keep my services reliable and efficient?

We have unique observations and local knowledge

Indigenous organizations and communities

What changes to expect in the long term?

We know the land and hold traditional knowledge. We see, understand, and deeply care about the changes that are directly impacting us.

Canadians

What is happening in my country and in the world?

We are the people who can take climate action, collectively

This is a draft to be improved further. It mostly reflects a scientific perspective.
We invite everyone to share their perspectives and knowledge.

Breakout groups

- Get together in small groups
- Collect notes on **network outcomes** (change in Canada 5–10 years from now):
  - important for Canada
  - important for you personally
- Report salient points back to plenary