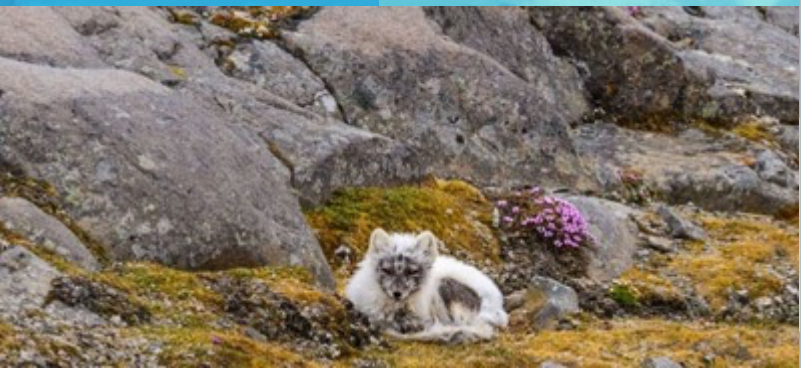
SAON's Roadmap for Arctic Observing and Data Systems (ROADS): A Call to Contribute through AOS

Drafting Team:
S. Starkweather, J-R. Larsen, E. Kruemmel, H. Eicken, D. Arthurs, N. Biebow, T. Christensen, R. Delgado, A. Gambardella, S. Kallhok, M. Johannson, H. Jóhannsson Y. Kodama, S. Sandven



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Arctic Observing Summit, 2020

"Observing for Action"

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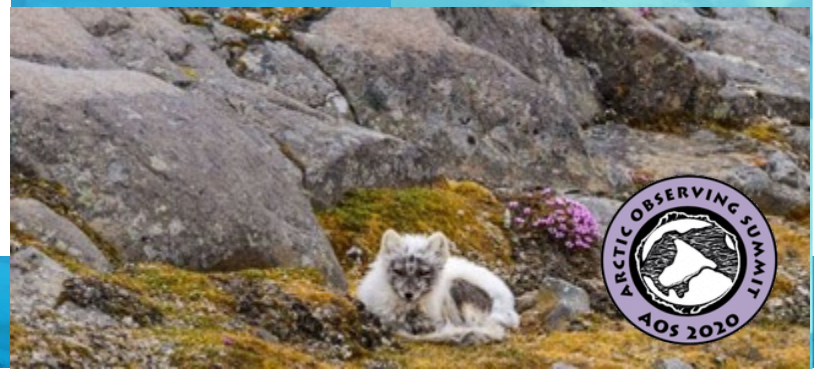
ROADS & the AOS, Outline

1. Why do we need the ROADS process?
2. What makes up the ROADS process?
3. How do I get involved?
4. Where will the ROADS process bring us?



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1b. Why do we need ROADS? Summary

- The pace, extent and magnitude of Arctic changes are unprecedented
- Observations inform actions in the face of these changes
- Systemic issues at the Global, Regional and Local scale impede progress
- SAON has been given a mandate to facilitate

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1b. SAON Strategic Plan, 2018-2028

1. Create a roadmap to a well-integrated Arctic Observing System;
2. Promote free and ethically open access to all Arctic observational data; and
3. Ensure the sustainability of Arctic observing.

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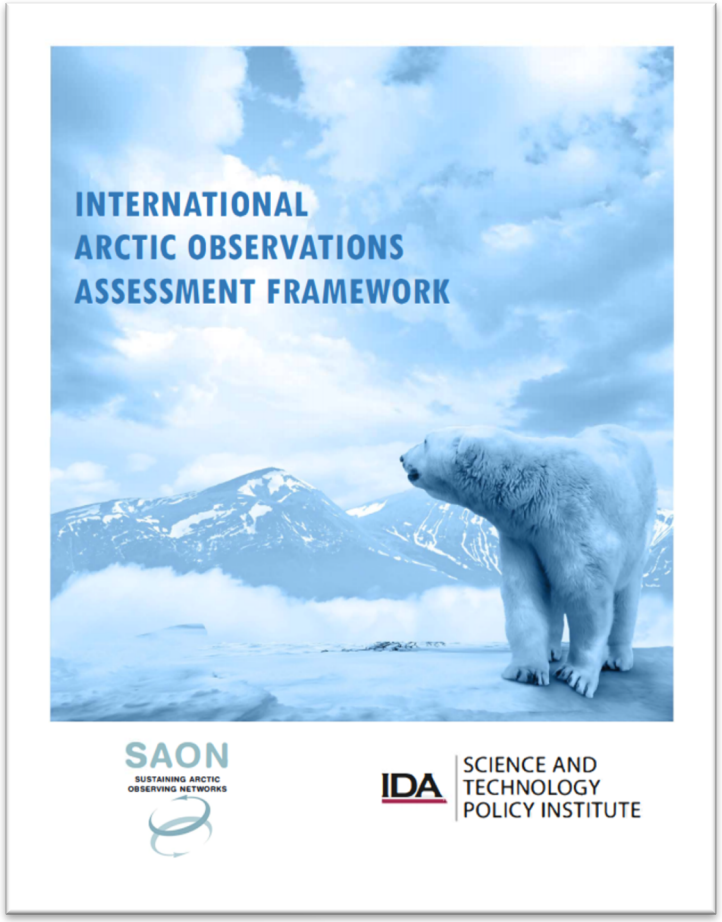
1b. SAON's Arctic Societal Benefit Areas (2017)



1. Disaster Preparedness
2. Environmental Quality
3. Food Security
4. Fundamental Understanding of Arctic Systems
5. Human Health
6. Infrastructure and Operations
7. Marine and Coastal Ecosystems and Processes
8. Natural Resources
9. Resilient Communities
10. Sociocultural Services
11. Terrestrial and Freshwater Ecosystems and Processes
12. Weather and Climate

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2a. What makes up the ROADS Process?

ROADS Principles & Assumptions:

- It must include funding for Indigenous Peoples' equitable partnership and active participation;
- It should complement and integrate, without duplication, the current planning approaches used by existing efforts (regional to global);
- It should support step-wise development through a flexible, collaborative and evolving structure.

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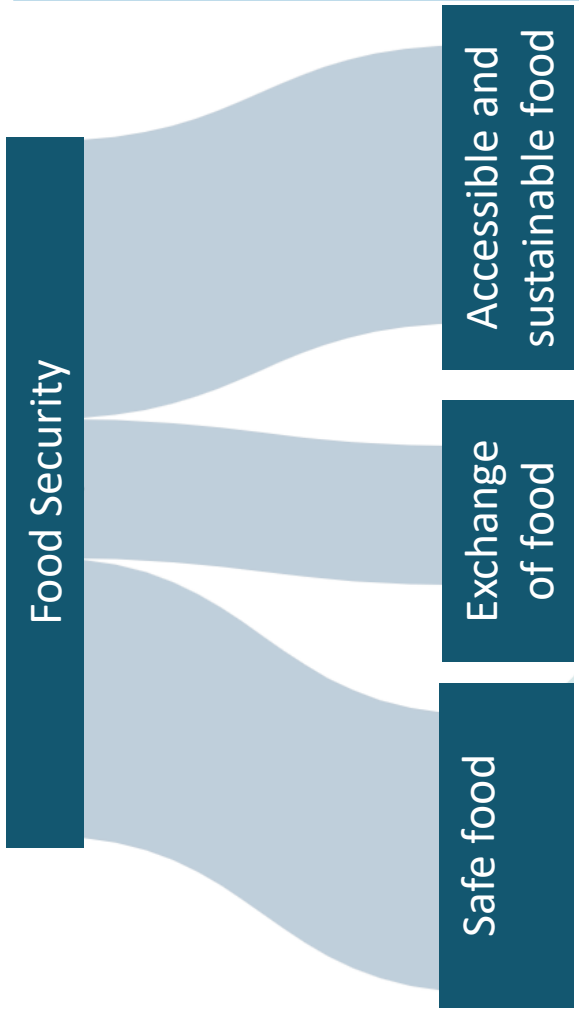
2b. ROADS Element: Value Tree Analysis (VTA)

Supports “systems view”, linking Observations to Action (SBA’s)



Societal Benefit Areas (SBA’s) and Supporting Objectives	“Applications”	Essential Arctic Variables, Processes	Intermediate Products	Observing System Inputs

2b. ROADS Element: Essential Arctic Variables

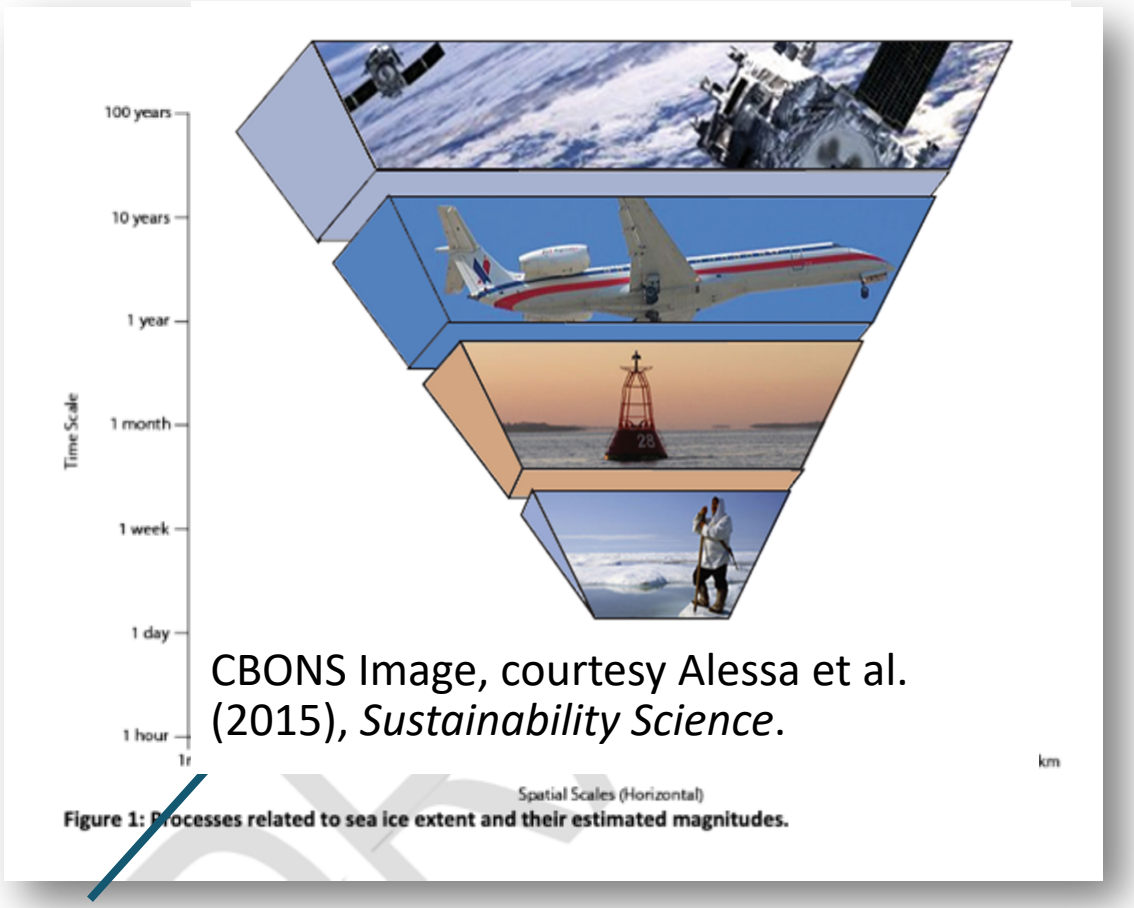
Support translation of societal requirements into observing system requirements and coordination of observing implementation strategies

EAV's are **conceptually broad phenomena** that provide a structured interface for coordination and collaboration in support of societal benefit.

Identified for their criticality to achieving Arctic societal benefit

Defined by their observing system requirements

Implemented through specific recommendations based on best available technology and practices.



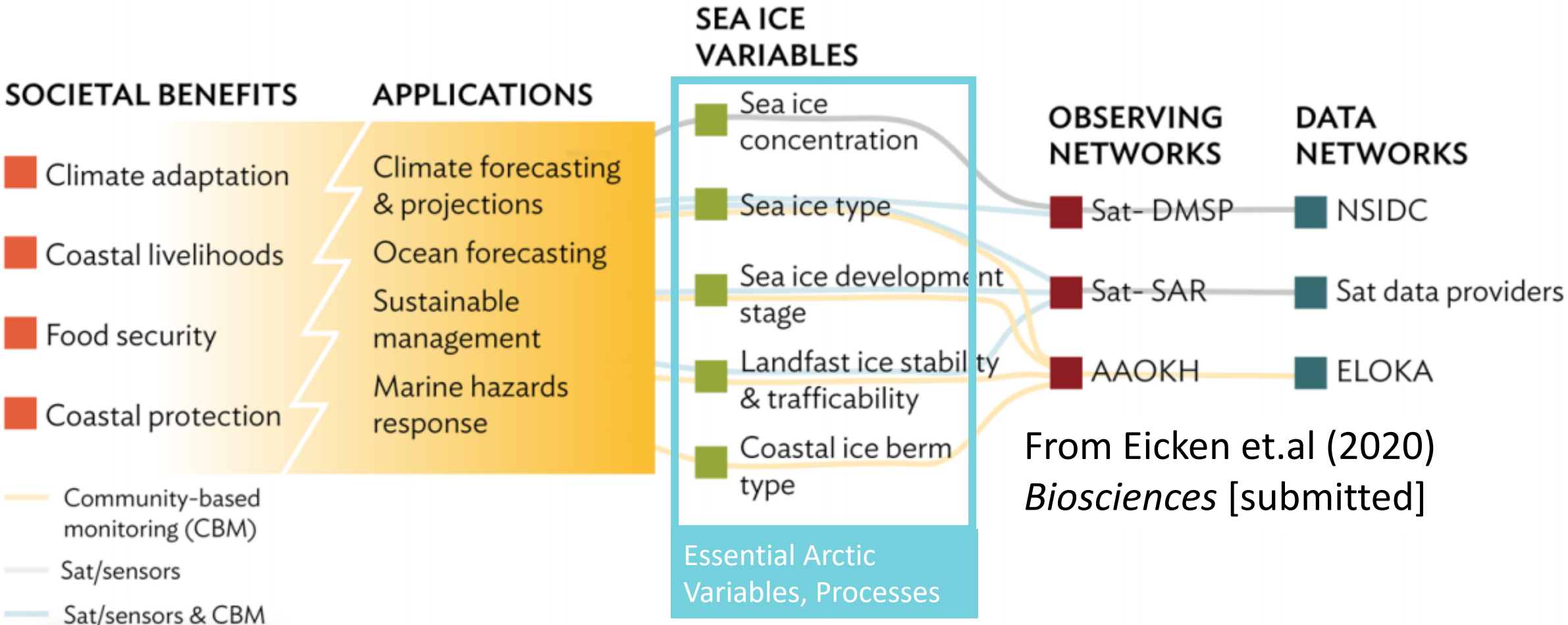
CBONS Image, courtesy Alessa et al. (2015), *Sustainability Science*.

Figure 1: Processes related to sea ice extent and their estimated magnitudes.

Adopting SEA ICE as an Essential Arctic Variable would extend requirements towards lower latency and spatial scales/locations relevant for local activity (e.g. fast ice)

2b. ROADS Element: Essential Arctic Variables

Candidate: Sea Ice, extending from global networks



From Eicken et.al (2020) *Biosciences* [submitted]

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2b. ROADS Element: Essential Arctic Process

Candidate: Rain on Snow, regionally significant

AROSS Arctic Rain on Snow Study

NSF NNA, Award # 1928230
PI: M. Serreze (NSIDC)

Societal Benefit Areas (SBA's)

Applications
- ROS Event Climatology
- ROS Detection Algorithm
- Expert System Models

Essential Arctic Process
- Rain on Snow (ROS) Events

Intermediate Products, Services, Outcomes
- LEO NETWORK
- Atmospheric Reanalysis (MERRA2, ERA5)
- Satellite Passive Microwave Products
- Validation Products
- CMIP6 Output

Observing System Inputs
- Regional & Local Media
- Local Observers
- DSMP
- AMSR2
- Automated In Situ

3a. How do I get involved? ROADS and AOS

ROADS Topic	Working Group
Assessing Impactful EAV's	WG-1, WG-2, WG-3, WG-5
Recommending a Schema to Structure Coordination	WG-1, WG-4, WG-5
Inclusive Engagement Strategy, Expert Panels	WG-3, WG-5
Inclusive Engagement Strategy, Advisory Panels	All WG's

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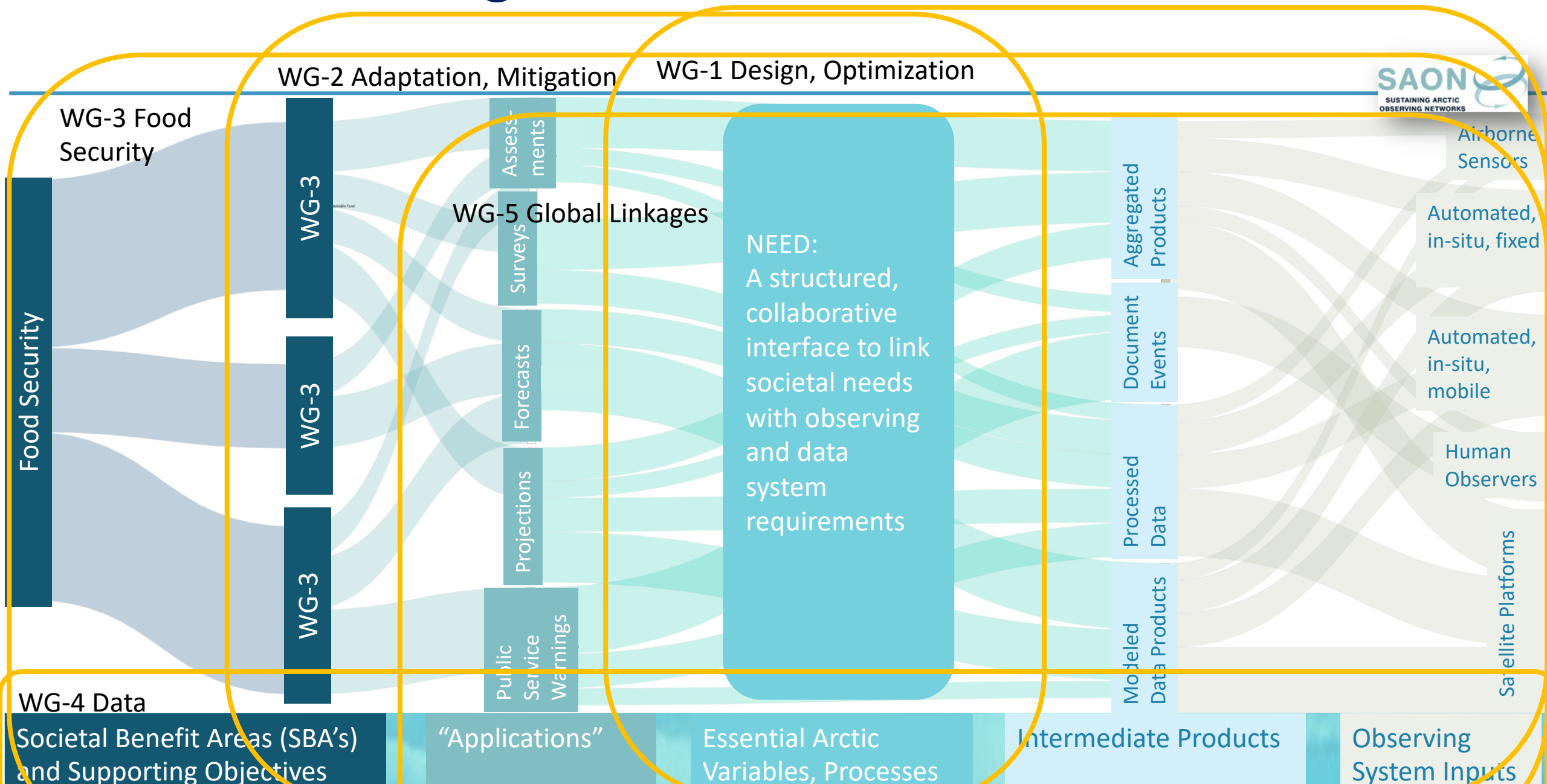
3a. How do I get involved? ROADS and AOS



4. Where should ROADS bring us?

- Towards a clear set of observing targets with well-defined benefits (EAVs);
- Towards robust, collaborative communities of practice to define & integrate observing system best practices and requirements;
- Towards pan-Arctic implementation strategies resulting in integrated, co-designed, sustained observations and accessible data and information streams.

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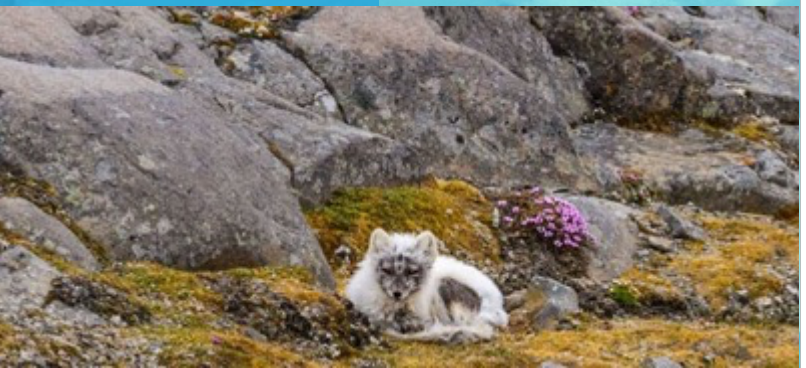

Wishing everyone a successful AOS2020!

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3b. ROADS Strategy for Mobilization: Funding Opportunities

1. US: Navigating the New Arctic and related Research Networking Activities
   - E.g. Food Security RNA (in review)
   - E.g. Permafrost Network (awarded)
   - E.g. Rain on Snow Events (awarded)
2. EU: H2020, Arctic GEOSS (pending)
3. Arctic Regional Component – GOOS, UN DECADE (initiating)

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Candidate Topical Foci for ROADS Expert Panels	Global	Regional	Local (needs attention from WG-3, 4 and others, examples started)	Identify Essential Arctic Variables	Develop Requirements for Observing, Data Management	Develop Implementation Strategy for Meeting Requirements
Meteorology, Hydrology	WMO, GCOS	COPERNICUS, INTAROS, INTERACT, SIOS, IASC-AWG		✓	✓	✓
Atmospheric Composition	GAW, GCOS	AMAP, IASOA, SIOS COPERNICUS, IASC-AWG		✓	✓	✓
Biodiversity	GEOBON, GCOS	CBMP, AMBON, DBO	PISUNA	✓	-	-
Food Security	GEOGLAM	(Proposed) AOS FSWG, SDWG, CBMP	ELOKA	-	-	-
Terrestrial Ecology		INTERACT, NEON, PCN,CAFF-CBMP, PEEX, T-MOSIAC, IASC-TWG		-	-	-
Cryosphere	GCW, GCOS	CliC, AMAP, PCN, GrIOOS, SIOS, IASC-CWG COPERNICUS, INTAROS	Snowchange Cooperative	✓	✓	✓
Integrated Ocean	GOOS, GCOS	ARC-GOOS, IASC-MWG IOOS/AOOS, CAFF-CBMP EuroGOOS, CIOOS, COPERNICUS, DBO, SIOS, INTAROS, Nansen	PISUNA	✓	✓	✓
Social Science		SDWG, ASI, IASC-SHWG		-	-	-
Litter and Microplastics		AMAP, CAFF (AMBI), PAME		✓	-	-
Ocean	GOAN	AMAP, IASC-MWG		✓	-	-

ROADS Advisory Panel will facilitate integration across EAV's, requirements & implementation strategies