ARCTIC SDI
ROADMAP & IMPLEMENTATION
PLAN 2020 – 2025

A collective work by the national mapping agencies of the eight Arctic countries: Canada, Finland, Iceland, Norway, Russia, Sweden, United States of America and the Kingdom of Denmark

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Approved by the Arctic SDI Board

Implementation Plan Overview

Five long-term strategic objectives and their anticipated outcomes are identified in the *Arctic SDI Strategic Plan 2020-2025*. The purpose of this *Arctic SDI Roadmap & Implementation Plan 2020-2025* is to guide Arctic SDI's direction for the next five years and inspire the Arctic community to contribute to a comprehensive, usable and relevant spatial data infrastructure for the Arctic. This document provides a roadmap for implementation and provides the context, anticipated outcomes and approach to operationalize each of the five strategic objectives through the identified actions.

The Arctic SDI Board evaluates strategic progress annually by reviewing the *Prioritized Activities List* supported by selected *Key Performance Indicators*. The Board ensures agreement on activities, responsibilities, coherence and timing for the deliverables documented in the *Prioritized Activities List*, thus organizing the work between the Arctic SDI Working Groups and the outreach and partnerships with other stakeholders.

All activities are reviewed against the Arctic SDI Reference Model, which lists essential SDI components to be achieved to build a multidimensional digital Arctic by and for the community.
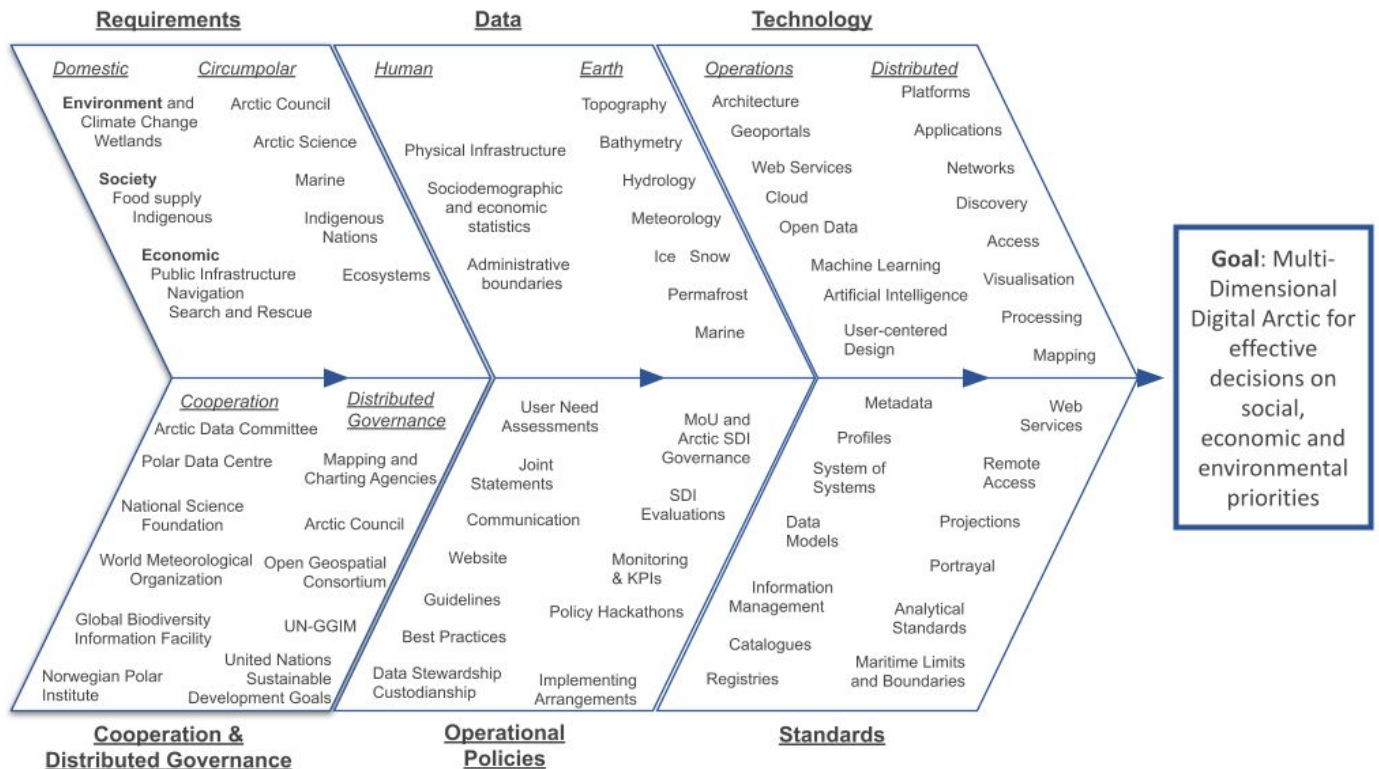

Figure 1: The updated Arctic SDI Reference Model frames parallel efforts across stakeholders who manage their own strategic objectives towards the building of a "system of systems." It provides high level scoping for potential SDI components and has been used to guide the Arctic SDI strategic planning and activities.

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Objective 1. Promote Data and Services Availability

The Arctic is changing dramatically and the consequences are underway. Authoritative, reliable spatial data and information are an urgently needed component of the SDI to support sustainable social, economic and environmental development in the Arctic. Helping to meet this growing need is a priority of the *Arctic SDI Strategic Plan 2020-2025*, which will focus actions on the requirements of Arctic Council and its working groups as well as those of other key Arctic stakeholders.

Anticipated Outcomes
Well-developed and maintained Arctic SDI services are seen as an important contribution to a coherent spatial data infrastructure. Increasing the availability of reliable and relevant authoritative spatial data in the Arctic by securing access to the most important reference data for the Arctic region is another key outcome. Together this will support the development of a multidimensional digital Arctic where data is easy to find, interpret and use by humans, machines or applications.

Approach
The primary approach is to continue maintenance and development of the Arctic SDI platform to provide simplified access to data, services, tools and documentation through the Arctic SDI website[1] and the Geoportal. This includes sharing data from the holdings of the national mapping agencies of the Arctic nations as well as facilitating access to other authoritative Arctic data through partnerships with relevant data distributors.

The Arctic SDI Topographic Basemap, using common cartographic specifications and provided from each country's data holdings, is an important reference map in the Arctic. That said, in order to expand its use in Arctic mapping applications the Basemap needs further improvements to meet multiple identified stakeholders needs.

Additionally, the Arctic SDI will encourage the establishment of data stewardship repositories by key partners to support data providers who have limited or no IT-resources for delivering their data and will encourage the use of SDI principles[2] so that data is collected, documented and distributed using international standards.

Other important aspects of this approach will be to:
- identify the most useful authoritative spatial data based on prioritized use cases,
- improve discovery and access to authoritative data,
- identify available data from other sources,
- continue documentation supporting the operational policies and guidance (standards, technology, procedures, etc.) required to enable the data providers to participate in the Arctic SDI, and
- assess the level of effort required by data providers and staff of the participating National Mapping Agencies to incorporate data into the Arctic SDI.

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[1] Arctic SDI Website: https://arctic-sdi.org/
[2] SDI Manual for the Arctic: https://arctic-sdi.org/wp-content/uploads/2017/04/SDI-Manual-for-the-Arctic-EDITED2_PS.pdf

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Actions

	Actions
1.1	Develop and operate the Cloud environment and services, including the Geoportal, as the Arctic SDI platform.
1.2	Seek partners and act as a broker to increase data availability.
1.3	Improve the Arctic SDI Basemap and integrate key partner data layers in the Geoportal.
1.4	Increase Arctic data available via standardized Web Services.
1.5	Exploit NMA data holdings when initiatives are taken to create curated reference and thematic data and services around topics prioritized by stakeholders.

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Objective 2. Promote Interoperability

Interest and activities in the Arctic have increased significantly in recent decades. A variety of activities across the region create valuable spatial information that could be used for effective decision-making in the Arctic. Unfortunately, this data is often kept for limited or local use, or shared in ways that prevent it from being reused or combined with other data and information.

Anticipated Outcomes

Across the Arctic there is increased data sharing and interoperability based on international standards to ensure that data, including geospatial and non-geospatial scientific and statistical data from multiple sources, can be easily combined to help address challenges in a changing Arctic.

Approach

By promoting interoperability, building on international standards and existing spatial data infrastructures, Arctic SDI will continue its efforts to make data accessible and interoperable, bridging the differences between domains.

The approach is to accelerate the implementation of open geospatial standards and technologies in three ways:
- Take advantage of our relationships with international standards bodies, primarily OGC, ISO and IHO and extend the power of OGC pilots and testbeds to benefit from a big community of developers and experts with long experience of addressing standardization challenges.
- Work with partners in the scientific domain, such as the Arctic Data Committee, established by SAON & IASC, to provide solutions for the need to combine scientific and statistical data with geospatial data.
- Use the Arctic SDI Geoportal to highlight the power of data discovery, delivery, visualization and analysis when data is shared and distributed in a standardized manner.

Actions

	Actions
2.1	Position the Geoportal to convey the value of standards and best practices for data discovery, delivery, visualization and analysis.
2.2	Highlight interoperability of services through embedded maps.
2.3	Leverage existing memberships of international standards bodies to enable data sharing across disciplines and organizations to create a comprehensive view of Arctic data and information.
2.4	Promote use of standards for data sharing across organizations through pilots, use cases and other efforts to test and improve data interoperability.
2.5	Monitor technical trends and opportunities for incorporation of new data and service types into the Arctic data ecosystem.

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Objective 3. Strengthen Engagement

Changes in the Arctic affect us all which means there is a diversity of stakeholders from communities, businesses, academia, public and private organizations, and governments across the Arctic. Outreach and partnership activities are key to understanding the diversity, interrelationships and needs of long-term Arctic stakeholders, and establishing a user driven spatial data infrastructure for the Arctic that creates value.

Anticipated Outcomes

A growing understanding of the concept "We are all Stakeholders," based on a deeper insight of the needs and requirements of Arctic data providers and users, increased awareness of how to participate with an understanding of the roles and responsibilities necessary to develop an effective and socially valuable spatial data infrastructure for the Arctic. This will result in a relevant supply and demand of standards based Arctic data and appropriate use of available data management tools.

Approach

To achieve this goal Arctic SDI will identify and pursue windows of opportunity with the key stakeholders that use and supply Arctic data, and collaborate and establish partnerships with key organizations that are providing SDI tools and guidance documents (e.g. reference data in the Arctic region, support and guidance for data management, guidance and development of standards and methods for data interoperability).

These organizations include the Arctic Council and its working groups and others like the Arctic Regional Hydrographic Commission (ARHC), World Meteorological Organization, US National Snow and Ice Data Center, Polar Geospatial Center at the University of Minnesota, Arctic Data Committee, ISO and OGC. The National Mapping Agencies will also continue to use their national participation in UN-GGIM to promote the Arctic Spatial Data Infrastructure as an example of a regional SDI contributing to the UN Sustainable Development Goals, and as the most relevant source for authoritative fundamental data covering the Arctic.

The results of these efforts will be concentrated around values that are less easily measured such as maximized access to common datasets across user groups, increased efficiency in decision making, improved international cooperation, and advancements in scientific knowledge.

Actions

		Actions
3.1		Focus outreach towards the Arctic Council, entities and other key stakeholders that use and supply Arctic data.
3.2		Collaborate and establish partnerships with key organizations in the development of an efficient regional SDI in the Arctic.
3.3		Identify requirements across stakeholder groups to guide the selection of technical enhancements and evolution of reference and thematic data, services and tools.
3.4		Evaluate shared value creation with stakeholders.
3.5		Develop a common SDI understanding across Arctic stakeholders through adopted use cases.

Objective 4. Amplify Communication Channels

For many stakeholders, the data collection and delivery principles of a spatial data infrastructure are not their main priority. Therefore, communicating the value that using standards and increasing interoperability will bring to them, and building capacity on how data can be accessed and used, is a key to building a digital Arctic. Arctic SDI is also an example of scientific and technical collaboration in action, which provides data that help guide complex discussions and actions among Arctic communities.

Anticipated Outcomes
Arctic SDI is perceived as a serious and reliable partner with consistent messages and deliverables that are understood and create value for the Arctic stakeholders. A suite of informative material and guidelines on data management best practices and standards is in place. Communications with the administrative and political stakeholders is closely coordinated with Arctic SDI partner organizations.

Approach
The Arctic SDI Website, Arctic SDI Geoportal, and a suite of publications and presentations to support outreach activities will be the main tools for Arctic SDI communication to reflect the strategic priorities and deliverables of the Arctic SDI. In cooperation with our SDI partners these communication tools will be further developed to include the relevant topics of partner organizations and ensure messages and outreach activities are well coordinated.

Actions

	Actions
4.1	Communicate that "we are all stakeholders" in the development of an SDI that reflects the strategies, priorities, strengths and roles of the participating bodies and partner organizations.
4.2	Update and further develop Arctic SDI communication tools, methods and channels.
4.3	Coordinate key messages with partners.
4.4	Showcasing the Arctic Spatial Data Infrastructure as an efficient regional SDI

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Objective 5. Further Governance and Business Processes

Guiding and contributing to the development of the Arctic spatial data infrastructure requires a long-term commitment and prioritized use of resources offered into the Arctic SDI by the National Mapping Agencies. This work includes partnering on documentation such as guidelines, best practices, procedures and manuals meant to serve the broad needs of Arctic stakeholder communities. This will facilitate common approaches that support delivery, access and use of relevant geospatial data in the Arctic.

Anticipated Outcomes

Arctic SDI services are widely used, partnerships and outreach activities are run efficiently, cost effectively and capitalize on previous national as well as international spatial data infrastructure work. The National Mapping Agencies bring together experts to extend domestic data holdings and incorporate on-going activities. The Arctic SDI benefits from and contributes to the development of the global spatial data infrastructure.

Approach

The Arctic SDI will continue its work based on the *Memorandum of Understanding* and the *Arctic SDI Governance Document*. The cooperative efforts have resulted in demonstrable contributions guided by our strategic objectives and approved prioritized activities and documented in the *Operational Setup*. Cooperation, outreach and communication actions as well as the development of services and tools are based on the guiding principles of value creation, building partnerships and leveraging existing investments through a flexible approach with respect to the diversity of partners, stakeholders and general framework conditions.

Actions

	Actions
5.1	Document the requirements, roles, responsibilities, processes and policies of National Mapping Agencies, partners and other stakeholder groups.
5.2	Publish operational policies for the greater Arctic community based on stakeholder needs, and SDI principles of open standards, interoperability and a suite of technical components.
5.3	Maintain and develop the Arctic SDI governance, business processes, and user terms and licenses to ensure effective and sustainable operation of the organization.

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