

Arctic SDI Strategy Working Group

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Arctic Spatial Data Infrastructure Strategic Plan

2015-2020

**Table of Contents**

[Purpose of the Strategic Plan 2](#_Toc402992078)

[Strategic Plan Overview 2](#_Toc402992079)

[Introduction and Background – from Idea to MOU and Strategy 2](#_Toc402992080)

[Arctic SDI Vision and Mission 3](#_Toc402992081)

[Guiding Principles for the Arctic SDI Activities 3](#_Toc402992082)

[Arctic SDI Reference Model 4](#_Toc402992083)

[Arctic SDI Strategic Plan, 2015-2020 4](#_Toc402992084)

[From a Map into an Infrastructure 4](#_Toc402992085)

[Long-Term Objectives and Anticipated Outcomes 5](#_Toc402992086)

[*Objective 1. Address Needs of Arctic Council and Other Users* 7](#_Toc402992087)

[*Objective 2. Provide Reference Datasets* 9](#_Toc402992088)

[*Objective 3. Facilitate Access to Thematic Data Sets* 11](#_Toc402992089)

[*Objective 4. Data Interoperability* 13](#_Toc402992090)

[*Objective 5. Provide a Suite of Spatial Operational Policies for the Arctic SDI* 15](#_Toc402992091)

[*Objective 6. Operational and Strategic Communications* 17](#_Toc402992092)

[*Objective 7. Resources and Financing* 19](#_Toc402992093)

**Arctic Spatial Data Infrastructure Strategic Plan, 2015-2020**

# Purpose of the Strategic Plan

The purpose of Arctic Spatial Data Infrastructure (Arctic SDI) is to ensure that stakeholders working in the Arctic can meet their goals and objectives by using reliable and interoperable geospatial reference data provided by the National Mapping Agencies in the Arctic. This Arctic SDI Strategic Plan is a living document which priorities and identifies where energy and resources could be best spent to implement the Arctic SDI. The primary audience for the Strategic Plan is the Arctic SDI Board. Secondary audiences include the Arctic Council, Arctic Council Working Groups, and other stakeholder groups.

# Strategic Plan Overview

This Strategic Plan is comprised of two sections:

1) A high-level overview containing a long-term vision and list of Arctic SDI objectives

2) An Implementation Plan with detailed information regarding each of the seven specific objectives, anticipated outcomes and strategies to accomplish the objectives and outcomes. The anticipated outcomes and strategies in the Implementation Plan will be linked to the Activity Plans of the Arctic SDI Working Groups to secure responsibilities for implementation.

# Introduction and Background – from Idea to MOU and Strategy

The Arctic Spatial Data Infrastructure was created to provide access to reliable geospatial information over the Arctic to facilitate monitoring and decision making, to help understand the impacts of climate change on nature, to support biodiversity management issues, and to support adaptability and sustainable use of all resources in the Arctic.

**Arctic SDI**

**National Mapping Agencies**

* Earth Sciences Sector of the Department of Natural Resources Canada
* Danish Geodata Agency
* National Land Survey of Finland
* National Land Survey of Iceland
* Norwegian Mapping Authority
* Federal Service for State Registration, Cadastre and Mapping of the Russian Federation
* Swedish Mapping, Cadastral and Land Registration Authority
* United States Geological Survey

The first cross bordering geospatial data cooperation in the Arctic was the Geographic Information Technology within the Barents Region Project, or GIT Barents ([www.gitbarents.com](http://www.gitbarents.com)), launched in the 1990s by the national mapping agencies in Finland, Norway, Russia and Sweden. Its purpose was to increase the use of spatial information within the Barents Region by producing a common geographic database covering the entire region and to establish an internet-based infrastructure aligned with the principles of the EU Infrastructure for Spatial Information (EU INSPIRE) Directive.

The Yellowknife Declaration introduced the Arctic SDI at the GeoNorth conference in Yellowknife, Canada in August 2007. Following a request from the National Mapping Agencies of the Arctic Council Member States, the Arctic Council unanimously gave its formal support to the Arctic SDI initiative at its Senior Arctic Officials meeting in November, 2009.

By 2014, the National Mapping Agencies of the Arctic Council member countries had made significant progress toward building an Arctic Spatial Data Infrastructure. A Memorandum of Understanding (MOU) was signed in February, 2014 with the objective to provide public access to authoritative geospatial reference data covering the Arctic and to assume the responsibility for taking the lead in building a Spatial Data Infrastructure for the Arctic, as well as facilitating access to geographically-related thematic Arctic data, digital maps and tools to generally support monitoring and decision making and a more robust management and manipulation of data for research, management, planning and business purposes.

The National Mapping Agencies have agreed to a framework and governance model for the cooperation and prioritized activities. Services are developed and managed through the commitment and resources voluntarily made available by the agencies involved as agreed to in the Arctic SDI MOU. The National Mapping Agencies have dual responsibilities in Arctic SDI- the first is the publication of selected data from their respective holdings; the second is to further Spatial Data Infrastructure best practices, with special reference to the Arctic.

The Arctic Council is strongly supportive of the Arctic SDI. The primary contact to liaise with the Arctic Council, as well as to explore possibilities for pilot activities, has been the Arctic Council Working Group Conservation of Arctic Flora and Fauna (CAFF). Engagement with other Arctic Council Working Group is promising and emerging.

# Arctic SDI Vision and Mission

The Arctic SDI vision, context and scope, as well as an introduction to the concept and the status of the cooperation and governance is available in *The Arctic SDI Framework Document* (http://arctic-sdi.org/index.php/strategic-documents/).

**Vision:**An Arctic SDI - based on sustainable co-operation between mandated national mapping organizations - will provide access to spatially related reliable information over the Arctic to facilitate monitoring and decision making.

**Mission:**To provide the best Geodata in the Arctic and support tools for data discovery, access and sharing.

# Guiding Principles for the Arctic SDI Activities

The following guiding principles serve as a guide to assess proposed activities and priorities when formulating the strategy and communicating the idea of the Arctic SDI.

The cooperation between the National Mapping Agencies behind the Arctic Spatial Data Infrastructure:

* Is based on a voluntary multilateral cooperation
* Is focused on accessible authoritative geospatial reference data
* Is flexible, acknowledging that the ability to deliver reference data varies between the mapping agencies
* Strives to keep the development simple while also envisioning the fully developed infrastructure
* Participates in cooperative activities including circumpolar and Arctic regional initiatives

The Arctic SDI Infrastructure:

* Is stakeholder driven
* Services are user driven
* Is based on and aligned with the global, national and regional geodata context – e.g. UNGGIM, OGC, ISO, INSPIRE and ELF, CP-IDEA, GEOSS, NSDI, CGDI and recognizes the Open Data Principle
* Capitalizes on previous Spatial Data Infrastructure work and recognizes the evolution of the acceptance of standards
* Is a standardization exercise guiding stakeholders
* Strives to communicate to the different levels in stakeholder organizations in clear language
* Identifies each component in the Reference Model to facilitate parallel developments amongst stakeholders

# Arctic SDI Reference Model

The Arctic SDI Reference Model depicts a conceptual framework of an interlinked set of clearly defined concepts to encourage clear communication. The Reference Model defines categories that provide high level scoping for subsequent development of potential Arctic SDI activities, thus guiding the priorities of the strategy.



# Arctic SDI Strategic Plan, 2015-2020

## From a Map into an Infrastructure

Public access to authoritative geospatial reference data is the key element in the Arctic SDI. With the establishment of the Arctic SDI Geoportal, the first Web Map Service and a Metadata Catalogue Service, the Arctic SDI initiative now has a reliable platform for dialogue with the wide range of stakeholders needed to build the Arctic SDI.

The initial phase of the Arctic SDI was the construction of a fully circumpolar Arctic SDI Web Map Service (WMS) built from separate base map services from each of the National Mapping Agencies at 1:250.000 map scale. This WMS is available from the Arctic SDI Geoportal. The Arctic SDI Geoportal is a web-based mapping portal, serving as a platform for the Arctic SDI services. The WMS includes support for six Arctic SDI polar projections. A Metadata Catalogue Service provides a standards based repository that can harvest metadata of data and web services from a federation of SDI systems.

By voluntarily investing in the initial establishment of the Arctic SDI, the National Mapping Agencies have demonstrated their willingness, ability and commitment for their respective roles in the future of the Arctic SDI. In order to have a constructive dialogue with stakeholders, it will be necessary in the future for the National Mapping Agencies to further define their own roles and responsibilities in the Arctic SDI (Objective 5). This will enable the National Mapping Agencies to clearly communicate what the Arctic SDI, as an “MOU-consortium”, can offer the stakeholders in the scope of services over time (Objective 2 and 3) and related business models to be developed (Objective 6). It also enables the National Mapping Agencies to convey and manage stakeholders’ expectations of the National Mapping Agencies, and to convey the kind of demands, contributions and commitment expected from the various other stakeholders participating in the Arctic SDI (Objective 1 and 3).

It is also necessary for the Arctic SDI to communicate (Objective 6) how users can benefit from the first version of the Arctic SDI Web Map Services, including identifying which immediate user needs it meets (Objective 1). This will facilitate a constructive dialogue identifying the gaps between the services currently available and basic user needs as well as their need for thematic data (Objective 2 and 3).

The Arctic SDI is a long-term investment with endless possible improvements and enhancements. The Arctic SDI Strategy 2015–2020 is the first step to engage the stakeholders and identify user needs in terms of geospatial reference data, tools, services, and applications (Objective 1), promote Arctic SDI policies and guidelines for thematic geospatial data (Objective 3, 4 and 5); and to assess the organization, standards, governance and funding of this endeavor (Objective 5 and 7).

This effort requires committed partners among the potential stakeholders and demands a realistic prioritization, efficient communication and relies on effective use of existing work in the field of Spatial Data Infrastructures. The strategy process also demands the firm determination from the National Mapping Agencies to cooperate and engage meaningfully for a long period (Objectives 5 and 7).

## Long-Term Objectives and Anticipated Outcomes

Seven long-term strategic objectives have been identified below, with anticipated outcomes to be achieved for each. Each objective is detailed as a separate item in the Implementation Plan following this primary document. Arctic SDI Working Group Activity Plans will be aligned with the Implementation Plan as the Activity Plans are revised.

The primary objectives, anticipated outcomes and Arctic SDI Working Groups involved are listed in the table below.

| **Objective** | **Objective Description** | ***Anticipated Outcomes*** | **Arctic SDI Working Group** |
| --- | --- | --- | --- |
| Objective 1 | Address Needs of Arctic Council and Other Users  | *A thorough understanding of the primary stakeholders, their needs and role in the Arctic SDI* | **Primary:** Communication**Supporting:** All |
| Objective 2 | Provide Reference Datasets | *Ensure reference data for the Arctic is available to users through the Arctic SDI*  | **Primary:** Technical**Supporting:** Communication |
| Objective 3 | Facilitate Access to Thematic Datasets | *Facilitate user access to needed thematic geospatial data of the Arctic, from a variety of sources, through the Arctic SDI using accepted standards* | **Primary:** Technical**Supporting:**Communication |
| Objective 4 | Data Interoperability  | *Diverse data sources will be based on international standards, through the efficient and effective use of shared technology infrastructure* | **Primary:** Technical **Supporting:**Operational Policy, Communication |
| Objective 5 | Provide a Suite of Spatial Operational Policies for the Arctic SDI  | *A suite of operational policies that provide guidance for National Mapping Agencies, stakeholders and users on governance, technical and administrative matters needed to ensure sound implementation of the Arctic SDI* | **Primary:**Operational Policy**Supporting:**All |
| Objective 6 | Operational and Strategic Communications | *A communication strategy and outreach plan to promote the benefits and use of the Arctic SDI, to explain the operation, organization and governance and to communicate data and the goals of the Strategic Plan* | **Primary:** Communication**Supporting:**All |
| Objective 7 | Resources and Financing | *Assessment of resources needed and documented processes and funding mechanisms to support the future of the Arctic SDI infrastructure* | **Primary:**Operational Policy **Supporting:**All |

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# *Objective 1. Address Needs of Arctic Council and Other Users*

### Working Group Involvement

**Lead:** Communication Working Group

**Supporting:** All other Arctic SDI Working Groups

### Background

Addressing the needs of the Arctic Council, Arctic Council Working Groups, and other stakeholders is key to the creation and implementation of the Arctic SDI. Primary to this is a thorough, documented understanding of the data producer, provider and user population, their specific technical environment, and users’ data needs.

### Anticipated Outcomes

The anticipated outcome for this objective is a thorough understanding of the primary stakeholders, their needs and role in the Arctic SDI.

### Strategic Approach

The primary approach to accomplish this objective is to identify and track over time the spatial data needs and requirements of the Arctic Council and their Working Groups, as well as other essential stakeholders. This includes their current and future needs for reference and thematic data, and the services and tools needed to efficiently utilize those data. This will be accomplished by surveying stakeholders within the Arctic Council and its Working Groups, and other international national, and local entities that may need or provide spatially consistent and geographically relevant data over the Arctic. Additionally, research will be undertaken to discover other possible data users and producers. In conjunction with other Arctic SDI Working Groups, the Arctic SDI will communicate, challenge, and validate the evolving Arctic SDI architecture. This objective will be achieved by informal and formal outreach meetings with user groups; workshops at national and international conferences, and public survey questionnaires. Items to be considered in this work include:

* What reference and thematic data is the most useful for different types of users (biologist, social scientist, policy analyst, etc.) and at what geographic, spatial, and time scales
* What is the scope of general knowledge about Geoportals, SDIs and their benefits
* What guidance regarding operational policies (standards, technology, etc.) is required to enable the data providers to participate in the Arctic SDI
* How existing reference and thematic data are being used and accessed, and where it is being accessed from
* How data is most easily discoverable (e.g., via one or more Geoportals Google/Bing, internal national mapping agency databases, etc.)
* What data services are preferred (open standards, proprietary, hybrid-standard mix, etc.)
* What types of future requirements would be needed to better accomplish user work in the Arctic
* What data products could the user or other providers contribute

Review and consideration will be given to adoption of commonly accepted use centered design methodologies (<http://en.wikipedia.org/wiki/User-centered_design>).

### Relationships to Other Objectives

This objective intersects strongly with Objective 2 - Provide Reference Datasets, Objective 3 - Facilitate Access to Thematic Datasets, Objective 4 - Data Interoperability, Objective 5 - Provide a Suite of Spatial Operational Policies for the Arctic SDI, and Objective 6 - Operational and Strategic Communications.

### Resources Needed

This objective will actively employ the Communication and Technical Working Group as well as other Working Groups as needed. Other individuals will be contacted and asked to contribute as needed to accomplish this objective, such as recommendations from the Arctic Council Working Groups on who to contact as information sources for this objective.

### Implementation Process

The implementation for this objective is focused on five major activities, with each stage providing information that leads to enhanced data gathering on the needs and uses of Arctic SDI information. The primary activities include:

1. Assessment of user needs of two Arctic Council Working Groups – Conservation of Flora and Fauna and Emergency Prevention, Preparedness and Response – to obtain preliminary baseline information
2. Establish contact and exchange information with the Arctic Council Working Groups Protection of the Arctic Marine Environment and Arctic Monitoring and Assessment Program about their data
3. Establish contact with at least one academic institute regarding the Arctic SDI
4. Assessment of other Arctic Council Working Groups to obtain preliminary baseline information on needs and accessibility
5. Initiation of other data user needs via presentations in conferences, formal and informal visits, and formal questionnaire

### Key Performance Indicators

* Documented user satisfaction through report summaries

# *Objective 2. Provide Reference Datasets*

### Working Group Involvement

**Lead:** Technical Working Group

**Supporting:** Communications Working Group

### Background

The National Mapping Agencies involved in the Arctic SDI have committed “To give access to reference datasets provided by the NMAs of selected, relevant national topographic and other types of data such as land cover, hydrology, and other data that may be available” (Board Decision, 30 Mar 2012 Arctic SDI Board Meeting). Reference Data is defined in the Arctic SDI Framework Document as “vector data used in creation of reference or base map of the Arctic. The base will form the backdrop for thematic data. Includes place names, projections, and symbology” (Appendix 2, 3.e).

Reference datasets from the National Mapping Agencies comprise a seamless base map through a Web Mapping Service providing reference geographic information for the Arctic. The National Mapping Agencies will also supply other discreet reference geospatial datasets as needed, available and authorized. This does not mean all reference data will come from the National Mapping Agencies- as relevant, useful and necessary, reference datasets from other sources may be made available through the Arctic SDI.

### Anticipated Outcomes

The anticipated outcome for this objective is to ensure reference data for the Arctic is available to users through the Arctic SDI.

### Strategic Approach

The primary approach to accomplish this objective is to provide the most current and complete reference data available.

* Further define and refine which reference datasets are available from the National Mapping Agencies and which reference datasets are important to users and stakeholders
* Identify and seek approval to utilize additional National Mapping Agency and non-National Mapping Agency reference datasets with a documented user need (Objective 1)
* The National Mapping Agencies will work together through the Technical Working Group to investigate, document and provide reference data in the most efficient way and in line with adopted open standards (Objective 4)
* In the case of reference datasets being provided from non-National Mapping Agency groups, work with possible reference data providers to understand available datasets, their uses and limitations, legal frameworks, metadata and standards and determine the most efficient ways to access the datasets (Objective 4)

### Relationships to Other Objectives

This objective intersects strongly with Objective 1 - Address Needs of Arctic Council and Other Users, Objective 4 - Data Interoperability, and Objective 6 - Operational and Strategic Communications.

### Resources Needed

This objective will actively employ the Technical and Communication Working Group, as well as other Working Groups as needed. Other individuals will be contacted and asked to contribute as needed to accomplish this objective, such as recommendations from the Arctic Council Working Groups on who to contact as information sources for this objective.

### Implementation Process

The implementation for this objective will be in several steps. The primary activities include:

1. Creation of a seamless reference base map Web Mapping Service including data from all the participating National Mapping Agencies (Accomplished, 2014)
2. Analysis to understand reference dataset gaps that could be filled by National Mapping Agency datasets, including surveys of National Mapping Agency holdings and user/stakeholder surveys
3. Addition of National Mapping Agency reference datasets discovered in step 2
4. Analysis to understand reference dataset gaps that could be filled by non-National Mapping Agency datasets, including user/stakeholder surveys
5. Dataset searches to find reference datasets held by non-National Mapping Agency that meet the needs of users/stakeholders
6. Outreach to non-National Mapping Agency data provider groups to ascertain information to add datasets or metadata information to the Arctic SDI for those reference datasets
7. Research possible incentives to encourage non-National Mapping Agency reference data providers to participate in the Arctic SDI

Examples of upcoming work includes place names information from the National Mapping Agencies and possibly a pan-Arctic digital elevation model (DEM).

### Key Performance Indicators

* Inclusion of National Mapping Agency appropriate and authorized reference data
* User satisfaction of existing reference data base map Web Map Services
* User satisfaction with accessing needed reference datasets easily
* User satisfaction with accessing metadata and Catalog searches for reference data

# *Objective 3. Facilitate Access to Thematic Data Sets*

### Working Group Involvement

**Lead:** Technical Working Group

**Supporting:** Communications Working Group

### Background

Thematic data are non-reference (i.e. non-basemap) datasets related to a theme of physical or human geographies, such as transportation, flora or fauna species mapping, ice extent predictions, etc., organized as thematic layers. Dataset providers could be governmental or interest organizations, companies, etc., or the National Mapping Agencies themselves. These datasets and metadata could be delivered and harvested using the same service alternatives as described for the reference data.

For end users, Arctic SDI Applications provides access to discover, view and download the underlying datasets, as well as access the reference data Web Mapping Services. Different applications with different Graphical User Interfaces (GUI) could present the datasets in numerous ways, according to independent needs and hardware/software platform. The searchable metadata catalog will be a central part of the applications, and thematic data from external partners will be overlain on the seamless background map from the mapping organizations. Data processing and overlay analysis could also be combined with the existing datasets.

### Anticipated Outcomes

The anticipated outcome for this objective is to facilitate delivery and user access to thematic geospatial data of the Arctic, from a variety of sources, through the Arctic SDI using accepted standards.

### Strategic Approach

The primary approach to accomplish this objective is to understand and document thematic data needs of users and then understand and document the role data providers play. Then, based on user requirements, engage with data providers to identify and facilitate data publication via ISO standards, OGC specifications and common operational policies. The Arctic SDI establishes collaboration based on guiding operational policies that focuses on sustaining and growing the data available through the Arctic SDI, and other spatial data infrastructures.

* The Communications Working Group will further define and refine which thematic datasets are needed and will identify the data providers through surveys, beginning with Arctic Council Working Groups such as the Conservation of Arctic Flora and Fauna and Emergency Prevention, Preparedness and Response (Objective 1), and subsequently working through a similar process with other stakeholders
* The Communications Working Group will engage with the Technical Working Group to investigate and document thematic data and reach out to the data providers to identify which operational policies are needed to facilitate an efficient and standardized way to establish access (Objective 4)
* Identify and seek approval to utilize additional thematic datasets (Objective 1)
* Thematic datasets being provided from non-National Mapping Agency groups requires work with the providers to understand available datasets, their uses and limitations, legal frameworks, metadata and standards and determine the most efficient ways to facilitate access the datasets

### Relationships to Other Objectives

This objective intersects strongly with Objective 1 - Address Needs of Arctic Council and Other Users, Objective 4 - Data Interoperability, Objective 5 - Provide a Suite of Spatial Operational Policies for the Arctic SDI, and Objective 6 - Operational and Strategic Communications.

### Resources Needed

This objective will actively employ the Technical and Communication Working Groups, as well as other Working Groups as needed. Other individuals will be contacted and asked to contribute as needed to accomplish this objective (e.g., recommendations from the Arctic Council Working Groups on who to contact as information sources for this objective).

### Implementation Process

The implementation for this objective will be in several steps. The primary activities include:

1. Analysis to understand thematic dataset needs through user/stakeholder surveys
2. Dataset searches to find thematic datasets that meet the needs of users/stakeholders
3. Outreach to data provider groups to ascertain information to add datasets or metadata information to the Arctic SDI for those reference datasets
4. Identify operational policies needed to facilitate an efficient and standardized way to establish access to thematic data
5. Research possible incentives to encourage non-National Mapping Agency data providers to participate in the Arctic SDI

### Key Performance Indicators

* User satisfaction of thematic data available through the Arctic SDI
* Number of hits on thematic data set searches (if technically feasible)

# *Objective 4. Data Interoperability*

### Working Group Involvement

**Lead:** Technical Working Group

**Supporting:** Communication and Operational Policy Working Groups

### Background

Standards facilitate the development, sharing, and use of geospatial data, providing consistent and interoperable patterns for creating, reproducing, updating and maintaining geographic information and services for decision-makers. Geospatial standards are technical documents that address specific interoperability challenges. Software developers and data producers use these documents and resources to build open interfaces into their products and services. The standards also provide an indicator of quality, including the structure for encoding metadata to help identify geospatial data.

Arctic SDI is grounded in common, consensus-driven, interoperable, international standards. Each member of the Arctic SDI is also a member of international standards or specifications bodies, including ISO and the Open Geospatial Consortium. It is of mutual benefit for each member country to work as collaboratively as possible at these bodies to garner further efficiencies and effectiveness by pursuing common needs across a larger variety of standards Working Groups.

### Anticipated Outcome

The Anticipated Outcome for this objective is that diverse data sources are based on international standards, through the efficient and effective use of shared technology infrastructure.

### Strategic Approach

In concert with other objectives and Working Group activity plans, data interoperability shall be achieved via a series of strategies:

* Understand what data the stakeholder community would like to consume and how to best meet that need
* Explore and document which services, and/or their functionality, meet those needs
* Represent web services requirements at standards, specifications or other bodies
* Identify who owns the data and who will publish it to standards
* Develop architecture and data flows and web services
* Maintain and enhance “data supplier” and “data consumer” relations

To accomplish the Interoperability Outcome a series of user engagement processes ranging from data identification to standards development or application. This includes their current and future needs for reference and thematic data, and the services and tools needed to efficiently utilize those data.

### Relationships to Other Objectives

This objective intersects strongly with Objective 1 - Address Needs of Arctic Council and Other Users, Objective 2 - Provide Reference Datasets, Objective 3 - Facilitate Access to Thematic Data Sets, Objective 5 - Provide a Suite of Spatial Operational Policies for the Arctic SDI, and Objective 6 - Operational and Strategic Communications.

### Resources Needed

Resources required for data interoperability include those needed for: requirements gathering, representation at standards bodies, outreach activities, professional networking, open source and proprietary solution sets, roadmap and architect development.

It is expected existing and respective national SDI initiatives, standards representation and the technology community’s collective efforts meet most of the resource requirements. Net incremental cost is expected to be neutral to contracting of standards roadmap and architecture technical bulletin.

### Implementation Process

The implementation for this objective will be done in four parallel or consecutive streams:

1. Information Collection- Arctic Council data and service needs
2. Roadmap Development – of which standards would best serve the data’s users, for example: domain standards, feature catalogue, ontologies, metadata profile, metadata and feature type registers, clearinghouses, and specific services such as Web Mapping Service or Web Feature Service.
3. Implementation Plan that articulates priorities, actions and performance measures
4. Increase Standards capacity by having strategic and technical documentation ready for Arctic SDI stakeholders and by engaging with Standards Bodies.

### Key Performance Indicators

The following Key Performance Indicators are limited to the scope of this objective:

* Arctic Council stakeholders (human or machine) consuming Arctic SDI services
* Breadth of functionalities that standards enable (e.g. discovery, visualizing, access, analysis, etc.).
* Number of data layers published according to standards
* Types of data published and consumed by services (vector, raster, sensor, etc.)
* Number of web service instances online
* Number of downloads of Arctic SDI Standards documents and who accessed them
* Qualitative measure of collective Arctic representation at standards or specifications bodies

# *Objective 5. Provide a Suite of Spatial Operational Policies for the Arctic SDI*

### Working Group Involvement

**Lead:** Operational Policy Working Group

**Supporting:** All other Arctic SDI Working Groups

### Background

Addressing the needs of the Arctic Council, its Working Groups, and other stakeholders and users is essential in the development of the Arctic Spatial Data Infrastructure (Arctic SDI). Spatial operational policies are a key instrument to address these needs and to eliminate barriers and enable the exchange of location –based information effectively and efficiently.

The spatial operational policies represents a broad range of practical instruments such as guidelines, best practices, procedures and manuals that address topics related to the lifecycle of geospatial information (i.e., collection, management, dissemination, and use) and help facilitate access to and use of spatial information. They apply to the day-to-day business of organizations and address technical and administrative requirements, and make issues such as data access, quality, ownership and integrity easier to manage.

### Anticipated Outcomes

The Anticipated Outcome for this objective is to elaborate a suite of operational policies that provide guidance for National Mapping Agencies, stakeholders and users on governance, technical and administrative matters needed to ensure sound implementation of the Arctic SDI.

### Strategic Approach

This objective is to identify a sufficient suite of operational policies needed to ensure that the necessary guidelines are in place to facilitate the participation of the National Mapping Agencies and targeted stakeholders in the development and operation of the Arctic SDI.

It will be accomplished by:

* Identifying National Mapping Agencies, stakeholder and user needs for operational policies
* Creating a strategic document for operational policies based on the statement that Arctic SDI is based on a suite of standards
* Recommending to the Board a prioritized list of policies to develop based on the need analysis and the identified policy gaps including issues linked to the larger interoperability discussion, e.g. metadata

### Relationships to Other Objectives

This objective intersects strongly with all objectives as operational policies will affect implementation of all other Arctic SDI actions.

### Resources Needed

This objective will actively employ the Communication and Technical Working Groups. Other individuals will be contacted and asked to contribute/review as needed to accomplish this objective (e.g. recognition of existing policies of various bodies including, but not limited to, Arctic Council, international policies, national policies and compliance with Memorandum of Understanding).

### Implementation Process

The implementation for this objective will be completed in stages, with each stage providing information that leads to enhanced policy formulation. The activities include:

1. Identifying and analysing issues pertaining to spatial sharing and use.
	* Operational policies which document the standards and procedures for the technical operation and maintenance of the Arctic SDI - based on dialogue with and documentation from the Technical WG.
	* Operational policies that may affect use of the Arctic SDI such as Intellectual Property Rights, necessary disclaimers for use or other limitations – based on internal assessment and dialogue with external data providers.
2. Conducting needs/requirements analysis in consultation with stakeholders and users.
3. Identifying priority operational policy requirements for Arctic SDI to direct resources for developing and updating operational policies and guidelines.
4. Promoting and raising awareness of geospatial policy issues, solutions and practices.

### Key Performance Indicators

* A document on Arctic SDI spatial operational policies
* Report summaries of reviewed needs/requirements analysis
* Report on the number of downloads of spatial operational policies documents and who accessed them as well as the number and distribution of participants during awareness events
* Recommendations to the Board on actions needed to address spatial operational policy guidance and data-sharing arrangements
* The first Arctic Council Working Groups are able to access and are using policy resources on operational issues and a feedback mechanism are in place.
* Recommendations to the Board on how to promote interoperability internationally from a policy perspective
* Recommendations to the Board on the need for capacity-development resources on spatial operational policies (for example- training, guidelines, web publications, workshops and webinars, etc.)

# *Objective 6. Operational and Strategic Communications*

### Working Group Involvement

**Lead:** Communication Working Group

**Supporting:** All other Arctic SDI Working Groups

### Background

Communicating with and addressing the needs of the Arctic Council, Arctic Council Working Groups, and other users of the Arctic SDI is key to the success and implementation of the Arctic SDI. The Operational and Strategic Communications objective will work to ensure that a consistent message is available to stakeholders that describes the strategies and goals for the ASDI, presents the operational policies and articulates how users and data providers will interact with the ASDI. This message will not be a single presentation or document, but a suite of materials that can be used by members of the ASDI, Working Groups and provided as part of the ASDI Official Website.

### Anticipated Outcomes

The Anticipated Outcome for this objective is to have a communication strategy and outreach plan to promote the benefits and use of the Arctic SDI, to explain the operation, organization and governance and to communicate data and the goals of the Strategic Plan

### Strategic Approach

The primary approach to accomplish this objective is to compile a framework for communication and outreach, so to promote the Arctic SDI towards the Arctic Council Working Groups, research groups and other scientific communities engaged in the Arctic, governments and governmental authorities involved in decision making processes concerning the Arctic, Media and the public including NGOs. Items to be considered in this work include:

* Arctic SDI official Website – operation, updating and editing
* Point of contact for stakeholders, users and the public in general
* Information and key messages
* Coordinate information within the groups of Lead and Supporting Countries and with the Arctic SDI Working Groups
* Identify and coordinate representation in international forums coordinated with the Secretariat of the Chair of the Board in line with the Calendar of Events
* Evaluate and employ methods for developing a feedback loop to ensure that user needs identified in Objective 1 are being met as development of the ASDI continues
* Produce, reference or leverage SDI literature to further an Arctic SDI Standards documents from numerous perspectives for (e.g. Spatial Data Infrastructure (SDI) Manual for the Americas)

### Relationships to Other Objectives

This objective intersects strongly with all the other objectives, but mainly with Objective 1 - Address Needs of Arctic Council and Other Users.

### Resources Needed

This objective will actively employ the Communication and other Working Groups as needed. Other individuals will be contacted and asked to contribute as needed to accomplish this objective (e.g., recommendations from the Arctic Council Working Groups on who to contact as information sources for this objective)

### Implementation Process

As the communication and outreach is a continuous and ongoing activity affecting all Working Groups, an implementation process does not apply. Instead, specific objective targets will be detailed in the Communication Working Group Activity Plan and the work within the Communication Working Group is described in the Terms of Reference, and also within this section under Strategies.

### Key Performance Indicators

* Feedback gathered from stakeholders on whether objectives and activities of the ASDI are meeting their identified needs as we move forward.
* Gather Analytics information about users who visit the site and which pages or documents they visit.

# *Objective 7. Resources and Financing*

### Working Group Involvement

**Lead:** Operational Policy Working Group

**Supporting:** All other Arctic SDI Working Groups

### Background

The resources invested in the initial establishment of the Arctic SDI and the first service providing cross border Arctic geospatial reference data derives from contributions voluntarily made available by the eight Arctic Council National Mapping Agencies.

If the dialogue with core stakeholders reveals the potential for developing the infrastructure and geospatial reference data services in a long perspective there is a need for establishing mechanism that secure funding both for development activities and for the operation of the Infrastructure, the Arctic SDI Geoportal and services.

### Anticipated Outcomes

Assessment of resources needed and documented processes and funding mechanisms to support the future of the Arctic SDI infrastructure.

### Strategic Approach

The strategy of this objective is to provide the basis for long term sustainable funding for the Arctic SDI operation and activities and the objective will be accomplished by

* Estimating the cost to operate the services operated by the eight mapping agencies and the cost to develop the Arctic SDI
* Identifying possible business models, identifying the beneficiaries and estimate the return of investment through cases studies.

This includes an assessment of resources needed, environmental scan of funding mechanisms and consultations focusing on Arctic Council activities and mechanisms in place in the eight National Mapping Agencies and other core stakeholders. Relationships to Other Objectives

This objective intersects with Objective 1 - Address Needs of Arctic Council and Other Users where the survey of user needs is expected also to reveal expectation to the Arctic SDI and the services as well as identification of benefits.

### Relationships to Other Objectives

This objective intersects strongly with all the other objectives.

### Resources Needed

This objective will actively employ the Communication and Technical Working Group, as well as other Working Groups as needed. Other individuals will be contacted and asked to contribute as needed to accomplish this objective if necessary.

### Implementation Process

The implementation for this objective includes the following activities:

1. Assessment of user needs and identification of benefits through dialogue with two Arctic Council Working Groups – Conservation of Flora and Fauna and Emergency Prevention, Preparedness and Response
2. Desktop research on financing mechanisms in the Arctic Council and other relevant pan-Arctic activities
3. Assessment of resources needed to develop and operate the Arctic SDI
4. Describing alternative business models and first draft case studies
5. Present funding mechanism options to the Board and recommend further actions

### Key Performance Indicators

* Desktop research and analysis on financing mechanisms
* Description of alternative business models and draft case studies
* Assessment of resources needed to develop and operate the Arctic SDI
* Recommendation Report to the Board on funding mechanism options