

The Arctic Spatial Data Infrastructure (Arctic SDI)

- Project Plan -

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TABLE OF CONTENTS

1. INTRODUCTION.....	4
1.1. VISION	4
1.2. BACKGROUND.....	4
1.3. PROJECT AIM	5
1.4. PURPOSE OF THIS DOCUMENT	6
1.5. EXPLANATION OF ACRONYMS USED IN THIS DOCUMENT	6
2. WHY IS AN ARCTIC SDI NEEDED?	7
2.1. MONITORING.....	7
2.2. ASSESSMENTS	8
2.3. MANAGEMENT AND SERVICES	8
2.4. RELEVANCE TO INDIGENOUS PEOPLES OF THE ARCTIC	8
3. PROJECT FRAMEWORK	9
3.1. PROJECT PHASES	9
3.2. EXPECTED BENEFITS OF ARCTIC SDI	10
4. DATA DESCRIPTION AND TECHNOLOGY	11
4.1. COVERAGE	11
4.2. SCALE	11
4.3. REFERENCE DATA	11
4.4. TECHNICAL ARCHITECTURE.....	12
5. PROJECT ORGANISATION	13
5.1. PROJECT PARTICIPANTS.....	13
5.2. PROJECT ORGANISATION AND MANAGEMENT.....	13
5.2.1. <i>Project Board</i>	14
5.2.2. <i>Project Steering Committee</i>	15
5.2.3. <i>Project Management Group</i>	16
5.2.4. <i>Working Groups</i>	17
5.2.5. <i>Reference Group</i>	17
6. VISION, STRATEGIES AND WORKPACKAGES	17
6.1. FRAMEWORK.....	17
6.2. PRINCIPLES.....	18
6.3. VISION	18
6.4. STRATEGIES	19
6.4.1. <i>Strategy A: Project organisation in function</i>	19
6.4.2. <i>Strategy B: MOUs regulating each participant’s involvement and responsibilities within the Arctic SDI project will be elaborated and signed.</i>	20
6.4.3. <i>Strategy C: A joint Arctic SDI will be elaborated - combining into one view national reference data and thematic information</i>	21
7. PROJECT FINANCING	23
7.1. FINANCIAL MEANS	23

1. Introduction

This document is compiled and agreed upon by the appointed Arctic SDI Coordinators – refer to above, page 2 – representing the circumpolar National Mapping Agencies.

1.1. Vision

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

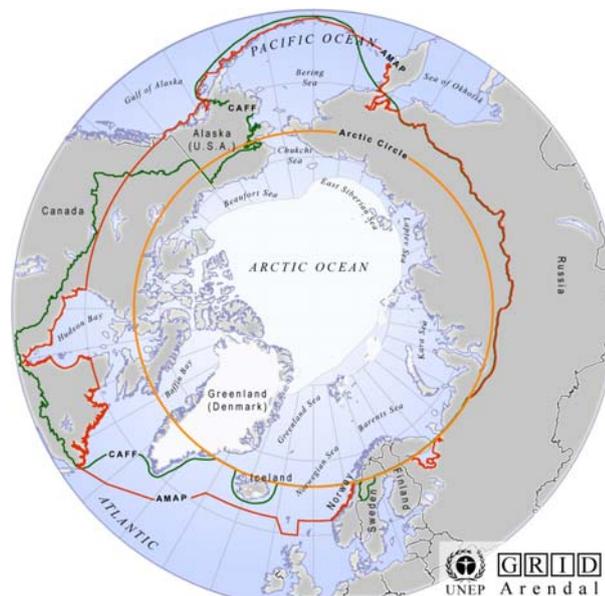


Figure 1. The Arctic can be identified and defined in many different ways depending on what parameters that are used – tree line, climate, arctic circle, temperature, flora, fauna etc. The examples above are used by two of the Working Groups of the Arctic Council. Map is from GRID Arendal (www.grida.no)

The Arctic SDI is to cover the Arctic regions of the involved participating countries, as defined by the countries themselves.

1.2. Background

The GIT Barents is cooperation between four countries (Finland, Norway, Sweden and the Russian Federation). The project was launched in the 1990's in order to increase the ability to use spatial information within the Barents Region – and to produce a common geographic database covering the entire region. An important objective has been to make data available to users within and outside the region by establishing an internet-based infrastructure, i.e. a Regional Spatial Data Infrastructure, aligned with the principles of – Infrastructure for SPatial InfoRmation in Europe (INSPIRE - inspire.jrc.ec.europa.eu)¹.

¹ The INSPIRE directive aims to create a European Union (EU) spatial data infrastructure. This is enabling the sharing of environmental spatial information among public sector organisations and

GIT Barents has resulted in a service which facilitates and helps develop cross-border co-operation, primarily in the fields of environmental planning, monitoring and protection, land use and other physical planning, transports, management of natural resources and development of cross-border tourism.

Preparations for establishing an Arctic SDI have been ongoing for a number of years. At the GeoNorth conferences in 2007 and 2009 the establishment of an Arctic SDI was proposed

(http://www.sciencepoles.org/articles/article_detail/paul_jolicoeur_ipy_geonorth_2007_conference_arctic_spatial_data). During the same period the Arctic Council Working Groups released a number of reports which stressed the need for an Arctic SDI (CAFF 2008, CAFF, AMAP, and EPPR 2009).

The Arctic SDI initiative received, after a request from the Nordic Mapping Organisations, the formal support of the Arctic Council at its Senior Arctic Officials (SAO) -meeting in November 2009: “All Member States expressed their support for and interest in participating in the Arctic SDI project”². The SAOs recognised the value of the Arctic SDI initiative and subsequently Greenland agreed to lead through the Conservation of Arctic Flora and Fauna (CAFF) project in the Arctic Council.

The first meeting of the project team with representatives of the National Mapping Agencies (NMA) from all the arctic countries and from the CAFF Working Group of the Arctic Council was held in Brussels in October 2011. At this meeting a protocol was signed which agreed to establish an interim organisation to be responsible for the production of the project plan and preparations for the formal project start.

The Arctic SDI³ is a pan-Arctic cooperative initiative based on input from the National Mapping Organisations of all eight Arctic Council countries. It has the support of Canada, Denmark, the Faroe Island, Finland, Greenland, Iceland, Norway, Russian Federation, Sweden and the United States.

1.3. Project Aim

The aim of this project is to jointly develop an Arctic SDI to include the following capabilities that will enable pan-Arctic science and societal decision support:

better facilitating public access to spatial information across Europe. The INSPIRE directive came into force on 15 May 2007 and will be implemented in various stages, with full implementation required by 2019.

² Meeting of Senior Arctic Officials, FINAL Report, 12-13 November 2009, Copenhagen

³ “SDI is often used to denote the relevant base collection of technologies, policies and institutional arrangements that facilitates the availability of and access to spatial data. The SDI provides the basis for spatial data discovery, evaluation and application for users and providers...” SDI Reference Manual - Cookbook. 2004. http://www.gsdi docs.org/GSDIWiki/index.php/Main_Page.

- Reference data as Web Map Services to establish a common image and vector base for the Arctic context at nominally 1:250,000-scale
- A searchable catalogue of map-able data resources – base maps and other geo-referenced thematic data and services
- A Web portal as primary user interface to search the catalogue and enable visual analysis of multiple base maps, thematic maps, and geographic data

With the current interest on climate change the Arctic has been subjected to intense scrutiny and as a result a wide array of data has been generated which is spatial in nature. The approach to managing much of this data has largely been national or dedicated to specific issues. As a result many of the existing datasets are distributed throughout many organisations. They are often not integrated or coordinated and it is difficult to find an environment in which these diverse datasets can be combined and analysed together.

There is an obvious need for a dedicated Arctic SDI, which would provide for the development of the necessary standards and framework to encourage more efficient integration of and access to these datasets. It would allow for a more robust management and manipulation of data for both research and management purposes.

It is intended to benefit from the experiences learned from the GIT Barents project (www.gitbarents.com), refer to above.

1.4. Purpose of this document

The purpose of this document is to describe the Arctic SDI project, its background and content as well as to define the framework for the Project to establish the Arctic SDI. This document will form the basis for an agreement between the concerned National Mapping Agencies on the development of the Arctic SDI.

The Project is comprised of three specific phases, (1) Structuring phase, (2) Establishing Phase and (3) Operational Phase. This project plan is focused on the Establishing phase. The Operational phase will be covered by a separate plan to be developed during the Establishing Phase.

1.5. Explanation of acronyms used in this document

To facilitate the understanding of this document, the used acronyms are explained in the table below.

ACAP	Arctic Contaminants Action Program
AMAP	Arctic Monitoring and Assessment Programme
AMSA	Arctic Marine Shipping Assessment
CAFF	Conservation of Arctic Flora and Fauna
CBMP	Circumpolar Biodiversity Monitoring Program

EPPR	E mergency P revention, P reparedness and R esponse
INSPIRE	I nfrastructure for S patial I nfo R mation in E urope
ISO	I nternational O rganization for S tandardization
MOU	M emorandum O f U nderstanding
NMA	N ational M apping A gencies
OGC	O pen G eospatial C onsortium
PAME	P rotection of the A rctic M arine E nvironment
PMG	P roject M anagement
SAO	S enior A rctic O fficial
SAON	S ustaining A rctic O bserving N etworks
SC	S teering C ommittee
SDI	S patial D ata I nfrastructure
SDWG	S ustainable D evelopment W orking G roup

2. Why is an Arctic SDI needed?

The Arctic SDI will be an essential tool in helping to understand the impacts of climate change on nature, biodiversity management issues, and the adaptability and sustainable use of all living resources in the Arctic. Successful conservation of the natural environment and while allowing for economic development will require a well functioning exchange of spatially referenced data, especially for cross boundary activities such as monitoring climate change, pollution, and changes in Arctic biodiversity. Furthermore spatial data can be used as a tool for integrated planning (for instance between oil and gas industry, environmental concerns and cultural heritage sites), helping to make planning efforts more cost effective.

The Arctic SDI will allow for the creation of a harmonised map covering the entire Arctic Region. This will facilitate a more robust management and manipulation of data for both research and management purposes.

Denmark’s Chairmanship of the Arctic Council for 2009 – 2011 places emphasis upon work to improve operational cooperation between the Arctic States, e.g. with regards to emergency crises. The Chairmanship programme also highlights that changes in the Arctic must be monitored. In order to do so, the Arctic Council requires effective and co-ordinated data services. Sharing of geographic information between the circumpolar countries and efficient use of that information for presenting thematic data would help avoid duplication of work in the Council. An Arctic SDI is thus a clear contribution to working towards these two priorities of Denmark’s chairmanship of the Arctic Council.

Examples of the contributions the Arctic SDI could make include the following: (2.1 – 2.4)

2.1. Monitoring

- Monitoring living resources – an Arctic SDI would allow for more effective circumpolar monitoring of biodiversity and common resources.

- Monitoring climate change – an Arctic SDI would allow for more effective interpretation and implementation of monitoring systems, e.g. with regards to climate change effects. The Arctic SDI will form an important framework and tool to facilitate, for example, the further development of CAFF's Circumpolar Biodiversity Monitoring Programme (CBMP – www.caff.is) and the Sustaining Arctic Observing Networks (SAON -www.arcticobserving.org).

2.2. Assessments

The Arctic SDI will provide a tool and means of contributing to:

- Increased knowledge of the effects of climate change, pollutants and heavy metals in the Arctic and their consequences for human and animal living conditions, globally as well as in the Arctic Region.
- Preservation of arctic nature, natural qualities, biological diversity and sustainable use of the region's resources, as far as both renewable and non-renewable resources are concerned.
- Contributing to the development and improvement of the quality of life of the arctic population and the ecological and economic prerequisites for continued human settlement in the Arctic.

2.3. Management and services

- An Arctic SDI would facilitate the development and effectiveness of circumpolar Search & Rescue operations and contingency plans e.g. as in the case of the newly agreed upon Search and Rescue agreement between all the Arctic countries.
- Emergency response – if there would be an oil spill in Arctic waters, the existence of an Arctic SDI could contribute significantly to facilitating the coordination and implementation of response measures between countries.
- The potential for increased shipping in Arctic waters calls for increased cooperation and integration of national datasets and activities (AMSA 2009 – www.amsa.is)

2.4. Relevance to indigenous peoples of the Arctic

The common priorities of the Norwegian, Danish and Swedish Chairmanship period of the Arctic Council are primarily concerned with climate change, integrated resource management, the International Polar Year, Indigenous peoples and local living conditions. The Arctic SDI will provide tools that are essential in assisting the development of work associated with these priorities. The Arctic SDI with its map data and services will also provide indigenous peoples with tools that can help clarify and explain land use practices with regards to e.g. hunting, fishing and reindeer herding. These issues and conditions can be presented, communicated and better understood by making use of the Arctic SDI data and its services.

3. Project framework

The project seeks to establish a joint technical collaboration amongst the national mapping agencies surrounding the Arctic in order to provide national geographic reference data as a basis for analysing and monitoring an environmental and climatologic change. The information will be accessed and distributed through a spatial data infrastructure consisting of national servers providing the national geographic datasets (Figure 1). New technology will provide for efficient and seamless presentation of reference data for advanced analysis together with thematic data.

The circumpolar national mapping agencies (NMAs) will lead the development, maintenance, and administration of the Arctic SDI by providing the national geographic information (reference data) and systems for data sharing amongst the circumpolar countries. Within the Arctic Council the project is being led by Greenland through CAFF. The work on the Arctic SDI will make use of technologies, data and experiences gathered from other SDI projects.

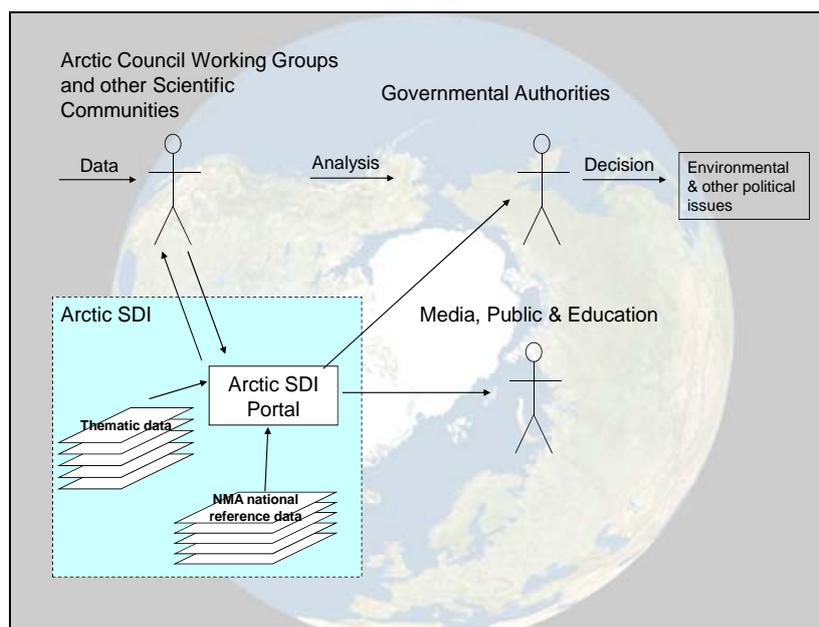


Figure 2. Relations between the different stake holders in the Arctic SDI

3.1. Project phases

Preparations for establishing an Arctic SDI have until now been focused on professional networking and administration. This phase is known as the Structuring Phase. The forthcoming work will be divided into an Establishing and an Operational phase (Figure 3).

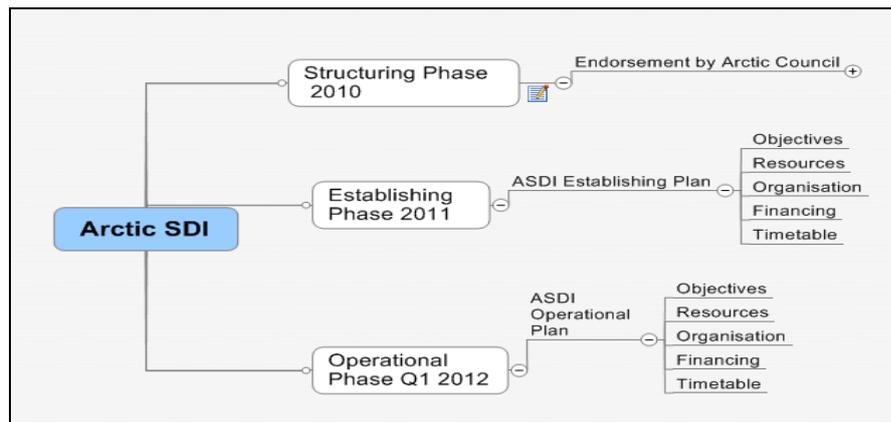


Figure 3. The three project phases.

3.2. Expected benefits of Arctic SDI

The project is expected to result in the following:

- Users, such as the Arctic Council, its Working Groups and the Arctic research community, will have easy access to relevant and updated geographic and thematic information covering the entire circumpolar region – data that can be used for many purposes and many different tasks.
- A distributed regional/arctic infrastructure consisting of interlinked servers with national high quality geographic data will be located in each of the eight arctic countries.
- Possibilities will be created for users to connect to web map services and simultaneously access, view, and explore several types of geographic and thematic information concerning the Arctic Region.
- Daily use of the Arctic SDIs web map and other services by national authorities.
- Daily use of the project's web map services in schools and universities in the Arctic and elsewhere.
- Possibilities for media to receive relevant and updated information.
- Possibilities to foster cooperation with industry on Arctic issues.

The Arctic SDI will also strengthen the Arctic community by:

- Contributing and helping to develop co-operation between involved mapping agencies.
- Providing a basis for international projects and co-operation.
- Contributing to more informed adaptation strategies in the region by providing a tool to facilitate improved understanding and analysis of the Arctic region.
- Providing a useful tool in issues such as search and rescue and resource management.

- Allowing for easy transfer of geospatial data between administrations and for combination of diverse data from countries throughout the Arctic and beyond.

4. Data description and technology

The information in this chapter is to be considered as guidance for further elaboration under defined work packages – refer to chapter 6.4 below.

4.1. Coverage

The Arctic SDI is to cover the Arctic regions of the involved participating countries, as defined by the countries themselves – refer to figure 1 (fig. 1) and information in connection with this.

4.2. Scale

In order to compile a comprehensive picture of the nature, extent, content and scale of spatial information available a questionnaire has been distributed to the participating NMAs. The results of this questionnaire will be reviewed and presented in a future report. However, it is envisioned that the Arctic SDI will be in the range of 1: 200 000 – 1:1 000 000.

4.3. Reference data

It is proposed that the Arctic SDI will include the following eight *reference* base data layers:

- administrative boundaries
- elevation
- bathymetric data
- hydrography
- transport
- settlements
- vegetation
- geographical names

The following guidelines are noted with regards to these data layers:

- All base data layers will be built on existing datasets.
- The base data layers will not involve the development of any new data. Data may be generalised from more detailed source maps.

- Current developments in remote sensing coverage and applications in Arctic regions and their relevance for the Arctic SDI must be taken into account.
- These base data layers will to a *limited* extent be harmonised, i.e. feature definition, common cartography (symbolization), and edge matching along international borders.
- Potential enhancing of the base data layers i.e. concerning additional map scales or improved harmonisation will be decided upon during the Establishing and Operational phases.

The above mentioned *reference* base data layers will form the basis for thematic datasets from others with interest in the Arctic.

4.4. Technical Architecture

The project will – if and when suitable – make use of technologies, data and experiences gained from the GIT Barents project and build upon principles contained in INSPIRE. The project architecture will be based on a distributed data structure and wherever feasible open source technology will be used.

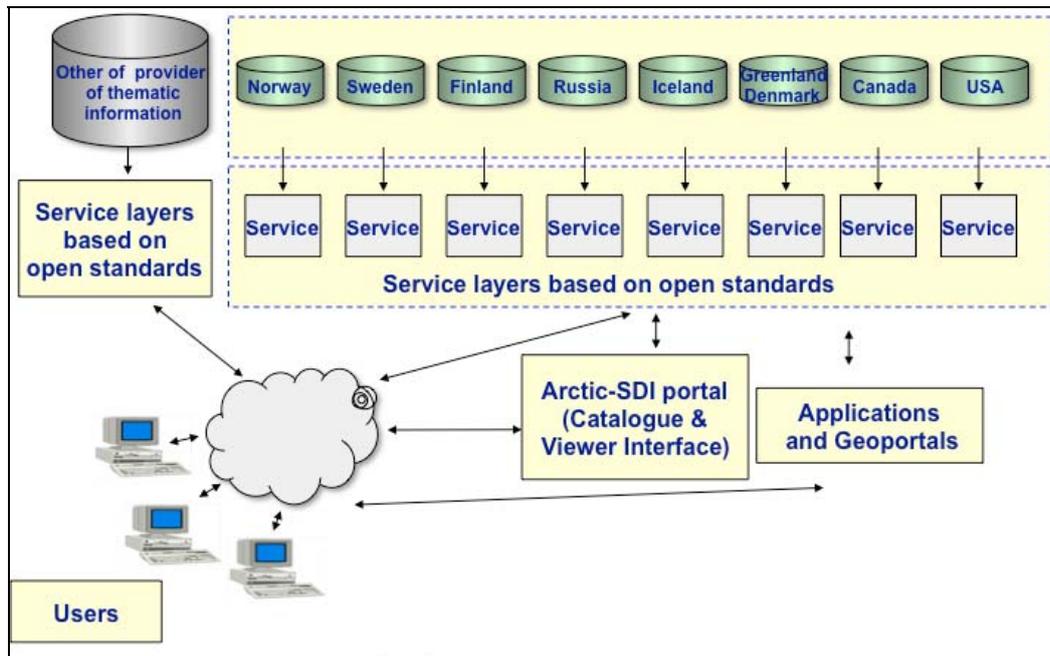


Figure 4. The Arctic SDI service architecture.

The Arctic SDI architecture is described in figure 4. The National reference data from the participating NMAs will be made available by a service layer that combines into one view reference and thematic information, maintained by several independent service providers.

These efforts will be further elaborated by the established technical working group and later on be implemented according to specifications.

The Arctic SDI is to be developed in accordance with international standards i.e. The Open Geospatial Consortium (OGC), the International Standards Organisation (ISO) etc.

5. PROJECT ORGANISATION

The project's organisation will include a Board, which will provide overall direction and oversight supported by an Advisory Group. A Steering Committee will guide and monitor the project's progress and operations. The actual project work will be executed by a number of specialised working groups.

5.1. Project participants

Cooperative partners for establishing an Arctic SDI with national geographic reference data are

- The US Geological Survey (USGS);
- Natural Resources of Canada (NRCAN);
- The Federal Service for State Registration, Cadastre and Mapping, Russia (ROSREESTR);
- National Survey and Cadastre, Denmark and the Faroe Islands (KMS);
- National Land Survey, Finland (NLS);
- Government of Greenland;
- National Land Survey Iceland (LMI);
- Norwegian Mapping Authority;
- Swedish Mapping, Cadastre and Land Registration Authority; and
- The CAFF working group for the Arctic Council.

The project result is aimed at providing state-of-the-art map services for use within the Arctic Councils, its Working Groups and the Arctic research community. The Arctic Council and its Working Groups are therefore participating in the Arctic SDI project work as Reference Group, representing the user community and thus exercising influence on the project and its results.

5.2. Project Organisation and Management

The Board, comprised of the Director Generals – or corresponding managerial level – of the participating national mapping organisations will supervise the project work. The main role is to guide and monitor project work and deal with any negligence. It is responsible for guiding the project to successful completion.

The Board will be supported by an Advisory Group, comprised of a limited number of acknowledged professionals outside the NMCAs, with a clear responsibility on promoting the project outside the NMCAs.

The national Arctic SDI coordinators (refer to table on page 2) from all the participating national mapping organizations will form a Steering Committee

(SC). This Steering Committee will have the overall responsibility for the project and for the co-ordination of work between the participants. The Chair of the Steering Committee is to be appointed during the constitutional meeting. SC will operate on a consensus basis. The Steering Committee is responsible for appointing the Project Management.

At a national level, all project related questions will be handled by the appointed Arctic SDI coordinators represented in the Steering Committee.

The targeted main user groups (i.e. the Arctic Council, its Working Groups and the Arctic research community) will be represented in a Project Reference Group, thus being able to exercise influence on the project and results. The CAFF Arctic Council Working Group will serve as a special Liaison between the Arctic Councils and the Arctic SDI.

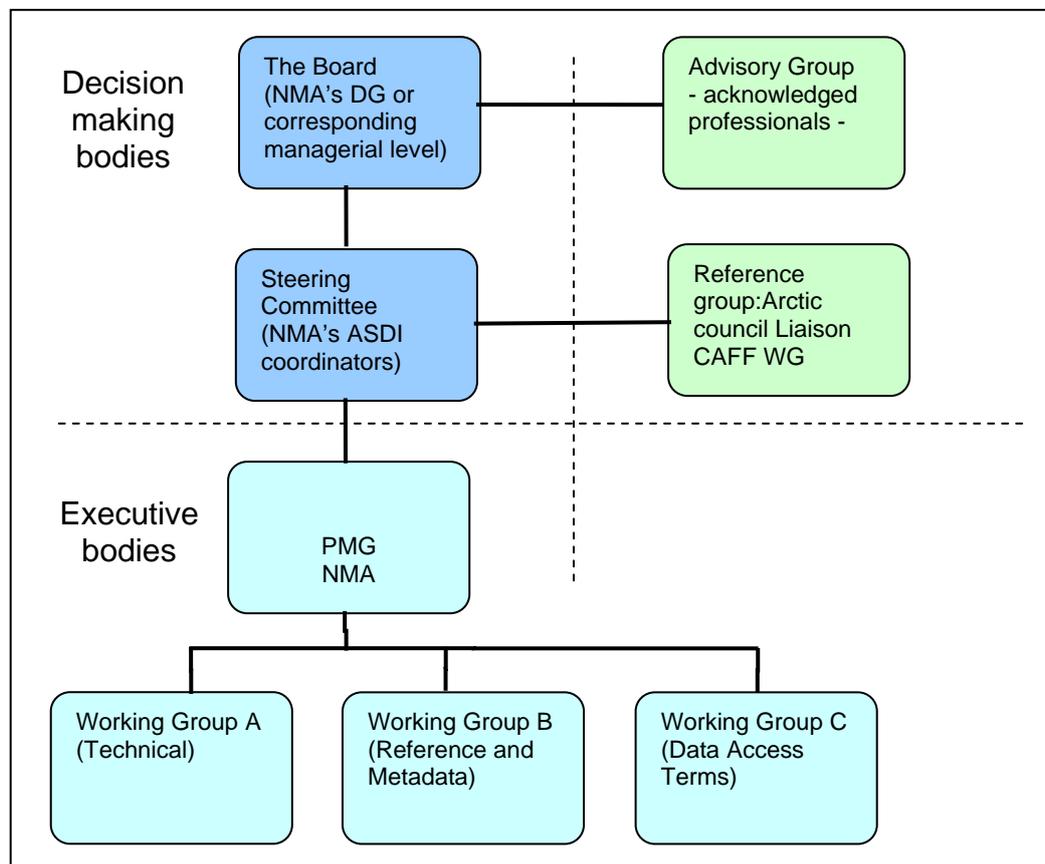


Figure 5. Project organisation.

5.2.1. Project Board

The Board consists of the Director Generals or corresponding managerial level of the participating national mapping organisations.

The Board will meet at least once a year. The Chairmanship will rotate every second year. The Chair of the Steering Committee will be assigned to the Board to act as the link between the Board and the Steering Committee.

- Magnús Guðmundsson; Director General, NLS of Iceland, Chair – on behalf of the Nordic NMAs (Denmark (Faeroes), Finland, Greenland, Iceland, Norway, Sweden)
- Canada – to be announced
- Russia – to be announced
- Carl Markon, Center Director, Alaska Science Center, US Geological Survey, USA
-

5.2.2. Project Steering Committee

The Steering Committee consists of the appointed Arctic SDI Coordinators of each participating organisation.

The SC has to meet frequently - to follow up on the proposed progress in the Arctic SDI project plan. Whenever feasible, internet meetings would be preferred. If possible, meetings could also be held back to back with Global Mapping conferences, Arctic Council Deputy Minister meetings, SAO and other upcoming conferences.

The Chairmanship will rotate every second year. The Chair of the Steering Committee will be assigned to the Board to act as the link between the Board and the Steering Committee.

The SC has the authority to alter its constitution and to recruit external expert assistance

Invitation to the meetings have to be sent at least six weeks before a meeting and the material for the meetings have to be sent at least two weeks in advance. Decisions on the next meeting place and time should be taken in end of each meeting.

The meetings are considered to be legal and have quorum if they have been summoned in due order.

The meetings shall be documented in writing and the protocols have to be delivered to the members of the SC and WG within two weeks after meetings. The protocols can either be approved in writing by all present members of the Steering Committee immediately after a meeting has ended, or are considered to be approved if none of the members of the SC has expressed a

dissenting opinion within four weeks after sending the protocols. The main rule shall be to approve the protocols in writing immediately after meetings.

MEMBERS	ORGANISATION	E-MAIL
Owe Palmér	<i>Project Manager:</i> Senior Adviser, National Land Survey of Sweden	ove.palmer@lm.se
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Vladimir Obinyakov	Head of SDI and Navigation Department, Rosreestr, Russia.	Vbo318@rambler.ru
Inge Thaulow	Special Advisor - International Coordinator, Government of Greenland	inth@ghsdk.dk
Eydís L. Finnbogadóttir	Head of international affairs, National Land Survey of Iceland	elf@lmi.is
Jens Peter Weiss Hartmann	Senior Adviser, National Land Survey of Denmark and the Faroe Islands	JEPHA@kms.dk
Douglas O'Brien	Director for Centre for Topographic Information, NRCan	Douglas.O'Brien@nrcan-nrcan.gc.ca
Douglas Nebert	Senior Advisor US Geological Survey, USA	ddnebert@usgs.gov
Tom Barry (Arctic Council Liaison*)	Conservation of Arctic Flora and Fauna (CAFF) Working Group of the Arctic Council	tom@caff.is

* Will be co-opted to the Steering Committee's meetings as required.

5.2.3. Project Management Group

The Steering Committee will appoint the Project Management Group from within the Steering Committee itself. The Project Management Group will be responsible of the daily work to seek progress of the Arctic SDI. The Project Management will report directly to the Steering Committee.

The Project Management will have at their disposal Working Groups with resources necessary to accomplish the assigned tasks.

Owe Palmer and Martin Skedsmo will serve as the Project Management Group.

5.2.4. Working Groups

The Project Management will be responsible of the establishment of the Working Groups.

- Working group A will be responsible of design, architecture and standards for development of the Arctic SDI based on use of open source technology.
- Working group B will be responsible of establishing a catalogue of existing and available reference data, specifications included and metadata.
- Working group C will be responsible of Data Access Terms.

5.2.5. Reference Group

The Arctic Council and its Working Groups, represented by CAFF, are participating in the Arctic SDI project work as Reference Group, representing the user community and thus exercising influence on the project and its results.

Tom Barry is pointed out as Contact person for the Reference Group, and will be assigned to the Steering Committee Meetings.

The Reference Group might adopt more representatives of user groups when needed.

6. VISION, STRATEGIES AND WORKPACKAGES

In this section the project work plan is outlined and describes the work packages to be reached; project outputs; measurable performance indicators; and activities to be carried out to insure the completion of each work package.

6.1. Framework

A framework for partner co-operation will be agreed upon for all project phases. At the first meeting of the project partners in Brussels on October 2010 a Project Protocol was agreed upon which outlined the establishment of an interim organisation responsible for the production of the project plan and finalisation of preparations for the formal project start in April 2011. It will be necessary to undertake written agreements concerning organisation, responsibilities and financial aspects of the Arctic SDI. These will include:

1. A signed Memorandum of Understanding (MOU) between all NMAs regulating each organisation's responsibility, the decision-making process, detailed co-operative organisation, financing of common undertakings and implementation.

2. A signed Memorandum of Understanding (MOU) with thematic data providers (the Arctic Council Working Groups and others) concerning data provision and data policy, e.g. specifications, standards, quality, terms and conditions for use of the data, etc.
3. Develop a terms of use guidelines for users of the Arctic SDI

6.2. Principles

The project work will be based on the following approach and principles:

- Establishing a prototype of an Arctic SDI, and reaching consensus amongst the project partners concerning its final design, data content and functionality.
- Obtaining and adapting national reference data sets.
- Implementing the distributed data/map services to provide access to reference data and thematic information.
- Creating a common catalogue and portal interface to facilitate access to registered Arctic SDI resources.
- Developing a co-operative model to ensure sustainable operation and maintenance of the Arctic SDI.
- The project will, if and when suitable, make use of technologies, data and experiences gained from the GIT Barents project and build upon principles contained in the European INSPIRE initiative.
- Open source technology will be used whenever feasible.
- Internationally adopted standards for data and metadata will be adhered to by all data providers and system developers.

6.3. Vision

The Vision

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

It is important to be focused on the needs and requirements of the potential Arctic SDI user groups. Four main categories of users have been identified:

- The Arctic Council Working Groups (AC WGs)
- Research groups and other scientific communities engaged in Arctic research
- Governments and governmental authorities involved in decision making processes concerning the Arctic

— Media and the public including NGOs

The project will initially focus on identifying and meeting the needs of the AC WG’s. Based on these and other considerations, the following project vision and strategies have been formulated:

6.4. Strategies

The Strategies on how to reach the vision
A. Project organisation in function
B. MOUs regulating each participant’s involvement and responsibilities within the Arctic SDI project will be elaborated and signed.
C. A joint Arctic SDI will be elaborated - combining into one view national reference data and thematic information

6.4.1. Strategy A: Project organisation in function

Work package A.1: - Elaboration of project plan, project organisation included April 2011 – End of project			
Output: Project organisation constituted.			
Indicator: Project plan are established, approved and implemented.			
Activity	Responsible	Start	End
1. Constitution of the project plan and the project organisation	Interim organisation	Apr 2011	End of project
2. Plans for future work within the operational phase	SC	Apr 2011	End of project
3. Final project report and evaluation	SC		End of project

Comments:

Activity 1: The project plan and organisation is presented, discussed, and approved.

The Board will supervise, monitor and guide the project, supported by an Advisory Group.

The Steering Committee will oversee the project, formulate and approve regulations concerning work and decision-making in the implementation of the project. The Steering Committee will meet as a rule three times a year. When needed, external expertise will be hired to assist with specific project issues. The Steering Committee will appoint Project Management.

The Project Management will be responsible for the implementation of the project according to time, quality and content decided upon and approved by the Steering Committee. Progress reports describing work carried out in the reporting period, current status regarding progress, costs and value of the work, as well as other factors of importance for the project implementation

should be submitted every four months. The Project Management will have at their disposal Working Groups with resources necessary to accomplish the assigned tasks.

The Working Groups will prepare detailed work plans based on this project plan. The work will start with a workshop and be continued by separate preparations of different specific parts of the work plan. The detailed work plan shall also include allocation of personnel and specification of their responsibilities.

Working group A will be responsible of design, architecture and standards for development of the Arctic SDI based on use of open source technology whenever feasible.

☐ Working group B will be responsible of the establishing a catalogue of existing and available reference data, specifications included and metadata.

Working group C will be responsible of agreements and other needed cooperative understandings concerning data to be involved in the Arctic SDI.

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Activity 2: The two first phases will, as stated above, be carried out within this project while the Operational Phase will be carried on by the existing organisational structures in the participating agencies. A plan for future co-operation in order to sustain the common information system established during the project will be prepared.

Activity 3: By the end of the project, the Steering Committee will provide a project report to be evaluated by the Board.

6.4.2. Strategy B: MOUs regulating each participant’s involvement and responsibilities within the Arctic SDI project will be elaborated and signed.

Work package B.1: Elaborate, anchor and sign MOUs			
Output: Signed MOUs between all involved participants			
Indicator: MOUs defining the co-operation between the NMAs, and between the NMAs and the user groups.			
Activity	Responsible	Start	End
1. Preparation of MOU between NMAs	PMG	April 2011	June 2011
2. Preparation of MOU between NMAs and thematic data providers	PMG	April 2011	June 2011
3. Signed MOUs	PMG	April 2011	June 2011

Comments:

Activity 1: The Project Management will prepare the MOU to be signed by the involved NMAs. The Memorandum of Understanding (MOU) will regulate each organisation's responsibility, the decision-making process, detailed co-operative organisation, financing of common undertakings and implementation.

Activity 2: The Project Management will prepare the MOU to be signed by the NMAs and thematic data providers (the Arctic Council Working Groups and others) concerning data provision and data policy, e.g. specifications, standards, quality, terms and conditions for use of the data, etc. to be signed by the Arctic SDI Board and the Arctic Council Liaison.

6.4.3. Strategy C: A joint Arctic SDI will be elaborated - combining into one view national reference data and thematic information

Work package C.1: Elaboration on design, technical platform and applicable standards for development of the Arctic SDI.			
Output: Technical Work plan on the Arctic SDI Architecture.			
Indicator: Written documents on design, architecture and standards for development of the Arctic SDI based on use of open source technology when applicable.			
Activity	Responsible	Start	End
1. Prepare a technical workshop	PMG	April 2011	Sept 2011
2. Arrange a workshop to elaborate and describe proposals for an Arctic SDI Architecture	PMG/WG A	Sept 2011	Sept 2011
3. Presentation of the results from the workshop in activity 2. To be evaluated and decided on by the Steering Committee.	WG A	Sept 2011	Jan 2012

Work package C.2: Inventory and evaluation of available and existing national reference data.			
Output: Catalogue of existing and available reference data, specifications included			
Indicator: Information gathered from all participating organisations			
Activity	Responsible	Start	End
1. Development of catalogue on reference data - specifications, scales and metadata	WG B	Sept 2011	Jan 2012
2. Presentation of catalogue	WG B	Jan 2012	Jan 2012

Work package C.3: Joint final decision on system design, content and services – January 2012			
Output: Written and approved proposal for system architecture specification			
Indicator: Decision entered in the meeting protocol of the common (SC+WGs) meeting			
Activity	Responsible	Start	End
1. Preparations for the common (SC+WGs) meeting	PMG	Sept 2011	Jan 2012
2. Presentation and demonstration of the results elaborated by working group A	WGA	Sept 2011	Jan 2012

3. Presentation and demonstration of the results elaborated by working group B	WGB	Sept 2011	Jan 2012
4. Decision on results provided by WGA	SC	Jan 2012	Jan 2012
5. Decision on results provided by WGB	SC	Jan 2012	Jan 2012

Work package C.4: Negotiations with concerned reference data owners (NMCAs) on conditions for inclusion of their data in the Arctic SDI decided on during Work package C.3 – January 2012 – May 2012

Output: Agreement on national reference data supply from the NMCAs

Indicator: Agreements concluded.

Activity	Responsible	Start	End
1. Elaborate a negotiation strategy and model	WGC	Jan 2012	May 2012
2. Start, coordinate and conclude parallel negotiations in involved countries	WGC	Jan 2012	May 2012
3. Agreement on data provision for Arctic SDI	Data Owners	May 2012	May 2012

Work package C5.: Establishing prototype - testing, and launching Beta environment– May 2012 – January 2013

Output: Beta-version of Arctic SDI (portal and country services) finalised and up and running

Indicator: System can be accessed on development servers

Activity	Responsible	Start	End
1. Establishment of prototype portal (catalogue and viewer) components, based on SC decision, May 2012.	WGA	May 2012	
2. Testing and evaluation of prototype portal.	WGA		
3. Building and testing beta-version against registered map data and services.	WGA		
4. Preparing joint workshop (SC+WGs)	PMG	Sept 2012	Jan 2013
5. Presenting beta-version portal environment	WGA		Jan 2013
6. Beta-version approved	SC		Jan 2013

Work package C6.: Reference data presented in work package C2 made available for use– May 2012 – January 2013

Output: National reference data made available in beta-version

Indicator: National reference data can be accessed on development servers

Activity	Responsible	Start	End
1. Compiling a catalogue of national reference data	WGB	May 2012	
2. Elaborate and present a joint cartography	WGB		
3. Compile and establish a search engine for metadata.	WGB		
4. Preparing a joint workshop (SC+WGs)	PMG	Sept 2012	Jan 2013

5. Presenting national reference data in beta-version	SC		Jan 2013
6. Beta-version approved	SC		Jan 2013

Work package C7.: Implementation of the Arctic SDI – January 2013 – End of project			
Output : Fully functional Arctic SDI portal and data services available			
Indicator: National reference data available in the Arctic SDI			
Activity	Responsible	Start	End
1. Implementation of Arctic SDI in concerned organisations and countries.	PMG/SC	Jan 2013	End of project

Work package C8.: Preparing the Operational phase – April 2011 – End of project			
Output : An Arctic SDI as described in the Vision in operational mode			
Indicator: Arctic SDI operated by a designated joint group of NMA employees.			
Activity	Responsible	Start	End
1. Project plan for the Operational phase being prepared	PMG	April 2011	End of project
2. Project plan for Operational phase presented and approved	PMG/SC/Board		End of project

7. PROJECT FINANCING

7.1. Financial means

The financial means needed for establishing an Arctic SDI are as follows;

- During the project's structuring phase the costs are mainly for personnel travel expenses, board, and lodging. These costs are expected to be carried within each participating organisations current budget.
- More substantial means must be made available for project work during the Establishing Phase. The participating organisations are expected to bear their own costs either within the current budget frame or by increased yearly allowances from the Government. These allowances should cover organisational efforts during 2011 – 2012. The required financial means for each participating organisation will depend on the organisations chosen level of involvement in system development and other Arctic SDI establishing efforts.
- All involved participants should investigate the possibility for external funding within its own system.
- Possibilities for seeking joint funding should be further elaborated.

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