

## Arctic SDI Evaluation Framework: Environmental Readiness

This Framework will assist in establishing the level to which the Arctic SDI is providing an enabling environment that facilitates discovery, access, dissemination, integration, reuse and interoperability of Geospatial Information to the Arctic Community and the wider society.

Category	Component	Sub-Component	Output/Outcome	Intent of the indicators	Indicator/Metric	Evaluation Methodology	Notes
Environment Readiness	Organizational Readiness	Governance	A governance structure exist to support the evolving levels of geospatial usage and sharing across the Arctic Community.	To measure the level to which a governance structure is in place to guide the processes involve in the provision of the following services: a. Easy and reliable access to geospatial information (in particular Arctic geospatial information) to the Arctic SDI Stakeholders and the wider community; b. Facilitate data interoperability and integration; c. Support the usage of geospatial information in decision-making.	<ol style="list-style-type: none"> <li>1. A Coordination Body(s) (central or distributed) is positioned to guide premium integration of geospatial information into the fabric of decision support across sectors, governments, and organizations with interest in the Arctic;</li> <li>2. The Coordinating Body(s) is equipped to guide the ongoing maintenance and evolution of the Arctic SDI (a management team in place);</li> <li>3. All major Arctic interest groups are represented on the Coordinating Body;</li> <li>4. The Coordinating Body has a legal right to coordinate the growth of the Arctic SDI (e.g., through the usage of policies and directives);</li> <li>5. The Coordinating Body works closely with other coordinating bodies across the Arctic Region and the international geospatial community (e.g., Arctic Council, OGC, UNGGIM, the National Mapping Agencies of the Arctic Countries, and INSPIRE).</li> </ol>	<ol style="list-style-type: none"> <li>1. Literature review of Arctic SDI implementation and policy documents;</li> <li>2. Review of the structure of the coordinating body and the mandate given to the Body;</li> <li>3. Review of the structure of the coordinating body and the mandate given to the Body;</li> <li>4. A review of the literature (e.g., directive(s)) used to establish the Body;</li> <li>5. Literature review of MOM and interview with members of the coordinating body.</li> </ol>	All major Arctic interest groups should participate in coordination of the Arctic SDI. If there is a champion for the SDI it should be noted. It is recommended that the Central Coordinating Body appoint working groups to develop and implement specific components of the Arctic SDI.
		Strategy	An Arctic SDI Strategic Plan developed and maintained in alignment with the vision and priorities of the stakeholders and interest groups.	To identify if a strategic plan was developed for the Arctic SDI and the extent to which such a strategic plan reflects the vision of all involved. The indicator should also identify whether or not the strategic plan will be reviewed in a timely manner.	<ol style="list-style-type: none"> <li>1. Is there a strategic plan for the Arctic SDI?</li> <li>2. The strategic plan provides a clear vision and direction for the SDI;</li> <li>3. The strategy is in alignment with the long-term vision and priorities of the stakeholders and interest groups;</li> <li>4. There is a mandated timeline for the review of the strategic plan;</li> <li>5. The strategic plan clearly articulates the need for an implementation plan and program design based on users and stakeholders needs;</li> <li>6. The strategy is in alignment with the strategy of the Arctic Council.</li> </ol>	<ol style="list-style-type: none"> <li>1. Literature review of SDI documents;</li> <li>2. Review and analysis of the strategic plan;</li> <li>3. Literature review and interviews with stakeholders;</li> <li>4. Literature review of SDI documents;</li> <li>5. Review and analysis of the strategic plan;</li> <li>6. Review of the SDI's strategic plan and the Arctic Council's strategic plan.</li> </ol>	The strategy should address cross-sector needs, social and cultural outcomes, and represent a vision for the efficient integration of geospatial information in decision-making with respect to Arctic activities.
		Human Resources	Qualified personnel available to assist in the implementation and maintenance of the Arctic SDI.	To determine the quality and quantity of the workforce and its capacity to actively participate in the implementation, maintenance, and evolution of the Arctic SDI.	<ol style="list-style-type: none"> <li>1. A qualified management team is in place;</li> <li>2. Positions are identified based on proposed workload;</li> <li>3. A structure is in place to recruit and retain qualified personnel. Personnel can be recruited through employment or through volunteers from stakeholders assigned to particular tasks;</li> <li>4. The percentage of identified positions that are filled.</li> </ol>	<ol style="list-style-type: none"> <li>1. Interviews with members of the coordination body;</li> <li>2. Interviews with members of the coordination body and literature review;</li> <li>3. Literature review;</li> <li>4. Literature review and interviews with members of the management team.</li> </ol>	Sufficient and qualified personnel are required to implement and manage the day-to-day operations of the Arctic SDI, as well as, monitor its performance with respect to the stated goals and objectives. These personnel can be either volunteers or contracted employees.

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Environment Readiness	Organizational Readiness (cont.)	Community Development	Stakeholder relationships are continually developed and improved to grow the usage of the SDI.	To measure the level to which partnerships are used to grow and support the evolution of the Arctic SDI.	<ol style="list-style-type: none"> <li>Partnering opportunities are identified and developed to garner support for growing and evolving the SDI (e.g., with research groups, NGOs and commercial organizations);</li> <li>A specific person or committee is identified to monitor and engage the coordinators of Arctic Projects with the potential of producing geospatial information or that may require the use of Arctic geospatial information;</li> <li>The Coordinating Body works closely with the Arctic Council to ensure that all Arctic activities are supported by the SDI and resulting geospatial information are collected within SDI specified standards;</li> <li>The Arctic SDI is linked to other domestic and international SDI organisations (e.g., NSDIs, GSDI, UN GGIM, INSPIRE);</li> <li>The Arctic SDI is linked to international standard organizations (e.g., ISO and OGC).</li> </ol>	<ol style="list-style-type: none"> <li>Review of the strategic and implementation plans. Interview with coordination body;</li> <li>Literature review;</li> <li>Interviews with members of the coordination body;</li> <li>Interviews with members of the coordinating body;</li> <li>Interviews with members of the coordinating body.</li> </ol>	Expectation for the Arctic SDI to align with projects taking place in the Arctic or that are Arctic related and use these opportunities to grow the SDI. It is also expected that the Arctic SDI will closely interact with domestic and international SDI related organizations and use the best practices of these organizations to grow the Arctic SDI.
		Performance Management	Program performance is managed through timely measuring, monitoring and reporting activities.	To identify if the Arctic SDI is achieving (in a structured manner) its expected targets, outputs, outcomes and impacts.	<ol style="list-style-type: none"> <li>A performance management program is entrenched in the strategic and implementation plans</li> <li>Framework developed to measure and monitor (evaluate) the performance of the Arctic SDI</li> <li>Different levels (aspects) of Arctic SDI's performance are measured and reported on regularly (within a given time frame).</li> </ol>	<ol style="list-style-type: none"> <li>Review and analysis of the strategic and implementation plans;</li> <li>Interviews with members of the coordination body/management team and literature review;</li> <li>Interviews with members of the coordination body/management team and literature review.</li> </ol>	The performance of the SDI is monitored, evaluated and reported on. Performance information provide valuable insight for future planning of the SDI. Indicators used in monitoring and evaluating the SDI can be either qualitative or quantitative.
		Authoritative Framework	Policies, directives, or regulations, (that are enforceable) are in place to facilitate the operation, maintenance and usage of the Arctic SDI.	To evaluate if current policies and regulations provides an enforceable Authoritative Framework that facilitates seamless access and dissemination of geospatial data	<ol style="list-style-type: none"> <li>An Authoritative Framework (e.g., Policies, rules, regulations, laws or directives) is in place to support the Arctic SDI;</li> <li>The Authoritative Framework is comprehensive (i.e., covers intellectual property, privacy, security, liability, data sharing guidelines, data archiving, confidentiality etc.);</li> <li>The Authoritative Framework is maintained and updated (new issues) in a timely manner ( with users' inputs);</li> <li>The Authoritative Framework is disseminated in the languages of all the stakeholders;</li> <li>The Authoritative Framework covers access and usage conditions of all geospatial dataset made available through the SDI.</li> </ol>	<ol style="list-style-type: none"> <li>Literature review of Arctic SDI documents;</li> <li>Literature review of Arctic SDI documents;</li> <li>Literature review of Arctic SDI documents;</li> <li>Literature review of Arctic SDI documents;</li> <li>Literature review of Arctic SDI documents.</li> </ol>	A mature authoritative framework should cover all aspects of data and information policy such as ownership, access, dissemination, use/re-use, charging/pricing (where appropriate), etc. Rules are more easily enforced than principles, and take more time and consideration to create. While policies based on 'general principles' may suffice to initiate the SDI, maturity will be gaged by the ability to implement and enforce. Such policies cannot be made in isolation from pre-existing policies, and must contravene with existing national and international policies (e.g., those relating to software, hardware, intellectual property, and governance).

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Environment Readiness	Organizational Readiness (cont.)	Funding Arrangements	Structured funding arrangements are in place that can effectively support the implementation, operation and maintenance of the SDI.	To determine if a funding model is in place and if yes, the level to which it is capable of financing the development and operation of the SDI.	<ol style="list-style-type: none"> <li>1. Structured funding arrangements are in place for the Arctic SDI;</li> <li>2. The funding arrangements consist of a budget that will support the financing of both the implementation activities and the day-to-day operations of the Arctic SDI;</li> <li>3. The funding model will support continuity;</li> <li>4. A business plan developed to support the implementation and maintenance of the Arctic SDI.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review of Arctic SDI documents. Interview with members of the coordination body;</li> <li>2. Analysis of the identified funding model and the implementation plan. Interviews with members of the coordination body/management team;</li> <li>3. Interviews with members of the coordination body/management team;</li> <li>4. Interviews with members of the coordination body/management team.</li> </ol>	The Arctic SDI Funding Model can be a diverse set of funding arrangements. That is, the funding model can be made up of different types of arrangements (e.g., cash, services, contributions, loan/shared usage of infrastructures, etc.). However, notwithstanding the type of funding arrangement(s) in place it is important that income and expenditure are meticulously forecast and a budget prepared for the implementation and maintenance of the SDI.
		Management	A management structure is in place guide the day-to-day operations of the SDI, manage expectations at all levels, communicate the progress, perform project management activities during implementation, and prioritize deliverables (components).	To determine if an effective management structure is in place to support the efficient implementation and operation of the Arctic SDI.	<ol style="list-style-type: none"> <li>1. Is there a directive in place that proposes or outlines a management structure for the Arctic SDI?</li> <li>2. A management structure is in place for the implementation and the day-to-day operation of the Arctic SDI;</li> <li>3. All staffing position within the management structure are defined;</li> <li>4. All staffing position within the management structure are filled;</li> <li>5. Number of man-hours per year spent on managing the operation of the SDI.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review and analysis of Arctic SDI documents;</li> <li>2. Review and analysis of Arctic SDI documents;</li> <li>3. Review and analysis of Arctic SDI documents;</li> <li>4. Interviews with members of the coordination body and executives of the management team.</li> <li>5. Interviews with members of the coordination body and executives of the management team</li> </ol>	SDI implementation is a multi-tiered, multi-year process that also entails daily operational support for the implemented components. Therefore, it is important to the success of the SDI that a management team is in place to guide the implementation and manage the operation of the SDI.
	Capacity Building: An environment exist to support the growth of the concept of data sharing, the usage of the SDI, and the application of geospatial information to informed decision-making	Outreach	A robust Outreach program is in place to grow the SDI through the promotion of increase usage and partnership. The outreach program should also educate the stakeholders on the organizational transformation their institutions may have to undergo to support the implementation of the SDI, as well as, utilize the services of the SDI to support more informed decision-making.	Measure the level of effort undertaken to promote and grow the awareness, benefits, and usage of the Arctic SDI.	<ol style="list-style-type: none"> <li>1. A well designed program for outreach is in place;</li> <li>2. Key outreach and communication products developed and disseminated (e.g., Arctic SDI Manual, Geoportal Users' Guide, brochures targeted at specific audiences &amp; promoting specific themes);</li> <li>3. Outreach products are maintained/updated periodically to reflect changing strategies, methods, technologies, needs, etc.</li> <li>4. Outreach programs collect stakeholders' feedback on the SDI</li> <li>5. Outreach activities are geared at promoting partnerships</li> <li>6. Outreach programs address the issue of stakeholders' organizational transformation</li> </ol>	<ol style="list-style-type: none"> <li>1. Literature review of Arctic SDI documents;</li> <li>2. Literature review of Arctic SDI documents;</li> <li>3. Literature review of Arctic SDI documents and interviews with members of the coordinating body;</li> <li>4. Interviews with key stakeholders and members of the coordinating body;</li> <li>5. Review and analysis of outreach and communication products;</li> <li>6. Review and analysis of outreach and communication products.</li> </ol>	Outreach programs should reflect the spirit of the SDI, inform of the benefits, reach new audiences, design specific for target audience, accommodate a two way flow of information, inform stakeholders on SDI activities, and promote partnerships. In addition, outreach programs should address the need for stakeholders to develop a culture of commitment and shared responsibility to the development of the SDI. This includes the collection of data in a manner that it can be shared (e.g., adhering to standards, and generate metadata).

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Environment Readiness	Capacity Building (cont.)	Capacity Strengthening	Stakeholders' capacity to utilize the services of the SDI, contribute to the growth of the SDI and utilize geospatial knowledge to support decision-making is continuously improving.	To measure the extent to which training programs to grow the utilization of the SDI and the usage of geospatial information in general are developed and implemented.	<ol style="list-style-type: none"> <li>Number of training programs on the usage of the SDI and geospatial information developed and implemented;</li> <li>Training programs are tailored to suit existing culture and the Arctic environment;</li> <li>The number of training programs developed and delivered to support specific Arctic projects;</li> <li>Training programs are developed specifically for the different categories of professional operating in the Arctic (e.g., bureaucrats, program managers, scientist, technicians etc.);</li> <li>A training program developed for guiding the Arctic Community on the processes involved in collecting geospatial data for sharing and reuse;</li> <li>The utilization of courses developed and offered by other organizations (e.g., stakeholders' countries, OGC, GSDI, etc.).</li> </ol>	<ol style="list-style-type: none"> <li>Interviews with key stakeholders and members of the coordinating body;</li> <li>Literature review of training programs;</li> <li>Literature review of training programs;</li> <li>Interviews with staff and members of the coordinating body;</li> <li>Literature review of training programs,</li> <li>Interviews with key stakeholders and members of the coordinating body</li> </ol>	The capacity-building program should seek to align itself with both new and existing Arctic activities. The program should also seek to utilize courses developed by other agencies.
	Information Infrastructure: Adequate Infrastructure exist to facilitate efficient access and dissemination of geospatial information	Reliable Infrastructure	Infrastructure optimized for performance facilitates storing, discovery, viewing, analyzing, and downloading of geospatial information.	To measure the capacity of the current infrastructure to provide stakeholders with efficient, reliable, and secure access to geospatial information and services.	<ol style="list-style-type: none"> <li>Hardware in place to support speedy access and retrieval of data;</li> <li>An architecture model is in place to support implementation;</li> <li>Technology platform meets international standards;</li> <li>Technology tools are aligned with emerging internet and technology trends;</li> <li>Technology nodes are automated and support shared data transfer services;</li> <li>Software in place to support the development of common spatial applications and the sharing of data across different platforms;</li> <li>Software supports accessing, viewing and publishing of spatial and non-spatial information;</li> <li>The infrastructure facilitates the linking of the SDI with other portals.</li> </ol>	<ol style="list-style-type: none"> <li>Interview with management team and review of implementation plan;</li> <li>Arctic SDI document review;</li> <li>Review of architecture model and international standards;</li> <li>Review of architecture model and international standards;</li> <li>Interview with management team and review of implementation plan;</li> <li>Interview with management team and review of implementation plan;</li> <li>Review of implemented software;</li> <li>Interview with management team and review of implementation plan;</li> </ol>	The indicators 1-8 only seek to identify that a minimum level of infrastructures are in place to support the Arctic SDI. However, it should be noted that metrics should be in place to measure the actual performance of the Arctic SDI (e.g., up time, response time etc.)
		Technical Infrastructure Transfer Environment	The Arctic SDI provides an environment where information are stored, accessed, and disseminated through secure infrastructure.	To identify the security procedures and technology in place to ensure that information managed by the Arctic SDI is secured against accidental or malicious corruption and unauthorised access.	<ol style="list-style-type: none"> <li>Security sound practices followed for the management of geospatial information;</li> <li>Technology platforms are compliant with best practice security requirements;</li> <li>Security best practices are implemented.</li> </ol>	<ol style="list-style-type: none"> <li>Interviews with members of the coordinating body/management team and literature review;</li> <li>Interviews with members of the coordinating body/management team and comparison with international standards;</li> <li>Comparison of current practices with international standards.</li> </ol>	Technology management and process security must be implemented. The integrity of information must be secured against corruption, accidental or intentional incidents

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Environment Readiness	Arctic SDI Geoportal: The Arctic SDI Geoportal facilitates the discovery, viewing, assessing, analysing, and downloading of geospatial information	Access	The geoportal provides efficient and reliable functions for discovering, viewing, and assessing available datasets.	To establish the level to which the geoportal provides efficient access to available datasets	<ol style="list-style-type: none"> <li>1. Available datasets can be discovered, viewed and assessed via the geoportal</li> <li>2. Discovery speed is efficient</li> <li>3. Viewing quality satisfies users needs</li> <li>4. Users can assess datasets through metadata information</li> <li>5. Does the geoportal facilitates different types of access (e.g., stakeholders vs. general public)?</li> <li>6. The geoportal provides access to information on other portals</li> </ol>	<ol style="list-style-type: none"> <li>1. Review of the geoportal;</li> <li>2. Review of the geoportal and interviews with key users;</li> <li>3. Review of the geoportal and interviews with key users;</li> <li>4. Review of the geoportal;</li> <li>5. Review of the geoportal;</li> <li>6. Review of the geoportal.</li> </ol>	
		Data Transmission	The geoportal provides a reliable and effective platform for downloading and uploading datasets.	To measure the capabilities of the Arctic SDI Geoportal to support effective downloading of available datasets, as well as, facilitate the efficient uploading of datasets	<ol style="list-style-type: none"> <li>1. The geoportal provides data downloading capabilities</li> <li>2. Downloading speed meets users' requirements</li> <li>3. The downloading process is user friendly</li> <li>4. Authorised stakeholders can self upload their data to the portal</li> <li>5. The geoportal facilitates transactional/real time update from key stakeholders</li> </ol>	<ol style="list-style-type: none"> <li>1. Review of the geoportal ;</li> <li>2. Review of the geoportal and interviews with key users;</li> <li>3. Review of the geoportal and interviews with key users;</li> <li>4. Review of the geoportal;</li> <li>5. Review of the geoportal.</li> </ol>	
		Services	The geoportal facilitates data reuse, data integration and data analysis.	Identify the web mapping services provided by the Arctic SDI Geoportal	<ol style="list-style-type: none"> <li>1. Does the geoportal provides web-mapping services?</li> <li>2. List the web mapping services provided</li> <li>3. Does the geoportal provide a business service?</li> <li>4. A help desk is provided to assist users</li> </ol>	<ol style="list-style-type: none"> <li>1. Review of the geoportal;</li> <li>2. Geoportal and documents review;</li> <li>3. Geoportal and documents review;</li> <li>4. Interview with management team.</li> </ol>	
		Geoportal development	Geoportal development follows best practice and encapsulate the feedback of stakeholders.	To identify if the development of the Arctic SDI geoportal is based on best practice and the needs of the stakeholders	<ol style="list-style-type: none"> <li>1. Development follows international best practices;</li> <li>2. A prototype environment exist for stakeholders to test and participate in the development of the geoportal through feedbacks.</li> </ol>	<ol style="list-style-type: none"> <li>1. Interview with management team;</li> <li>2. Interview with management team and review of the geoportal.</li> </ol>	
	Arctic Circle Geoportals	National Geoportals	The Arctic SDI geoportal is linked to, or can be linked to stakeholders' national geoportals.	To identify the number of National geoportals within the Arctic Community and whether or not the Arctic SDI's geoportal is link to them.	<ol style="list-style-type: none"> <li>1. The number of national geoportals within the Arctic Community;</li> <li>2. The number of national geoportals linked to the Arctic SDI Geoportal</li> </ol>	<ol style="list-style-type: none"> <li>1. Literature review;</li> <li>2. Interview with management team.</li> </ol>	
		Community Geoportals	The Arctic SDI geoportal is linked to, or can be linked to community geoportals.	To identify the number of community geoportals within the Arctic Community and whether or not the Arctic SDI's geoportal is link to them.	<ol style="list-style-type: none"> <li>1. The number of community geoportals within the Arctic and their owners;</li> <li>2. The number of community geoportals linked to the Arctic SDI Geoportal.</li> </ol>	<ol style="list-style-type: none"> <li>1. Literature review;</li> <li>2. Interview with management team.</li> </ol>	

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Environment Readiness	Data and Information Environment: The Arctic SDI facilitates access to current, reliable and relevant data	Reference Datasets	The Arctic SDI provides easy and reliable access to the reference datasets as defined by the stakeholders.	To determine the extent to which the defined reference datasets are available through the Arctic SDI	<ol style="list-style-type: none"> <li>Reference datasets have been defined by the stakeholders;</li> <li>Custodians have agreed to make the datasets available to the SDI and data sharing agreements (e.g., SLAs and MOUs) are in place;</li> <li>All reference datasets are well maintained by the custodians to specified standards (e.g., quality, currency, scale);</li> <li>Reliable metadata developed by custodians with support from the SDI;</li> <li>The percentage of reference datasets that are readily available through the SDI;</li> <li>The coordinating body is constantly working on evolving the definition of reference datasets;</li> <li>Reference datasets are interoperable (can be integrated);</li> <li>Reference datasets include both land and marine data.</li> </ol>	<ol style="list-style-type: none"> <li>Literature review and interviews with members of the coordinating body;</li> <li>Literature review;</li> <li>Interviews with members of the coordinating body/management team and cursory review of the datasets;</li> <li>Review of fundamental datasets;</li> <li>Review of the Arctic SDI Geportal;</li> <li>Literature review and interviews with members of the coordinating body;</li> <li>Interviews with members of the coordinating body/management team;</li> <li>Review of fundamental datasets.</li> </ol>	Stakeholders should agree on what is defined as reference datasets (this definition can evolve) and these datasets should be maintained by the custodians and made available through the SDI.
		Relevant Thematic Datasets	The Arctic SDI provides easy and reliable access to datasets relevant to the stakeholders.	To determine the quality and quantity of the datasets made available through the Arctic SDI.	<ol style="list-style-type: none"> <li>The number of relevant datasets available through the SDI;</li> <li>Datasets available through the SDI satisfy stakeholders needs;</li> <li>Datasets available through the SDI are of good quality and meet specified standards (e.g., quality, currency, scale);</li> <li>Datasets available through the SDI are accompanied by reliable metadata;</li> <li>The percentage of stakeholders whose datasets are available through the SDI;</li> <li>Systems are in place for the SDI to continuously acquire access to relevant datasets through partnerships (in particular with local communities);</li> <li>Relevant datasets are assessed before they are made available through the SDI;</li> <li>Key stakeholders can easily provide (upload) datasets to the SDI;</li> <li>Procedures in place for the archiving of relevant data.</li> </ol>	<ol style="list-style-type: none"> <li>Review of the geoportal;</li> <li>Interviews with key stakeholders;</li> <li>Cursory assessment of datasets and interviews with management team;</li> <li>Cursory assessment of datasets;</li> <li>Review of the geoportal and Interview with management team;</li> <li>Literature review and interviews with management team;</li> <li>Interviews with management team;</li> <li>Interviews with management team;</li> <li>Interviews with management team.</li> </ol>	Through users needs surveys the Arctic SDI is continuously identify and acquiring thematic datasets that are relevant/useful to stakeholders, users and potential users.

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Environment Readiness	Data and Information Environment (cont.)	Non-spatial Information	Non-spatial information (e.g., reports, scientific data, and statistics) are accessible through the SDI.	To determine the extent to which Non-spatial information are made available through the SDI.	<ol style="list-style-type: none"> <li>1. Policies and protocols are in place for the SDI to provide access to non-spatial information;</li> <li>2. The quantity of non-spatial information current available through the SDI;</li> <li>3. Non-spatial information are provided in a manner that they can be easily integrated with spatial data.</li> </ol>	<ol style="list-style-type: none"> <li>1. Literature review;</li> <li>2. Review of the geoportal and interviews with management team;</li> <li>3. Review of the geoportal and interviews with management team.</li> </ol>	It is important that the SDI is capable of providing links to non-spatial information (in particular cultural information) as they relate to a specific region or location.
	Standards: Standards are in place and promoted to support geospatial interoperability	Data Standards	Common data standards are agreed upon and adopted by Arctic SDI stakeholders.	Identify the data standards of the Arctic SDI and the level to which they have been adopted.	<ol style="list-style-type: none"> <li>1. Stakeholders agree upon common data standards that are aligned to international standards;</li> <li>2. Agreed upon metadata standards exist and are based on international standards (e.g., ISO/19115);</li> <li>3. Arctic SDI promotes the use of metadata standards;</li> <li>4. Metadata tool(s) developed or adopted for efficient collection of metadata;</li> <li>5. All agreed standards are documented and disseminated;</li> <li>6. Framework in place to promote the usage of standards;</li> <li>7. Standards support data interoperability and integration.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review of standard documents;</li> <li>2. Review of standard documents;</li> <li>3. Interviews with members of the coordinating body and literature review;</li> <li>4. Interviews with members of the coordinating body and management team;</li> <li>5. Review of Arctic standard documents;</li> <li>6. Literature review;</li> <li>7. Review of standard documents.</li> </ol>	Common agreed standards should be in place to support sharing, interoperability, integration, assessing and reuse of data.
		Web Services Standards	Arctic SDI uses web services standards in the development of its tools for manipulating, transforming, managing, or presenting geographic information.	To determine if Arctic SDI uses web services standards and if these standards are aligned with international standards.	<ol style="list-style-type: none"> <li>1. Key web services standards developed</li> <li>2. Arctic SDI web services standards are based on international standards (e.g., OGC)</li> <li>3. Web services standards supports data sharing across different systems and applications;</li> <li>4. What are the key web services standards developed?</li> </ol>	<ol style="list-style-type: none"> <li>1. Review of the web services standards documents and interview with management team;</li> <li>2. Interviews with members of the management team and a review of the different international standards currently available;</li> <li>3. Interviews with members of the management team;</li> <li>4. Review of web services standards documents and interview with management team.</li> </ol>	Key web services standards (e.g., Web Map Service (WMS), Web Feature Service (WFS), Web Processing Service (WPS), and Catalogue Services for the Web (CSW)) are developed and implemented to support the manipulation, transformation, managing, or presenting geographic information.

Category	Component	Sub-Component	Output/Outcome	Intent of the indicators	Indicator/Metric	Evaluation Methodology	Notes
Environment Readiness	Standards (cont.)	Data Exchange Standards (e.g., discovery, visualization, access, pedigree, download, publish etc.,)	Standards and policies have been developed and implemented to support efficient and effective exchange of data.	To determine if standards are in place to support key data exchange activities.	<ol style="list-style-type: none"> <li>1. Data Exchange standards developed and implemented;</li> <li>2. Data Exchange standards are based on international standards;</li> <li>3. What are the key data exchange standards developed?</li> </ol>	<ol style="list-style-type: none"> <li>1. Review of the Data Exchange standards documents and interview with management team;</li> <li>2. Interviews with members of the management team and a review of the different international standards currently available;</li> <li>3. Interviews with members of the management team;</li> </ol>	
		Technology Standards	The implementation of the Arctic SDI infrastructure utilizes international technology standards and best practice.	To determine if Arctic SDI infrastructure implementation utilizes international technology standards and best practice.	<ol style="list-style-type: none"> <li>1. Technology standards developed or adopted for the SDI</li> <li>2. Infrastructure platforms are acquired and implemented using international standards</li> <li>3. Infrastructure platforms are acquired and implemented based on international best practice</li> </ol>	<ol style="list-style-type: none"> <li>1. Interviews with members of the management team and document review;</li> <li>2. Interviews with members of the management team and document review;</li> <li>3. Interviews with members of the management team and document review.</li> </ol>	