**Date: October 19, 2015**

**MEMORANDUM**

**FROM**: Cameron Wilson, National Contact Point Canada

**SUBJECT:** Arctic SDI Assessment

**OBJECTIVE:** The goal of this project is to conduct an assessment of the Arctic Spatial Data Infrastructure (Arctic SDI) in order to baseline current state to guide future developments.

**BACKGROUND:** The Arctic SDI Implementation Plan 2015-2020[1] lists key performance indicators (see Appendix A) to be measured over the time period: 2015 to 2020. In order to report on the development and status of the Arctic SDI, as well as to position it for future growth and continued relevance, an assessment framework will be developed and used to assess progress and performance of the Arctic SDI. Taking stock of the Arctic SDI by performing a multifaceted assessment to identify priorities for geospatial information access, sharing and use of the infrastructure will inform areas where work is still required to advance the Arctic SDI.

The development of an Arctic SDI assessment framework will be based on academic and applied SDI assessment methodologies[2]. The Arctic SDI assessment framework will define measures of success, both qualitative and quantitative. Data collection methods include desktop research of national and International SDI activities as well as Arctic SDI stakeholder consultations. The Arctic SDI Assessment Framework will consist of performance indicators that address the components of Arctic SDI – standards, policies, technology, framework data, as well as collaboration and leadership.

The Arctic SDI Strategy Working Group identified the need for a practical and cost-effective assessment framework and developed initial assessment metrics (see Appendix A).

**PROJECT PHASES**: This project will occur in two phases.

**Phase 1 – Arctic SDI Assessment Framework Development**

Phase will develop the assessment framework draw from existing works. Spatial Data Infrastructure (SDI) assessment methodologies vary in complexity. They provide a snapshot of an SDI from different perspectives[3,4]. There have been investigations into the evaluation of SDIs in the academic sector and many countries report on their SDI progress[5]. SDIs behave like

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[1] http://arctic-sdi.org/wp-content/uploads/2014/08/Arctic-SDI-Implementation-Plan_June-20125.pdf

[2] INSPIRE State of Play, NSDI Assessment Framework, CGDI Assessment Framework and Methodology

3 From: Multi-view SDI Assessment Framework, Lukasz Grus, Joep Crompvoets, Arnold K. Bregt, International Journal of Spatial Data Infrastructures Research, 2007, Vol. 2, 33-53. lucas.grus@wur.nl; joep.crompvoets@wur.nl; arnold.bregt@wur.nl.

[4] Performance Indicators a Tool to Support Spatial Data Infrastructure Assessment, Garfield A. Giff and Joep Crompvoets. *Computers, Environment and Urban Systems* (2008), doi:10.1016/j.compenvurbsys.2008.08.001

5 Permanent Committee for Geospatial Data Infrastructure of the Americas (PC-IDEA) (2013). Chapter 10 Measuring and Monitoring Impacts and Benefits in "Spatial Data Infrastructure (SDI) manual for the Americas", http://unstats.un.org/unsd/geoinfo/RCC/docs/rcca10/E_Conf_103_14_PCIDEA_SDI%20Manual_ING_Final.pdf

Complex Adaptive Systems[6], hence all components (framework data, standards, policies, technologies and collaboration) need to be assessed to draw a complete picture.

**Phase 2 – Arctic SDI Assessment and Status Report**

This phase will pilot the Arctic SDI assessment framework by conducting a preliminary baseline assessment: to test the framework and to provide an initial baseline of Arctic SDI in order to track the progress of Arctic SDI. The resulting assessment report will be used to communicate Arctic SDI status and identify gaps and priorities for the maintenance and evolution of Arctic SDI.

**For more information, please see the Statement of Work - Appendix B and the following papers:**

- *Multi-view SDI Assessment Framework*
- *Performance Indicators a tool to Support Spatial Data Infrastructure assessment*

Available in:
https://drive.google.com/folderview?id=0BwNhOMLWgzfCTEtsZ3dVR0hseWs&usp=sharing&tid=0BwNhOMLWgzfCeGJZcnR1VFRMcTg

[6] Grus, L., Bregt, A. and J. Crompvoets (2006). "Defining National Spatial Data Infrastructures as Complex Adaptive Systems", Proceedings GSDI-9 Conference, 6–10 November 2006, Santiago, Chile.

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APPENDIX A – Key Performance Indicators

From: ARCTIC SDI Implementation Plan 2015-2020, page 3, http://arctic-sdi.org/wp-content/uploads/2014/08/Arctic-SDI-Implementation-Plan_June-20125.pdf

**"Key Performance Indicators**

Several key performance indicators will be measured over the time period from 2015 to 2020 to gauge the effectiveness of the implementation of the *Arctic SDI Strategic Plan 2015-2020*, as well as the effectiveness of the Arctic SDI itself. The methods used to measure each key performance indicator will be detailed in a separate *Arctic SDI Key Performance Indicators Document* developed in the Strategy Working Group and coordinated with all other Working Groups. These will be measured, assessed and tracked yearly over the 2015-2020 timeframe with regular reports to the Arctic SDI Board.

Key performance indicators will include qualitative or quantitative metrics on:

- User satisfaction of authoritative reference and thematic data and services
- Relevance of Arctic SDI reference and thematic data to users
- The use of the Arctic SDI Geoportal, web services and metadata
- Known applications based on the Arctic SDI and their relevance
- Arctic SDI Operational Policies influence on the development of Arctic Council information management policies"

**Date: October 19, 2015**

# Appendix B - STATEMENT OF WORK

## Arctic SDI Assessment – *A Baseline*

## 1 Requirement

The CGDI Division has a requirement to conduct an assessment of the Arctic Spatial Data Infrastructure (Arctic SDI) in order to measure the progress, success and current status of the Arctic SDI[7].

## 2 Background

### 2.1 Arctic Spatial Data Infrastructure Performance Project

The Arctic SDI is a voluntary, multilateral cooperation between the 8 National Mapping Agencies of the Arctic countries (Canada, United States, Russia, Kingdom of Denmark, Iceland, Sweden, Norway and Finland). The goal of the Arctic SDI is to provide politicians, governments, policy makers, scientists, private enterprises and Northerners with access to reliable and interoperable geospatial data, tools and services to facilitate monitoring and decision making in the Arctic.

The Arctic SDI Implementation Plan 2015-2020[8] lists key performance indicators (see Appendix A) to be measured over the time period: 2015 to 2020. In order to report on the development and status of the Arctic SDI, as well as to position it for future growth and continued relevance, an assessment framework (baseline) will be developed and used to assess progress and performance of the Arctic SDI (current state). Taking stock of the Arctic SDI by performing a multifaceted assessment to identify priorities for geospatial information access, sharing and use of the infrastructure will inform areas where work is still required to advance the Arctic SDI.

## 3 Scope

### 3.1 Phase 1 – Arctic SDI Assessment Framework Development

Spatial Data Infrastructure (SDI) assessment methodologies vary in complexity. They provide a snapshot of an SDI from different perspectives[9][10]. There have been investigations into the evaluation of SDIs in the academic sector and many countries report on their SDI progress[11]. For

7 http://arctic-sdi.org/

8 http://arctic-sdi.org/wp-content/uploads/2014/08/Arctic-SDI-Implementation-Plan_June-20125.pdf

9 From: Multi-view SDI Assessment Framework, Lukasz Grus, Joep Crompvoets, Arnold K. Bregt, International Journal of Spatial Data Infrastructures Research, 2007, Vol. 2, 33-53. lucas.grus@wur.nl; joep.crompvoets@wur.nl; arnold.bregt@wur.nl.

10 Performance Indicators a Tool to Support Spatial Data Infrastructure Assessment, Garfield A. Giff and Joep Crompvoets. *Computers, Environment and Urban Systems* (2008), doi:10.1016/j.compenvurbsys.2008.08.001

11 Permanent Committee for Geospatial Data Infrastructure of the Americas (PC-IDEA) (2013). Chapter 10 Measuring and Monitoring Impacts and Benefits in "Spatial Data Infrastructure (SDI) manual for the Americas", http://unstats.un.org/unsd/geoinfo/RCC/docs/rcca10/E_Conf_103_14_PCIDEA_SDI%20Manual_ING_Final.pdf

SDIs, which behave like Complex Adaptive Systems[12], all components (framework data, standards, policies, technologies and collaboration) need to be assessed to draw a complete picture.

The development of an assessment framework for Arctic SDI will be based on international SDI assessment models as well as known assessment methods[13]. The Arctic SDI assessment framework will define measures of success, both qualitative and quantitative. Data collection methods include desktop research of national and International SDI activities as well as Arctic SDI stakeholder consultations. The Arctic SDI Assessment Framework will consist of performance indicators that address the components of Arctic SDI – standards, policies, technology, framework data, as well as collaboration and leadership.

The Arctic SDI Strategy Working Group identified the need (see APPENDIX A) to determine a practical and cost-effective assessment framework in order to assess the performance of the Arctic SDI, measure the status (baseline) of the Arctic SDI and influence future funding priorities in order to advance the Arctic SDI.

### 3.2 Phase 2 – Arctic SDI Assessment and Status Report

This phase will pilot the Arctic SDI assessment framework by conducting a preliminary baseline assessment: to test the framework and to provide an initial measure of Arctic SDI (a baseline) as well as tracking ongoing development and progress of Arctic SDI. The resulting assessment report will be used to communicate Arctic SDI status and identify gaps and priorities for the maintenance and evolution of Arctic SDI.

## 4. Milestone and Deliverables

| Milestones/Deliverables | Date Completed |
|---|---|
| **Milestone 1 – Kick-off**<br>• Kickoff meeting<br>• Contractor analysis of provided material<br>• Project plan including timelines, deliverables and assessment plan/methodology | November 1, 2015 |
| **Milestone 2 –SDI Assessment Methodologies**<br>• Research SDI assessment methodologies<br>• Develop a two-page analytical comparison of SDI assessment methodologies implemented by different organisations (i.e. NSDI, CGDI, INSPIRE, …) to provide context to Arctic SDI stakeholders | December 1, 2015 |
| **Milestone 3 – Arctic SDI Assessment Framework** | January 7, 2016 |

[12] Grus, L., Bregt, A. and J. Crompvoets (2006). "Defining National Spatial Data Infrastructures as Complex Adaptive Systems", Proceedings GSDI-9 Conference, 6–10 November 2006, Santiago, Chile.

[13] INSPIRE State of Play, NSDI Assessment Framework, CGDI Assessment Framework and Methodology

| | |
|---|---|
| • Conduct desktop research<br>• Develop assessment indicators<br>• Consult with Arctic SDI National Contact Point members and Arctic SDI Technical Working Group members<br>• Indicator reductions/modifications<br>• Finalized assessment framework | |
| **Milestone 4 – Apply Arctic SDI Assessment Framework**<br>• Conduct desktop research<br>• Possibly supplement with key stakeholder consultations | February 1, 2016 |
| **Milestone 5 – Analysis**<br>• Analysis of the research and consultations<br>• Comparison to baseline data<br>• Preparation of draft assessment report<br>• Draft assessment report presentation | March 1, 2016 |
| **Milestone 6 – Wrap-up**<br>• Preparation of final assessment report based on feedback<br>• Preparation of a PowerPoint presentation on the Arctic SDI assessment results<br>• Presentation of the Arctic SDI assessment results (webinar; audience: Arctic SDI National Contact Point members, Arctic SDI Technical Working Group members, Arctic SDI Board members)<br>• Preparation of a lessons learned report | March 15, 2016 |

## 5 Considerations

- The Arctic SDI is an interoperable network, or system of systems that enables access to and usage of geospatial information and services. This complex system involves multiple stakeholders from all levels of government, private industry, academia, Aboriginal communities and many other organizations. Assessment plans and methodologies will need to account for these multiple stakeholders as well as the often complex relationships that exist between stakeholder groups.

- The Arctic SDI is fed by suppliers and accessed by users and each of these two stakeholder groups need to be considered during assessment planning.

- Arctic SDI key performance indicators listed in the Arctic SDI Implementation Plan 2015-2020 (see APPENDIX A).

- Governing structures of key stakeholders: Arctic Council and Arctic SDI

- Arctic SDI leverage

- Assessment results need to be focused on SDI components which are **operational policies**, **standards**, **technologies** and **framework data** as well as overarching **collaboration** for the development and maintenance of the infrastructure**.**

## 6 Reporting Requirements

For each completed milestone, the Contractor will report progress to the Project Authority with an e-mail containing:

- Activities completed during the reporting period;
- Deliverables completed during the reporting period;
- Issues and concerns – proposed strategies/steps;
- Major decisions / project changes;

For the last milestone of the project, the Contractor will be asked to provide a final report (1-3 pages) containing:

- Activities completed during the reporting period;
- Deliverables completed during the reporting period;
- Budget details of expenses during the reporting period;
- Issues and concerns – proposed strategies/steps;
- Major decisions / project changes;
- Invoice (supporting financial documentation if required).

## 7 Method and Source of Acceptance

All deliverables and services rendered under any contract are subject to inspection by the Project Authority. The Project Authority shall have the right to reject any deliverables that are not considered satisfactory, or require their correction before payment will be authorized.

## 8 Other Terms and Conditions of the SOW

### 8.1 Contractor's Obligations

The Contractor shall:

- Respect CGDI stakeholder requirements with regards to proprietary information;
- Maintain all documentation in a secure area;
- Return all materials belonging to NRCan upon completion of the Contract;
- Submit all written reports in hardcopy and softcopy (Microsoft Office Word, Power Point and Adobe PDF formats) on CD / DVD;
- Attend meeting with stakeholders, if necessary;
- Participate in teleconferences, as needed;
- Attend meeting at NRCan sites, if required.

8.2 NRCan's Obligations

NRCan shall:

- Provide feedback on or indicate acceptance of project deliverables within a reasonable, predetermined period of time;
- Provide access to relevant documentation and materials government and departmental policies and procedures, publications, reports, studies, etc. relevant to the project;
- Provide access to the GeoConnections Project Authority or delegate to provide guidance and answer questions as required.

## 9 Estimated Period of the Contract

The estimated period of the contract is 4-5 months, ending no later than **March 15, 2016**.

## 10 Estimated Budget

The estimated budget is **$25,000**.