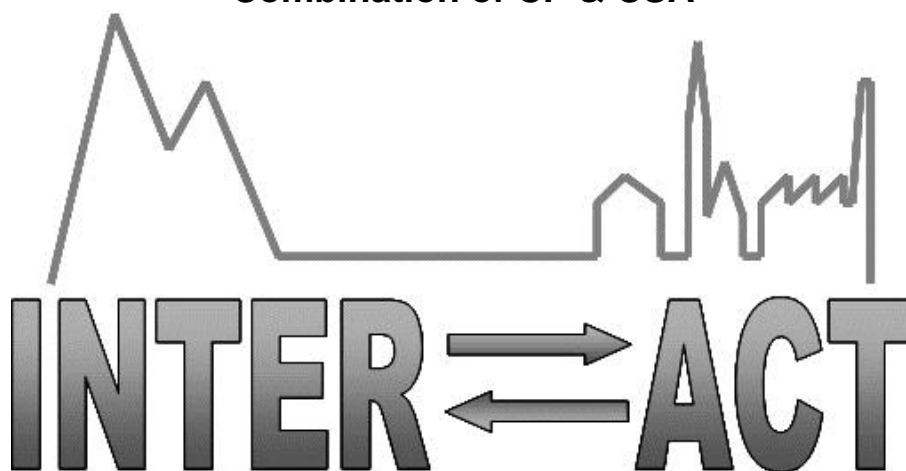


Combination of CP & CSA



D7.2 – Abisko Scientific GIS

Project No.262693– INTERACT

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Author: Tomas Thierfelder

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the Consortium (including the Commission Services)	
CO	Confidential, only for members of the Consortium (including the Commission Services)	

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Publishable Executive Summary

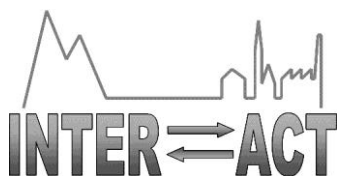
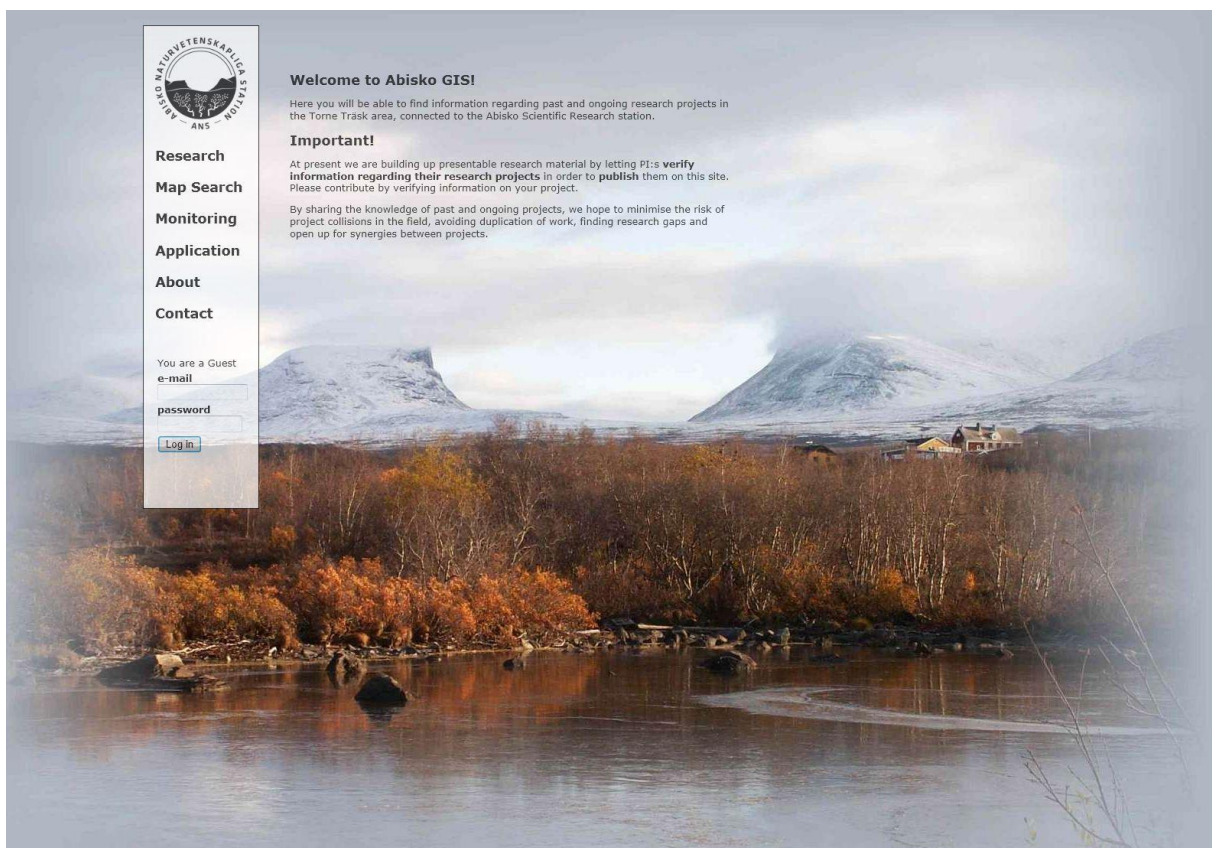
The Abisko Scientific GIS has been constructed and made publically available at <http://www.abiskogis.se> from 2013-01-01. It is a web-based geographic information system that is providing geo-referenced metadata regarding research and monitoring activities performed under the auspices of the Abisko Scientific Research Station, sub-Artic Sweden, through the approximate period from 1980 until present. In addition, the system is generically designed for every-day administration of station-based research and monitoring activities, including semi-automated handling of visitors and their associated lodging. Via the administration of visitors, standardized (INSPIRE-compatible) protocols are utilized for harvesting new metadata that describe their intended research and monitoring activities. When these metadata are added to the existing geo-database, present station activities are connected with the past at real-time pace. Since the provision of metadata is a compulsory prerequisite for being able to enter the station, the procedures for continuous update of the geo-database breathes life into the system, and constitutes an essential key to its survival.

INTERACT Deliverable Report 7.2

Work Package 7: Data Management

Deliverable 7.2: Abisko Scientific GIS

Tomas Thierfelder, Mohsen Bashang, Sofia Bryntse
Dept. of Energy and Technology, Swedish University of Agricultural Sciences, Uppsala branch



Swedish University of Agricultural Sciences
www.slu.se

INTERACT Deliverable 7.2

Abisko Scientific GIS

A geographic metadata catalogue for environmental monitoring and research

Tomas Thierfelder, Mohsen Bashang, Sofia Bryntse

Dept. of Energy and Technology, Swedish University of Agricultural Sciences, Uppsala branch

Abstract

The Abisko Scientific GIS has been constructed and made publically available at <http://www.abiskogis.se> from 2013-01-01. It is a web-based geographic information system that is providing geo-referenced metadata regarding research and monitoring activities performed under the auspices of Abisko Scientific Research Station, sub-Artic Sweden, through the approximate period from 1980 until present. In addition, the system is generically designed for every-day administration of station-based research and monitoring activities, including semi-automated handling of visitors and their associated lodging. Via the administration of visitors, standardized (INSPIRE-compatible) protocols are utilized for harvesting new metadata that describe their intended research and monitoring activities. When these metadata are added to the existing geo-database, present station activities are connected with the past at real-time pace. Since the provision of metadata is a compulsory prerequisite for being able to enter the station, the procedures for continuous update of the geo-database breathes life into the system, and constitutes an essential key to its survival.

1.1. Introduction

Remotely located research and monitoring stations like the Abisko Scientific Research Station (ANS) have double responsibilities in hosting research and monitoring activities as well as the associated visiting scholars. The scholars typically apply for permission to conduct research at the station by filling in an application form that is administrated by station personnel. After evaluation and approval of the application, scholars are lodged at the station while the project applied for is being conducted. In most cases, the resulting data are thereafter brought away from the station for post-experimental processing and publishing. The station legacy of the project is typically an archived application form, publication references, and a diffusively expanded knowledge-base.

The situation depicted above is quite generic and applies, more or less, to many remotely situated research and monitoring stations. As time goes by, archived application forms, publication references, and knowledge accumulate and, ultimately, at the far side of the historic record, are facing the possibility of being forgotten. With quite large numbers of scholars annually visiting a typical research and monitoring station, several hundred at some stations, the total amount of information passing by in the form of applications, publications, and diffuse knowledge is large. When conglomerates of stations are considered in-common, like all terrestrial research and monitoring stations across the Arctic region, the amount of information is immense.

Whether single stations or conglomerates are being considered, station planning necessarily rests on the experiences gained through, and reflected in, the record of past and current activities. By considering the record, latent as well as redundant research and monitoring activities may be identified, synergies across activities may be exploited, sites affected by previous activities may be detected, etc., etc. In order to utilize the record of experiences gained for decision support, the record needs to be organized into a metadata catalogue that provides decision-support functionalities. With station-based research and monitoring activities typically being performed in a geo-referenced context, the associated metadata is geo-referenced with the desired decision-support functionalities operating on geographic topologies. In other words, a geographic information system (GIS) is required for utilization of the record of past and current activities for station administration. With the Abisko Scientific GIS, such a system is provided for administration of the Abisko Station. Since the system is generically designed, it is open for any station that wishes to take advantage of its functionalities while simultaneously sharing the station record of activities with the rest of the world.

1.2. System overview at a glance

The Abisko Scientific GIS (<http://www.abiskogis.se>) offers the following main functionalities:

1. Text- or map-based query for current and historic research and monitoring projects.
2. Web-based visitors' application form.
3. Tools for semi-automated management of projects and visitors.
4. Tools for querying and managing a publication database – integrated with a system database.
5. System management including Principal Investigator accounts for database editing.

1.3. System specification

The system is, per definition, a web-based geographic information system. The associated functionalities are hence map-based and supportive of spatial input, editing, storage, and analysis. Its services are given within five main application areas:

1. Historic database

Metadata information regarding past and current research and monitoring activities have been digitised and made publicly available. The database may be queried either per text or geographically per an interactive map covering the area of station activities. The theme of the back-drop map may be adapted to suite the query theme.

2. Electronic application form

A tool for harvesting new data regarding the intended activities of visitors. When used as a compulsory prerequisite for entering the station, it continuously adds new metadata to the historic database, thus breathing life into the system. This is essential for system survival.

3. System/station administration

Tools for station management are easily linked to the basic facilities described above. The system hence contains tools for automatic hostel reservation and billing, where

additional routines for things like annual reporting and economic assessment are easily added. The system is flexible and may be tailored according to individual station-administrative requirements.

4. Publication database

The station's publication database is an integral part of the system, where publications are linked to the metadata catalogue and available for integrative query.

5. Routines for verification of data

Metadata regarding research and monitoring activities should be verified by the principal investigators (PI) prior to publication. The system is highly supportive of such verification, and provides individual PI accounts for database editing and verification.

In addition to its built-in services, the system contains:

- On the server side

The system is securely hosted at a highly specialised web-hotel that offers managerial services per hourly fee. The hosting fee is approximately 50 EUR annually, and may be shared across user stations.

- Education

The training of system managers is administrated by the Swedish University of Agricultural Sciences.

- Documentation

Full system documentation is due in December 2014 (D7.8).

- Expansive

The system is very flexible and open for adaptation to the special needs of individual stations – it is built on OPEN-philosophy

- Compatible

The system is INSPIRE-compatible (<http://inspire-geoportal.ec.europa.eu/>) and will eventually contain the map-services provided by the Arctic SDI (<http://arctic-sdi.org/>).

1.4. Migration – inclusion of additional stations

Our goal is to suggest the system as a standard shared by INTERACT stations. The prototype has been developed at the Abisko Scientific Research Station where it has been taken into actual usage in 2013, and thereafter (post INTERACT) migrating it throughout a selection of INTERACT stations. The inclusion of additional stations can be made in the existing system, with minor additional programming being required. However, if station-specific historic metadata should be included, station resources will be required for the associated inventory and digitisation.

With several stations included in the geographic metadata catalogue, queries regarding past and current activities may be conducted either within or across stations. This would provide the important possibility for individual stations to consider the activities of others in the planning and administration of research and monitoring activities.

1.5. Typical development and implementation procedures

In order to join the geographic metadata catalogue, prototyped at ANS, with a typical research and monitoring station, the following tasks and considerations are required:

- Station-specific inventory of administrative procedures and of activities/monitoring database

In close collaboration with system developers

- Digitisation of database

Labour intensive with total extent depending on the amount and format of data

- Adaptation of existing web-based system (the Abisko Scientific GIS) to multi-station functionality

Relatively small programming task – specialisation of the system developers is required

- Adaptation of resulting web-based system to station-specific metadata profile and administrative routines

In close collaboration with system developers

- System implementation

In close collaboration with system developers

- In-place training

In close collaboration with system developers

There is an important choice to be made with the end-product, namely to decide whether queries regarding research and monitoring activities should be made station-specific or jointly together with other stations. If the latter is preferred, the system will touch upon fundamental strategies for national as well as international metadata dissemination.

1.6. Typical time-plan for system development and implementation

The constituents of the generic time plan given in table 1 (below) serve as project milestones, and are typically subject to consecutive reporting of development and implementation status. Constituent 6, System documentation, is typically delivered in the form of a written document. In brief; the inclusion of additional stations to the geographic metadata catalogue prototyped at ANS is typically programmed during project-year 1, and taken into active usage at the initiation of project-year 2 activities.

Table 1: Typical time-plan for system development and implementation

1. Basic system development:								
2. Analysis of user requirements:								
3. System adaptation:								
4. System implementation:								
5. In-situ education:								
6. System documentation:								
Quarter:	1	2	3	4	1	2	3	4
Year:	1				2			

1.7. Indicative costs for system development and implementation

In the list of typical development and implementation procedures given above, all procedures that involve hands-on collaboration with system developers require a budget. The procedure of digitising historic metadata may be performed in-house, without much external contribution. With the associated work-load depending on the amount and format of station-specific historic metadata, the (in-house) budget of this relatively time-consuming task is difficult to estimate. However, based on experiences with a Swedish station that has joined the system, 40 to 70 kEUR per station might be an approximate indication of the total costs.