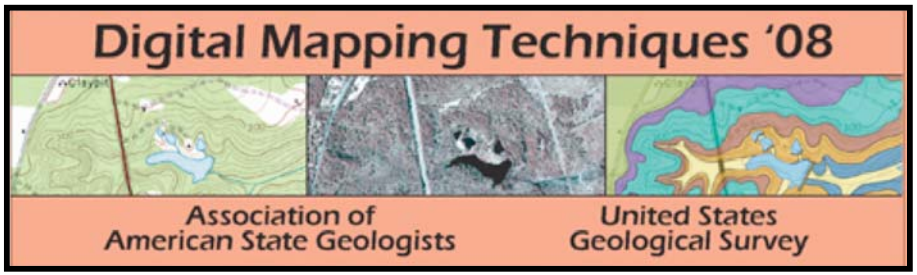

The following was presented at DMT'08
(May 18-21, 2008).

The contents are provisional and will be
superseded by a paper in the
DMT'08 Proceedings.

See also earlier Proceedings (1997-2007)
http://ngmdb.usgs.gov/info/dmt/

GEOLOGICAL MAPPING INTO A NEW ERA - A FINNISH EXAMPLE

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INTRODUCTION

The Geological Survey of Finland (GTK), like most long-established geological surveys, is in the process of renewing its mapping strategies. The revolution in information technology, pressures for greater responsiveness to customer groups, and the push of for greater organizational efficiency are the main drivers behind this process. Web-based approaches also increase the importance of being able to query and exchange geoscientific information internationally.

The largest issues to be tackled in the renewal process relate to data models and architecture, data capture and acquisition, as well as dissemination and delivery. The process occupies consider resources and demands a wide variety of skills. To date, GTK has expended some 200 man-years just on digitizing legacy data. Moreover, even with careful planning, the process has not been straightforward. The original plan of centralized storage based on the ESRI Geodatabase data structure (Oracle-ArcSDE platform) has been revised. We now plan to divide the databases in spatial (Oracle-ArcSDE) and aspatial parts (e.g. Geological unit register with attribute data in relational database).

The present focus is on careful analyses of work flows to modernize the mapping processes, designing seamless map databases for the entire country and map products at scales of 1:1 million and 1:200,000, as well as finalizing national data models for Precambrian and Quaternary geology and reworking the data structures accordingly.

MOVING INTO DIGITAL ERA

Goals

- Improve services
- Efficient Processes from Field to End-users
- National Geodata Warehouse

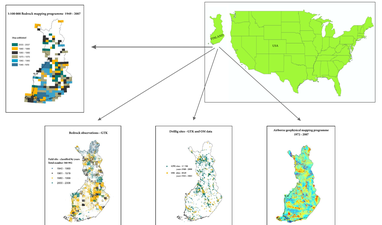
Requirements

- National Data Models
- Interoperability
- Weld-defined Workflows

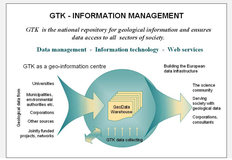
Challenges

- Harmonisation of Data-sets
- Seamless Map-databases
- Synchronized Databases

FINLAND FROM PAST TO PRESENT: BEDROCK MAPPING AS AN EXAMPLE



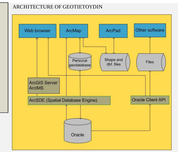
GTK GOAL



FIELD DATA CAPTURE

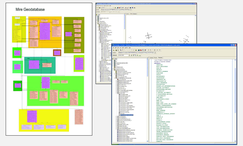
GTK has been developing digitalized field data capture process during past years as a part of development of information system based on Oracle-SDE –environment. The goal is to aggregate all field data from GTK's main processes (surficial and bedrock geology, peat investigations) under the same information system architecture.
Since data models used are very complicated the GTK has focused software programming on attribute editor development. GTK´s way to construct attribute editors is programming them on top of ArcGIS. Digitalized field data capture has been taken into production use largely at GTK.
Enhanced workflows, both in terms of quality control of data and effectiveness or processes, are the clear advantages.

ARCHITECTURE OF GEOTIETOYDIN



PEAT INVESTIGATIONS

- PDA-devices
- shape and dbf files derived from central geodatabase
- forms and all functionality maintaining data integrity are custom made by GTK



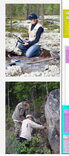
Planning of investigations lines with ArcMap and custom tools

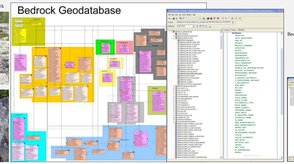
Field device and software

BEDROCK OBSERVATION

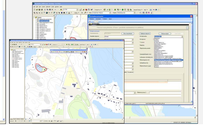
- rugged tablet PC's
- base maps, geophysical maps and previously made observations etc. in digital format
- standard ArcMap tools and custom GeoKernel editors
- database structure is extracted from the central geodatabase
- data model for bedrock observation covers all the sub processes such as basic bedrock mapping, exploration of metallic ores, natural stone investigations and detailed mapping needed for infrastructure projects

Tablet PC for field work





Bedrock editors on top of ArcMap



MAP DATABASE

BEDROCK MAPPING – HISTORY

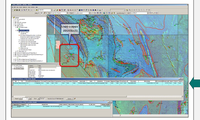
- Systematic geological mapping has been going on for more than 100 years with different map scales and variable coverage
  - 1:400 000 – first map published 1900 and last 1980 (100%)
  - 1:100 000 – first map published 1949 and last 2007 (57 %)

Map databases 2005 –>

- Map database projects (DigiKP200 and DigiKP1M) launched 2005. The first versions planned to be "traditional lithological" map data database
- New approach 2007
  - Data model based on NADM-C1 with national needs (Precambrian Bedrock)
  - Seamless nation-wide map database
    - Based on geological units (NASC 2005 and Stratigraphic Commission of Finland 2008 – Guide book "Guidelines and Procedures for Naming Precambrian Geological Units in Finland")
    - Lithostratigraphic – lithodemic - tectonostratigraphic units with lithology
    - Controlled vocabularies (international standards - IUGS - CGI)
    - Interoperability needs (INSPIRE – OneGeology - GeoSciML)

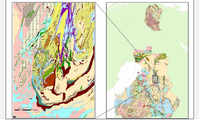
MAP DATABASE – DATA ENTRY – ARCGIS

User interface



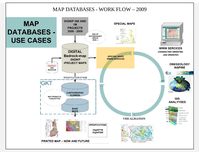
DRAFT PRODUCTS FROM GEODATABASE

LITHOLOGICAL MAP



UNIT BASED MAP

MAP DATABASES – WORK FLOW – 2009


MAP DATABASES - USE CASES
SPECIAL MAPS
MINE SERVICES (Mining Company requirements)
DIGITAL Bedrock-map (GTK's Mineral Potential PROJECT MAP)
GEOLOGICAL MAP DATABASE
GEOLOGICAL MAP DATABASE
GTK
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