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Background

Project Partners

- Financed by 8\textsuperscript{th} EDF Fund, SYSMIN Programme (European Union)
- Participating Authorities:
  - Ministry of Lands and Natural Resources
  - Geological Survey Department (GSD)
  - Minerals Commission (MC)
  - Inspectorate Division of the Minerals Commission
  - Precious Minerals Marketing Company Ltd. (PMMC)
Background

Project Partners

- **Realized by:**
  - Beak Consultants GmbH Freiberg  
    Design, Implementation, Training
  - IBIS Chemnitz  
    Technical infrastructure
  - Accelon Accra  
    Local partner for infrastructure
- introduction of 5 local area networks (LAN) at the Ministry, GSD, MC, ID, PMMC

- inter-connection of the 5 LAN via a wide area network (radio transmission)

- secured and permanent connection of this network to the internet

Locations:
- Ministry of Lands, and Natural Resources (Ministry)
- MC – Minerals Commission
- GSD – Geological Survey Department
- ID – Inspectorate Div. Of MC
- PMMC – Precious Minerals Marketing Company
Intranet Design (by IBES GmbH, Germany)

Roaming Users connected by RAS-Service over modem directly to GSD or MC – or – with VPN-Clientsoftware using any internet connection

Dedicated private wireless network 36MBit (each site >1MBit, up to 6MBit depending on environmental conditions)

Security provided by VPN-Gateways with Hardware encryption by IpSec ESP with 256bit AES Each GW up to 20MBit/s without delay

Secure LAN
Mines Department
Secure LAN
Minerals Commission

WAN/MAN

Geological Survey
Secure LAN

Marketing Agency
Secure LAN

Ministry of Lands, Forestry and Mines
Secure LAN

Microsoft ISA Server2004
Internet application layer firewall with integrated Cache
Server integrated Dial In RAS-Service for 8 lines
VPN Gateway with integrated application layer Firewall

Physical WAN/MAN link
Secure link (VPN Tunnel)
Physical Dial In link (POTS)
Internet Link (DSL)
Background
Geological Survey Department (GSD)

The GSD was founded in 1913

The vision of the GSD is to be an internationally recognised organization contributing to the development agenda of the country through the provision of geoscientific data

GSD is the principal curator of the national geoscientific data, and has the main task to continuously generate, collect, store and archive relevant geoscientific data, and to disseminate data and information in a user-friendly way to the government, industry and the public at large.

The department has the responsibility to advice the nation to make informed decision on geoscientific issues concerning mineral and groundwater resources, environment, geohazards and land use planning
Background

Significance of Ghana Mining Sector

- Mining in Ghana: 39 % of total export value
- Mining sector employs directly > 36,000 people
- Mining accounts for 5% of Ghana’s GDP
- Main commodities: Gold, Manganese, Bauxite, Diamonds
- Known reserves have depleted rapidly
  - Effective mining techniques
  - Lack of exploration funds
Background

Significance of Ghana geoscientific data

- Demand for data management to make exploration and licensing procedures more effective for investors
  - Efficient provision of geoscientific data
  - Up-to-date information about licences
Background

Main tasks

- The IMS project provides the Mining Sector of the MLNR and its agencies with
  - a new IT infrastructure,
  - a common web portal,
  - a powerful customized database / GIS software.

The IMS project is essential for the further development of one of the most promising economic sectors in Ghana.
Implementation of the System
General Database Structure

Reports & Documents

Factual Data & Metadata

Spatial Data
Geometrical data with relationship to the database
- Deposits
- Drill holes
- Licences
- Geology
- …
Topographical base data
- Topographic maps
- Satellite images
- …

File System

Database

Database / File System

Planning, Implementation and Introduction of Information Management Systems in the
Esri EMEAUC13  Geological Survey of Ghana
Implementation of the System

Database

Systematic storage, handling and provision of data:

- mineral licence data,
- mineral deposit data,
- geoscientific maps,
- geoscientific primary data,
- drillhole data,
- analytical data, …
Implementation of the System

Functions

• Data entry,
• Inquiries,
• Import and export (flat tables for further processing),
• Compilation of reports, statistics and maps for frequent data evaluations,
• Fast and easy printing of user defined maps,
• Alert functions for selected important events (e.g. expiry of licences).
Implementation of the System

Functions

Start form

Module forms:
- Licences
- Mine data
- Drill holes
- Deposits
- Reports
- Metadata
- Bibliography
- Geol. field data
- Geochemistry
- Pers.& comp.
- Geophysics
- Documents

Map printing

GIS

Administration

Frontend

Documents
Implementation of the System

Technical background

- ArcGIS
- MS SQL Server
- Programming languages libraries: .net, ArcObjects
Workflow: Example mineral deposits

GEODETASBASE GHANA

Mineral deposit module

Filter function

Setting of conditions
Workflow: GIS

9 deposits match the conditions

Addition of background data

Customised map printing
Workflow: GIS

1. Remove the filter
2. Pick up some deposits
3. Display their properties in the database
Workflow: database functions

Export data to EXCEL

Jump to literature

view selected record

Read the report
Workflow: geochemical database

Find any sample with $U > 10$ g/t

And display the sample locations in GIS
EXAMPLE OF GEOLOGICAL SURVEY OF Western Australia (GSWA)
ACTIVITIES OF GSWA

The department operates the MINEDEX, a continuously updated database containing information on mines, mineral deposits and prospects in Western Australia. To check, verify mining report and to integrate the information into the database.
DIVISIONS IN THE GSWA

- The various divisions within the GSWA are:
  - Mineral Geoscience – research on selected minerals
  - Land Use Geoscience – construction minerals
  - 3D Geoscience
  - Mapping
    - Mapping
    - Result Group
STRUCTURE FOR THE WEB PORTAL DATABASE

- Environment Impact (polygon)
- GSWA Geology (polygon, line, point)
- Mineral Deposits (polygon)
- Mineral License (polygon)
- Petroleum License (polygon)

Stored in ARCSDE – Spatial database

External website (Geoview)
Link to the

BUDGET

- Annual budget for the GSWA is 53 million Australian dollars
- Gain from sells from requested maps and report is 70,000 Australian dollars.
- Royalties from mines is 16 billion Australian dollars.
CHALLENGES

• THE GEODATABASE HAS TO BE UPDATED (no updates since its installation 2006) to make it user friendly

• The WAN should be functional to facilitate data exchange amongst the Ministry, Department and Agencies (MDAs)

• GSD should be made semi-autonomous to improve on its service delivery and also motivate its staff to stop the brain drain

• A functional homepage which is linked to the geodatabase
Thank you for your attention

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