



# Mineral Wealth Conference 2016

## Kampala / Uganda

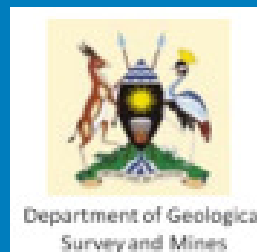
# Management of Geological Information for Mining Sector Development and Investment Attraction – Examples from Uganda and Tanzania

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Edwards Katto<sup>2</sup>, Grace L. Nassuna<sup>2</sup>, Agnes Kuterema<sup>2</sup>,  
Abdulkarim H. Mruma<sup>3</sup>, Yokbeth Myumbilwa<sup>3</sup>

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<sup>2</sup> Department of Geological Survey and Mines, Entebbe/Uganda, [dgsm@minerals.go.ug](mailto:dgsm@minerals.go.ug)

<sup>3</sup> Geological Survey of Tanzania, Dodoma/ Tanzania, [madini.do@gst.go.tz](mailto:madini.do@gst.go.tz)



# Data is Money!

- **Billions of Dollars** were spend for mineral resources and geological exploration
- **Data** is stored as paper files & different data formats
- **Data** is the key issue for:
  - Mining investment attraction
  - National development
  - Land use and infrastructure planning
  - Environmental protection
  - Geo-hazard prevention
  - Forestry, water supply, ....



# How to Make Data Available?

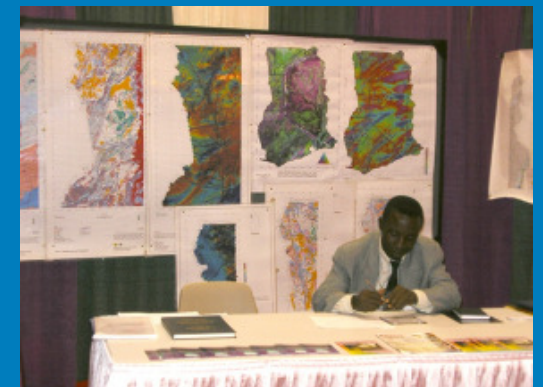
- Have data „on stock“
- Centralise data management
- Standardize data structures and coding
- Have instruments for data distribution
- Regulations for data release/ usage

→ **Manage data independently  
from the further use**

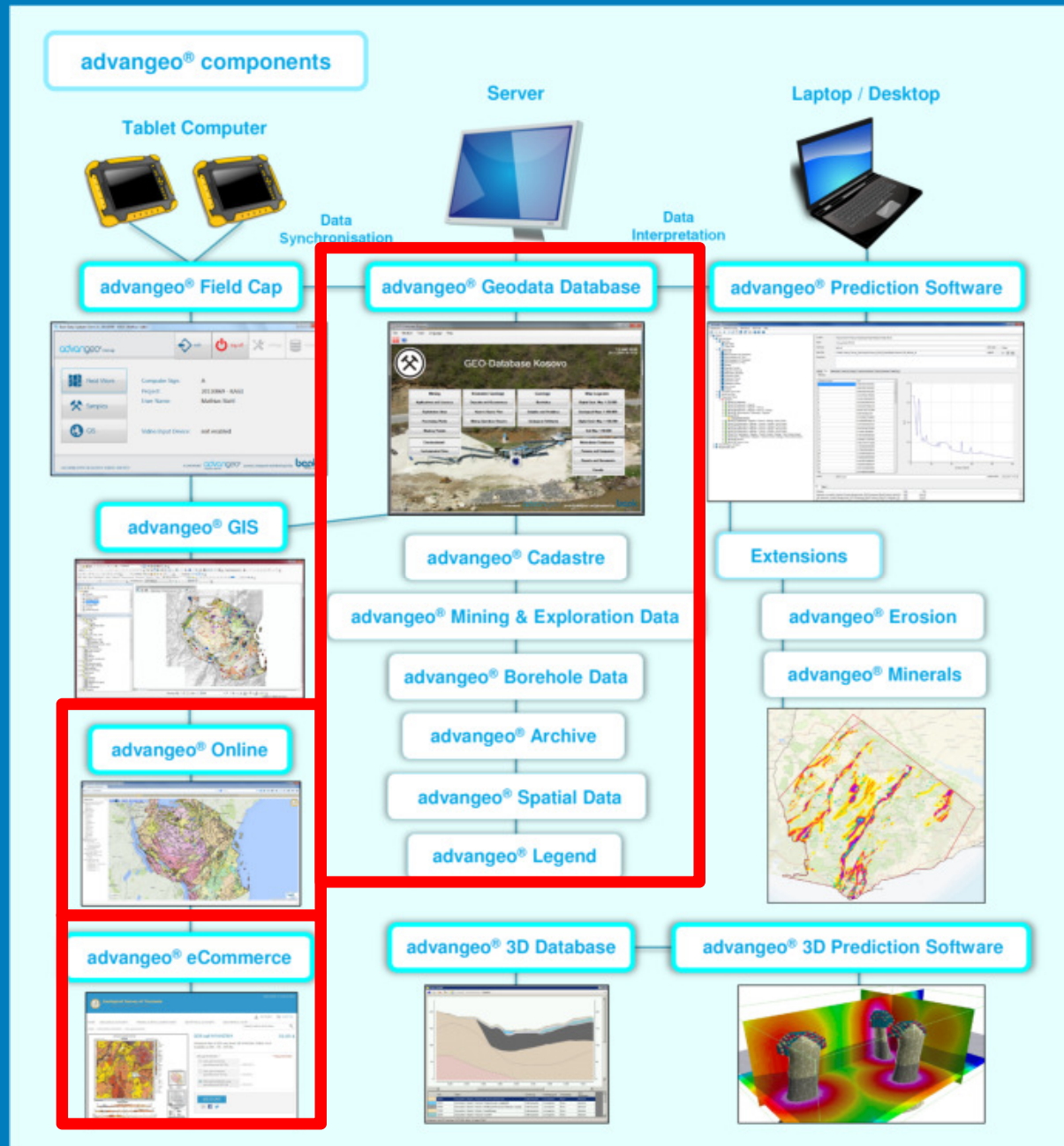
→ **Guarantee data security**

→ **Prevent loss of data**

→ **Information Management System**



# Beak Consultants GmbH: advangeo® Software Solutions



# Case Study Locations

**Uganda:**

2007 – 2012  
WB funded

**Tanzania:**

2013 – 2016  
WB funded



# Case Study 1: Uganda – *Project Overview*

## Task

Establishment of a Modern Documentation Centre

- Ensure access, efficient storage, search, retrieval, and dissemination of geological information
- Strengthen information sharing and exchange among geo-science stakeholders
- Establish a website through which effective dissemination will be coordinated and enforced

## Beneficiary:

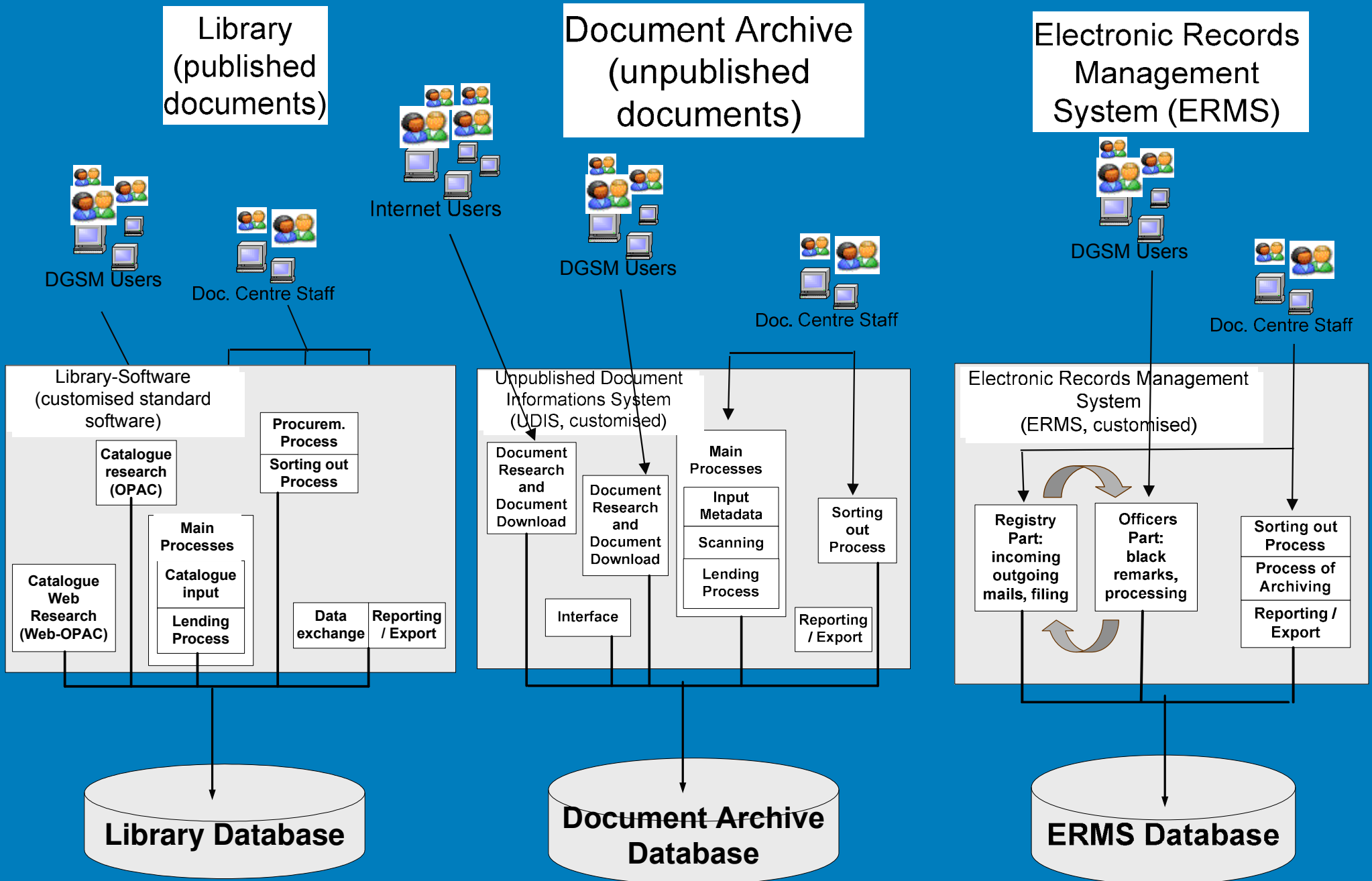
Department of Geological Survey and Mines

## Project Team

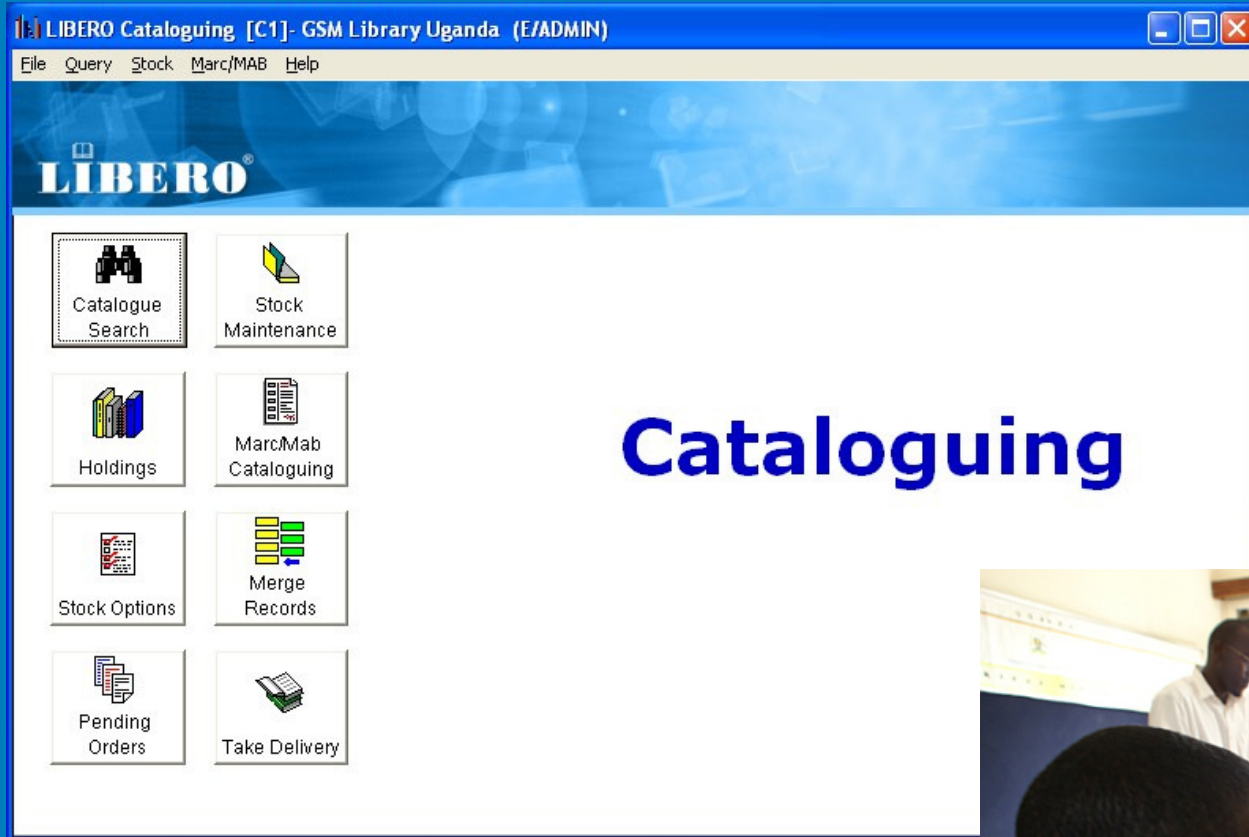


2008

# Case Study 1: Uganda – Software Architecture



# Case Study 1: Uganda – *Library Software (LIBERO)*



24,000 media  
captured





# Case Study 1: Uganda – Web Catalogue

Welcome

www.uganda-mining.go.ug/WebLIBERO

## Library Stock of the Department of Geological Survey and Mines Uganda (DGSM)

The Documentation Center of the DGSM in Entebbe contains published books and Journals managed by a professional library software called LIBERO. Here you can query the exported metadata and find location codes of the books. Please contact Documentation Centre staff for further information (www.uganda-mining-go.ug)

look in  for

- Report on the World Tin Position
- A Rapid Method for the Determination of Small Amounts of Tin in Soils
- The Relationship Between Primary Tin Deposits and Granitic Rocks
- Developments in Tin Consumption and the Role of Research
- A Draft for the Third International Tin Agreement
- The Influence of some Mineralogical Factors in the Chemical Processing of Low-Grade Tin
- The Recovery of Fine Tin by Floatation
- The Underground pursuit and Development of Tin Lodes
- The Underground pursuit and Development of Tin Lodes
- Off-Shore Mining of Tin Deposits in South Thailand
- Mining and Milling Methods and Costs at the Black Hills Tin Co., Tinton, S. Dakota
- The Work and Problems of the International Tin Council
- The Mitta Mitta Tin and Gold Field
- The Mount Bischoff Tin Field
- Geophysical Survey of the Renison Bell Tin Field, Tasmania

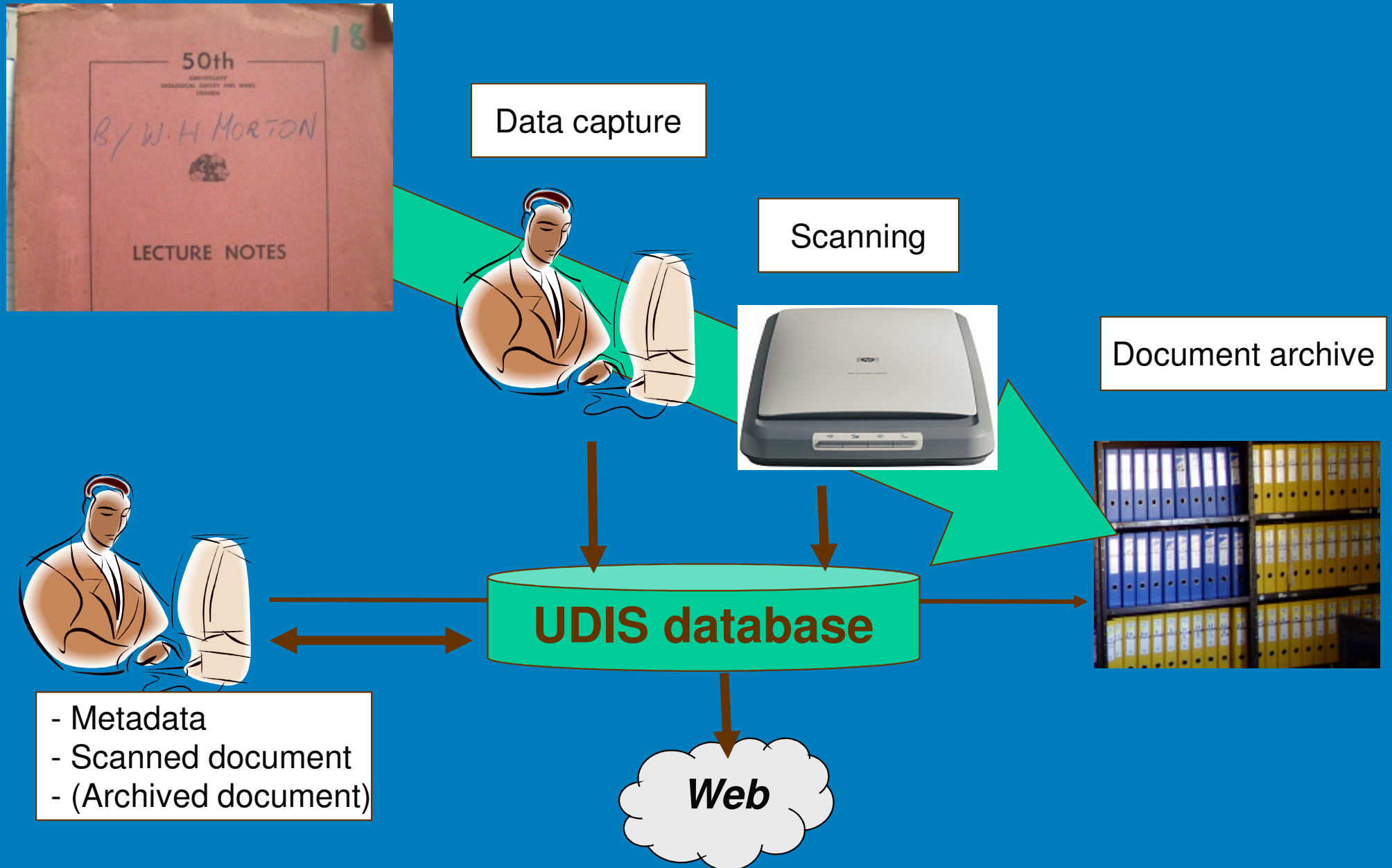
look in  for

TITLE	Some Observations on the Solubility of Gold
MAIN_AUTHOR	Boyle, R. W.
CALL_NUMBER	B.-.02
RSN	4253
ISBN	
PUBLICATION	Ottawa: Crown
SERIES	Paper
SUB_TITLE	
PUBLICATION_YEAR	1975
LANG	eng
ClassMain	GEOCHEMISTRY\$XGOLD

# Case Study 1: Uganda – *Hardware and Furniture*





# Case Study 1: Uganda – Unpublished Documents Information System (UDIS)



# Case Study 1: Uganda – *UDIS User Interface*

Unpublished Document Information System

File Administration Modules Help

 **UDIS**   
**DGSM Documentation Center**

**Administration**

- Lookup Tables
- Integrity Check
- User Administration

**Business data**

- Personal Data
- Lending

**Metadata database**

- Documents and Special Objects

# Case Study 1: Uganda – UDIS Module & Document Download

Unpublished Document Information System - [Documents]

File Administration Modules Help

Title: A field trip to Tororo plant and Limestone deposits; and to Mbale clay deposits.

Document type: DGSM reports

Year of pub./report: 1994

Country: Uganda

Serial title: UGSM Unp. Rep.

Place of publication:

Language of document: English

Abstract: A field trip to Tororo and Mbale was made 7-9.3 1994 to get information about the current situation at the cement factory and about the quality and reserves of limestone and clay used in cement manufacture.

Box: Prefix: Box number: Doc. number:

View document

Upload document

No. of copies: 0

Document is lent:

go to lending

Details I Details II Details III

Principal geol. theme

Description
Ore deposits
Economic Geology (Ore Deposits), including expl...

Keywords

Description
cement
limestone
clay

Authors

Name
KATTO, E.
Pekkala, Y.
TUHUMWIRE, J.T.

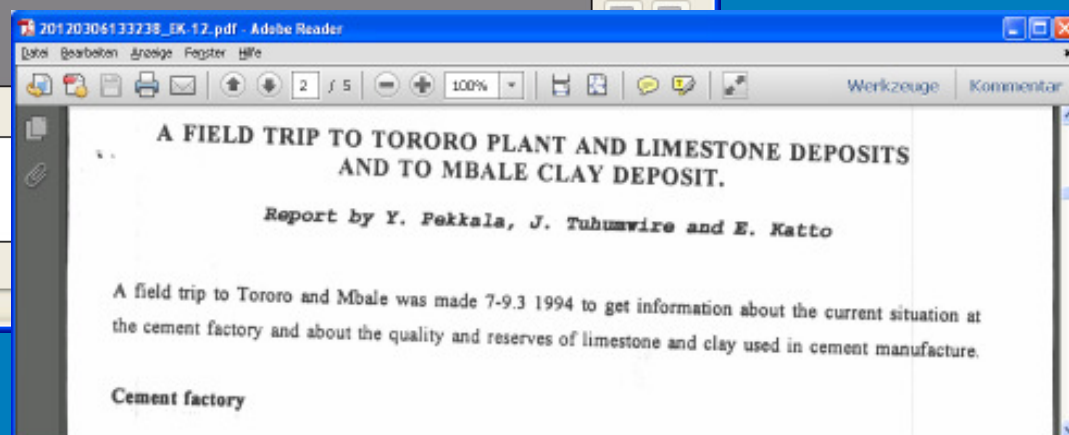
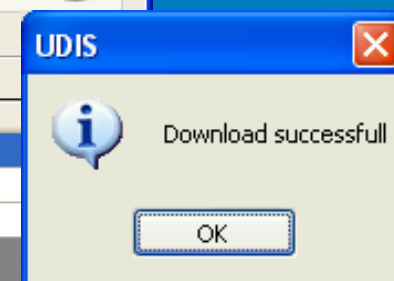
Subordinated documents

Title	Comment	Type	Web	Scale
-------	---------	------	-----	-------

Comment

automatically imported by BEAK

Editmode: OFF Filter: On Record: 8 from 64



# Case Study 1: Uganda – Web UDIS

## WEB - UDIS

Unpublished Document Information System, Geological Survey Department Uganda

Home

Last query result

Info

### LAST QUERY RESULT

[Petrographical notes on rocks from Kilembe](#)

1930 GROVES, A.W. Unpublished Report  
Western region

[Report on an examination of thin sections](#)

1951 MCCONNELL, R.B. Unpublished Report  
Western region

[Results of fieldwork on the Kilembe-Series](#)

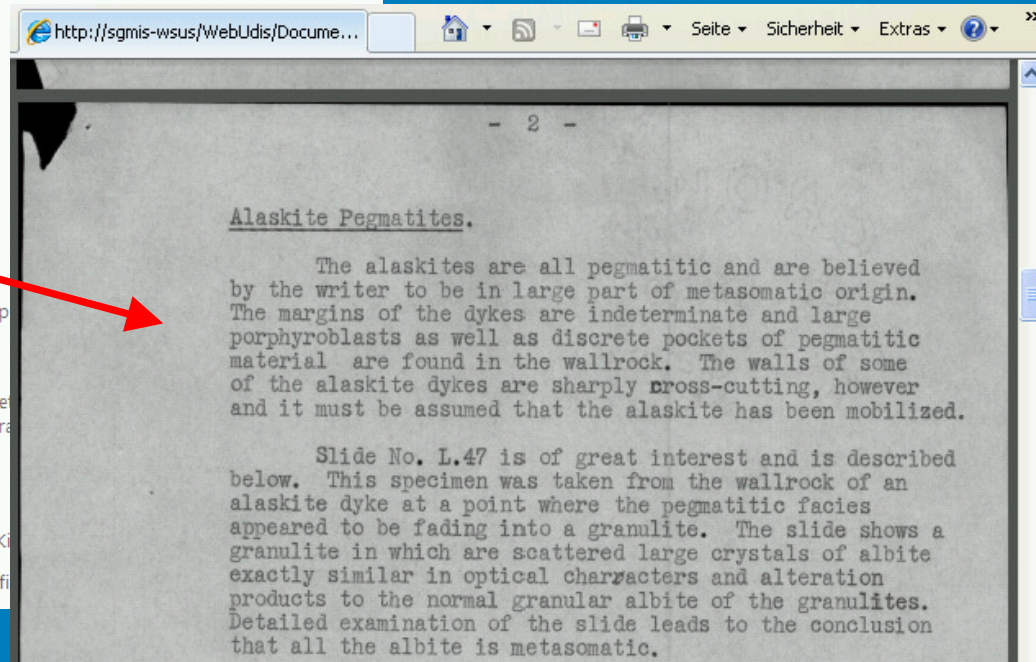
1963 FREEMAN, R.P. Unpublished Report  
region

1

Unpublished Document Information System, Geological Survey Department Uganda

### DOCUMENT DETAILS

Title: Results of fieldwork on the Kilembe-Series at Kilembe  
Author: FREEMAN, R.P.  
Document type: Unpublished Reports  
Date of pub/rep.: 1963  
Country: Uganda  
Serial title: KML Bull.  
Place of publication:  
Language of document:  
Abstract:  
Publisher:  
Scale (if map):  
Box:  
Commodity: Non-Ferrous Metals\_Cop  
Region: Western region  
Principal geol. theme: Ore deposits  
Keyword: copper; geochemical-met  
mining-geology; structural  
Storage: KML  
Country on which document is about: Uganda  
Geotag: Bukangama; Dungulea; Kilembe  
Physical description (content): No.172.; 59 p.; 2 tb.; 14 fi



# Case Study 1: Uganda – Geocoded Document Search on GMIS



**GMIS**

Geological and Mineral Information System  
Department of Geological Survey and Mines, Uganda

Tuesday, September 25, 2012

Register Login

## MENU

Home

Geodata

Geophysics

Mining Cadastre

Doc Centre

Environmental

News

Contact Us

Links

FAQ

Register / Login

You are here: Home

Uganda's Geological and Mineral Information System

News

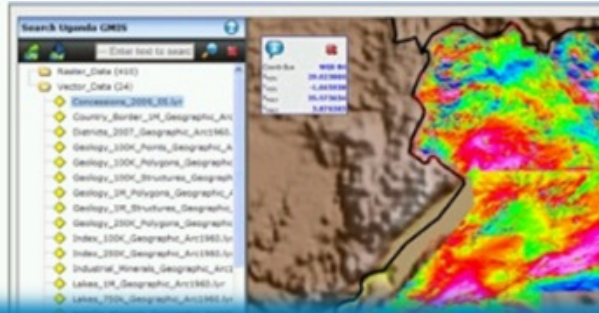
## Welcome to the Geological and Mineral Information System

Welcome to Uganda's Geological and Mineral Information System (GMIS). The design for the GMIS is based on ArcGIS software and database technology. The system is employed in environmental management of Geological Data (DGSM).

Uganda cadastre portal live - Friday, September 07, 2012

View Geocoded Documents

Search WEB-UDIS



Documentation Centre - Geocoded Documents

- Results
- Map Contents
- Documentation\_Center\_Geocoded\_D
  - Geocoded Documents
    - 1 - 6
    - 7 - 11
    - 12 - 18
    - 19 - 25
    - 26 - 42
  - Topography
    - Towns\_750K\_Geograph
    - Railways\_750K\_Geogr
    - Rivers\_750K\_Geograp
    - Roads\_750K\_Geograp
    - Lakes\_1M\_Geographic
    - Lakes\_750k\_Geograph
  - Administrative Boundaries
    - Country\_Border\_1M\_G
    - Districts\_2007\_Geogra
    - Regions\_2007\_Geogra




# Case Study 1: Uganda – *Electronic Record Management System (ERMS)*

Electronic Record Management System

File Administration Modules

- Staff members
- Files
- Documents
- Distribution

 **ERMS**   
**DGSM Documentation Center**

**Administration**

- Lookup tables
- Integrity Check
- User administration

**Business data**

- Staff members

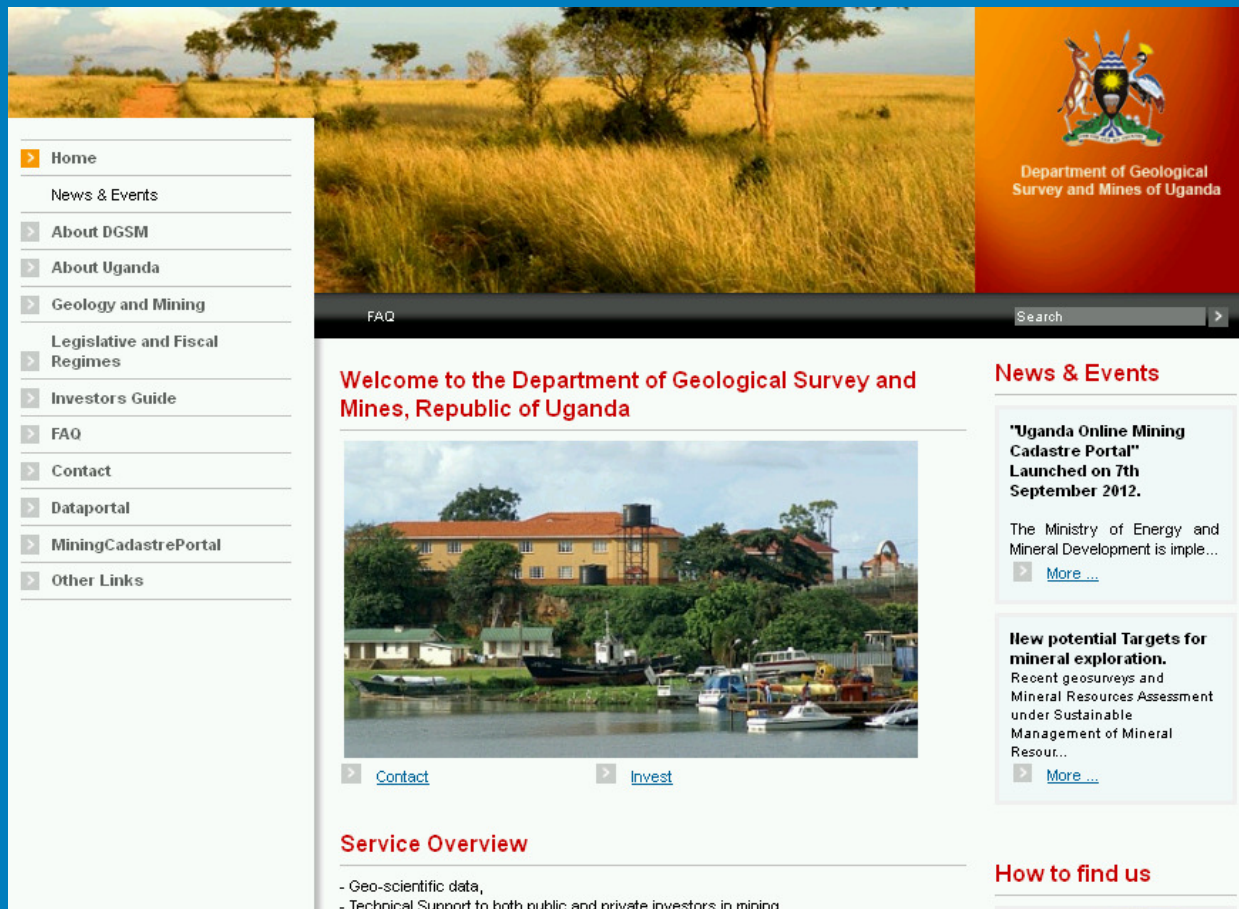
**Metadata database**

- Files
- Documents
- Distribution



# Case Study 1: Uganda – Website

## www.uganda-mining.go.ug



The screenshot shows the homepage of the Department of Geological Survey and Mines of Uganda. The header features a large landscape image of a savanna with tall grass and scattered trees. To the right of the image is the national coat of arms of Uganda, with the text "Department of Geological Survey and Mines of Uganda" below it. A navigation menu on the left lists various sections: Home, News & Events, About DGSM, About Uganda, Geology and Mining, Legislative and Fiscal Regimes, Investors Guide, FAQ, Contact, Dataportal, MiningCadastralPortal, and Other Links. The main content area is divided into several sections: a "Welcome to the Department of Geological Survey and Mines, Republic of Uganda" section with a photo of a building and boats; a "News & Events" section with two news items, including "Uganda Online Mining Cadastre Portal" launched on 7th September 2012; a "Service Overview" section with bullet points; and a "How to find us" section.

**Home**

- News & Events
- About DGSM
- About Uganda
- Geology and Mining
- Legislative and Fiscal Regimes
- Investors Guide
- FAQ
- Contact
- Dataportal
- MiningCadastralPortal
- Other Links

**Welcome to the Department of Geological Survey and Mines, Republic of Uganda**

**News & Events**

- "Uganda Online Mining Cadastre Portal" Launched on 7th September 2012.**  
The Ministry of Energy and Mineral Development is imple...  
[More ...](#)
- New potential Targets for mineral exploration.**  
Recent geosurveys and Mineral Resources Assessment under Sustainable Management of Mineral Resour...  
[More ...](#)

**Service Overview**

- Geo-scientific data,
- Technical Support to both public and private investors in mining

**How to find us**

## Monthly statistics:

- Visitors:
  - Average: 750
  - Maximum: 1500
- Days:
  - Mainly Mon – Wed
  - Barely Fri – Sun
- Time:
  - 70 % < 30 sec
  - 20 % > 5 minutes

## Case Study 1: Uganda - *Benefits*

- **Metadata** for new reports can be captured, which allows for proper storage and future search and use
- Reports can be **linked to maps and samples**
- Local and international users can access all documents and reports and can **download reports** by themselves
- It is user friendly and new staff can use it to **locate documents** and students are using it for **research**
- Sister departments in Kenya are **learning from it** and also trying to improve their own

## Case Study 1: Uganda - *Benefits*

- **Reduced workload** on user support as less physical visits are done to the Documentation Center since users can download online → Number of physical visits has reduced
- **New clients** request for more information by email after reading the metadata online → Number of email requests has increased
- **Good management** of reports and **improved transparency** due to availability / accessibility of geoscience information
- **Investment attraction** has increased → **Increased licensing status**

## Case Study 1: Uganda - *Issues*

- Needs **continuous support** to be able to maintain the technology → Website currently off due to pending procurement process for renewal of website maintenance contract
- Problem of **power fluctuations** affects the server indicating some down period (not accessible sometimes)
- Need **more training** on use of the system and the need to embrace **change to digital workflows**

# Case Study 2: Tanzania – *Project Overview*

## Task

Preparation of Geoscientific  
Data Information Management System

## Beneficiary

Ministry of Energy and Minerals  
Geological Survey of Tanzania

- IT Infrastructure issues
- **GMIS Design and Implementation**
- 60 QDS Map Sheets
- **Minerogenic Map**
- Data Dissemination Policy
- Library and Archive
- Museum, Rock Store and Core Depot
- **Investment Promotion**
- Remote Sensing Unit
- Training

## Project Team



# Case Study 2: Tanzania – *GMIS User Interface*

File Module Help

**Geological and Mineral Information System**

**Economic Geology**

- Deposits & Min. Occ.
- Mines
- Drill holes
- Geochemistry

**Mineral Licenses**

- Licenses

**Business data**

- Companies

**Geology**

- Map 1:2.000k
- Map 1:500k
- Map 1:100k
- Map 1:100k (Capture)
- Field Work Data

**Remote sensing Data**

- Geophysics

**Library and Archive**

- Library
- Archive
- Spatial Data / Maps

**Museum / Core Depot**

- Museum collection
- Drill Core Depot

**Minerogenic Map 1:1.5Mio**

- Minerals
- Geology
- Tectonics

**System administration**

- Look up tables
- User Management

**GIS**

The GMIS Portal – Gate to:

- 20 technical modules
- System administration module
- GIS module

# Case Study 2: Tanzania – Library Module

Geological and Mineral Information System - [Library]

File Module Help

**Library**

Title: Mapping from Aerial Photographs.

Book Volume:  Edition:  Classification: -B.17

Periodical/Series:  Vol. / No.:  Year:

Type: Scientific Literature Language: English (eng)

Medium: Book (single)

Scale (if map):

Open scanned document

Abstract / Physical Description Authors Conference Keyword Economic Geology Physical Location ISBN/ISSN Series Section Publisher Sub-Documents Record Modification Info

**Abstract / Content Description**  
This book would be an introduction to the main theoretical bases of producing topographical maps from aerial photography.

**Physical Description**  
- 304 p.  
- Inc. Figures.  
- Index  
- Illustrations.

**List of all Records**

Periodical/Series	Classification	Title
	-B.35	Cartometric Measurements.
	IN.D.ec	The Wealth of India. - A Dictionary of Indian Raw M
	-B.ch	Volumetric Analysis (Titration Methods : Acid - Base,
	-B.na	International Critical Tables of Numerical Data Physi
	-B.ec	Capital Transfer Tax Planning.
	-B.zz	Britannica Book of the Year 1958.
	-B.17	Mapping from Aerial Photographs.

Record 7 of 596 Filter OFF Mode READ ONLY

Filterconditions for Library

Journal/Serie:  IS A Series of Monographs on Analytical C

Title:  IS

Classification Geographical:  IS -- global

Classification Item Type:  IS B - Monographs, Books, Book with Volu

Classification Subject:  IS ch - Chemistry

Type:  IS Scientific Literature

Medium:  IS

Scale (if map):  IS

ISBN:  IS

ISSN:  IS

Author:  IS

Publisher:  IS

Keyword Scientific:  IS

Keyword Country:  IS

Commodity:  IS

Mineral:  IS

Rock:  IS

Record is checked:  Yes

Filter Options:  Create a new filter  
 Select from SET  
 Add to SET

Use joker for text search

OK Cancel

# Case Study 2: Tanzania – Archive Module

Geological and Mineral Information System - [Archive]

File Module Help

## Archive

Archive No.

Title  Volume No.  Year

Issuing Company  >>

License No.  >>

Type  Medium

Scale (if map)

Open scanned document

Other Companies Authors Language Abstract / Physical Description Keyword Economic Geology Physical Location Sub-Documents Comment Related items by GST Record Modification Info

**Abstract**  
A field report on prospecting for monazite in the Yambombwe hills, Mafumbo area, near Kisaki - Morogoro, however, no monazite was found.

**Physical Description**  
- 3 pages

List of all Reports

Archive No.	Title	Issuing Company
D. 3666	Unloading of Kyanite from Longido.	
D. 1257	Note on the occurrence of uranium and thorium in the Federation of Rhodesia and Nyasa...	
D. 2728	Field report on the possibility of finding coal in the Karema-Nilumba region.	
C. 664	Prospect 30.	
D. 1567	A field report on prospecting for monazite in the Yambombwe hills, Mafumbo area near Kis...	
D. 2319	An interpretation of certain topographic features noted during the geological survey of the...	
D. 1649	Geological notes on Kenya side of the Kenya-Tanganyika border between the 36th and 3...	

of 4028 Filter OFF Mode READ ONLY

PDF Data exportation

PDF Data annotation

Outlines creation

Outlines update



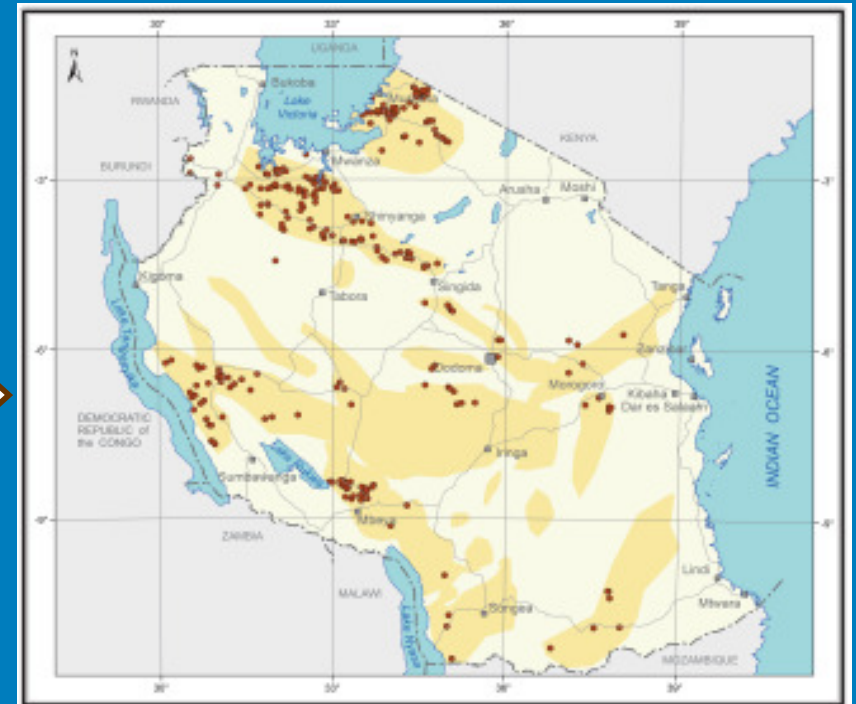
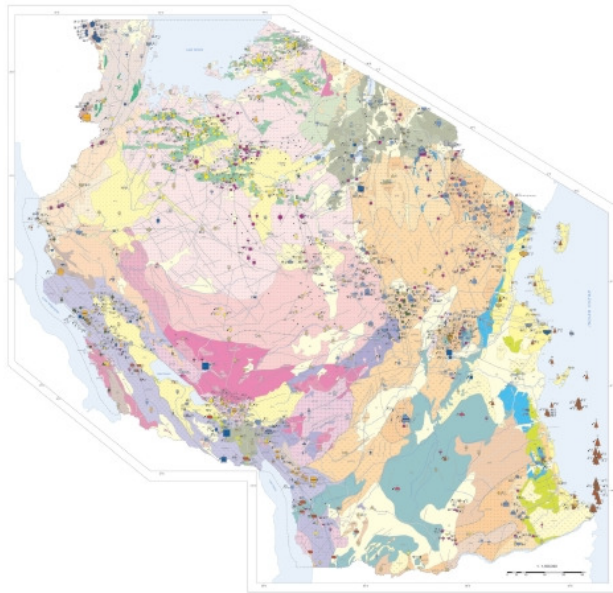


# Case Study 2: Tanzania – *Publications (Explanatory Notes)*

**GEOLOGICAL SURVEY OF TANZANIA**

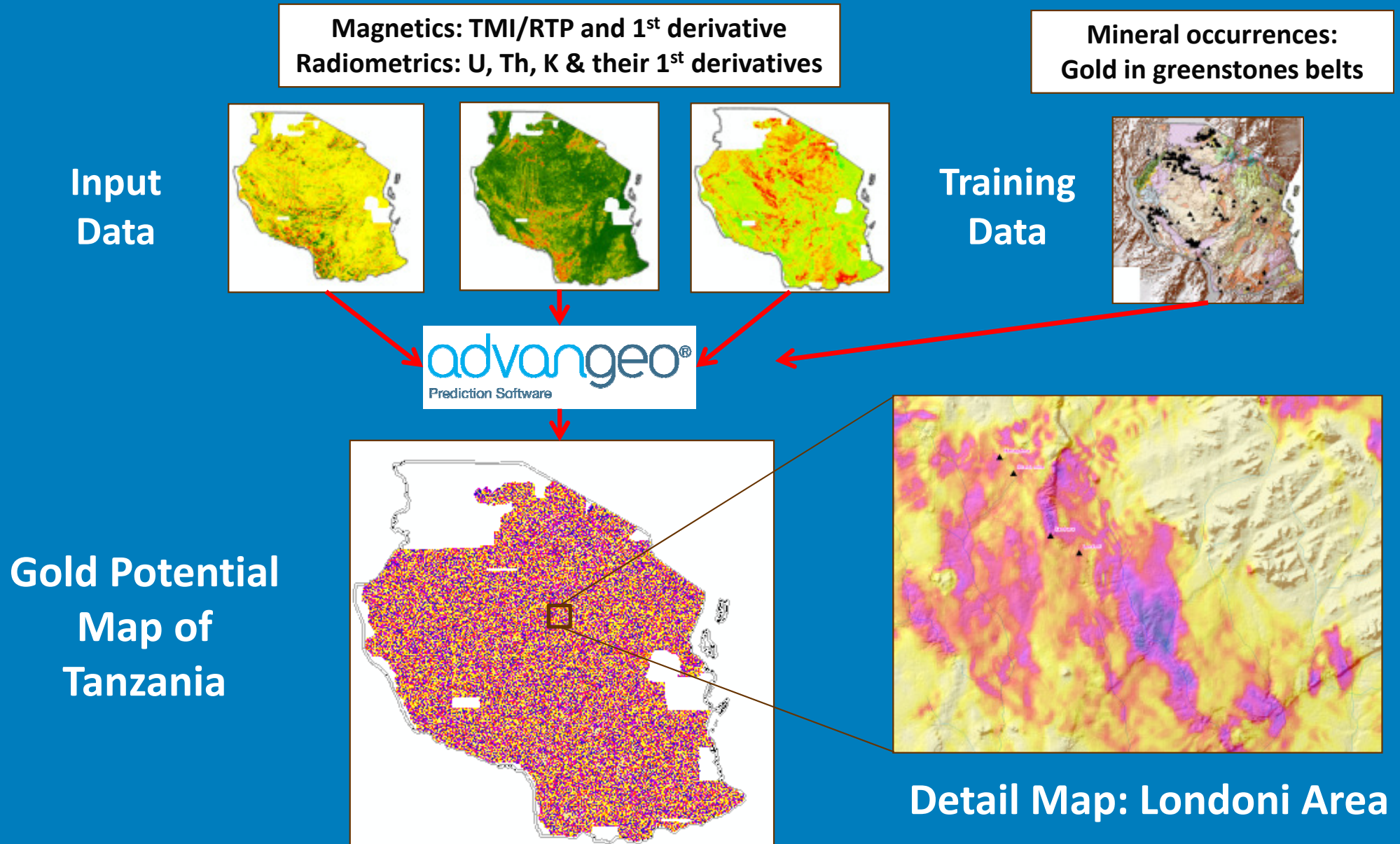


**EXPLANATORY NOTES FOR THE  
MINEROGENIC MAP OF TANZANIA**



**Gold Potential Map of Tanzania  
outlines areas with potential for  
Gold occurrences**

# Case Study 2: Tanzania – *Potential Mapping Using Existing Data*



# Case Study 2: Tanzania – Website



Home   Contact Us   Feed Back   Sitemap

## GEOLOGICAL SURVEY OF TANZANIA

About GST   Research   Mapping   Resources   Geo Information   Exploration   Services   Media Center   Map Products   Geo Hazards   Projects

### WELCOME TO GEOLOGICAL SURVEY OF TANZANIA

The **Geological Survey of Tanzania (GST)** is the government agency responsible for the acquisition and storage of geoscientific data and information used in the mineral resources sector and other sectors of the economy. GST is active in promoting mineral exploration and mining in Tanzania. GST core activities range from geological mapping, mineral exploration, evaluation, and processing, and research work on geological processes and mineral systems and geohazards. GST'S vision is to evolve as a centre of excellence providing national geoscientific data and information for use in the evaluation and sustainable utilization of natural resources. GST maintains a balance of resources between its primary responsibilities of conducting geological mapping ,geodata management, technological and conceptual research and development, and providing services to both public and private sector.



**OUR SURVEY HEAD QUARTERS**

Geological Mapping	Geological Resources	Price List
<p>GST's mapping programmes produce basic information for the needs of the mineral sector</p> <p>» <a href="#">Read more</a></p> 	<p>Resources in mining engineering, geophysics, geoinformation and BSc in various disciplines of science</p> <p>» <a href="#">Read more</a></p>	<ul style="list-style-type: none"><li>• Laboratory Services</li><li>• Geophysical Digital Data</li><li>• Geochemical Data</li><li>• Geo Publications</li><li>• Map preparation</li><li>• Museum visit charges</li></ul>

#### QUICK LINKS

[Geological and Mineral Information Systems](#)

[National Bureau of Statistics-NBS](#)

#### LATEST NEWS

[Tanzania Electricity Supply Industr Reform Strategy and Roadmap 2014-2025](#)

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CENTRE OF GEOLOGICAL EXCELLENCE

# Case Study 2: Tanzania – Web GMIS

www.gmis-tanzania.com

Geological Survey of Tanzania, Geological and Mineral Information System

The screenshot displays the Web GMIS interface. On the left is a 'Spatial Data' legend with categories like Geo-Economic Data, Mining Licenses, Topography, and Background Maps. The main area shows a map of Tanzania with various mining locations marked. Below the map is a 'Query Results' table with columns for Name, Region, Commodity Group, and Commodity. The table lists several mining sites and their associated regions and commodities. A scale bar and navigation tools are also visible on the map.

Name	Region	Commodity Group	Commodity
Akbarker	Mbeya	Metallic Minerals: Precious Metals	gold
Allways	Mwanza	Metallic Minerals: Precious Metals	gold
Area 3 West (Geita)	Mwanza	Metallic Minerals: Precious Metals	gold
Aureole	Mwanza	Metallic Minerals: Precious Metals	gold
Barata	Mara	Metallic Minerals: Precious Metals	gold, copper
Binetti	Mara	Metallic Minerals: Precious Metals	gold

Total: 123 Selected: 0

10 | 25 | 50 | 100

# Case Study 2: Tanzania – Data Sales Portal

## www.gst-datashop.com

**Geological Survey of Tanzania**  
Geoscientific Data Web Market

HOME / GEOLOGICAL DATASETS / MINERAL & METALLOGENIC MAPS / GEOPHYSICAL DATASETS / GEOCHEMICAL MAPS

HOME / GEOLOGICAL DATASETS / QUATER DEGREE SHEETS (QDS)

### QUATER DEGREE SHEETS (QDS)

Scales 1:100,000 and 1:125,000

SORT BY: Name | VIEW AS: [Grid Icon] [List Icon]

QDS 001 KYERWA	QDS 004 NORTH MARA (TARIME)	QDS 005 NORTH MARA (TARIME)
For price list please select view details	For price list please select view details	For price list please select view details
<a href="#">VIEW DETAILS</a>	<a href="#">VIEW DETAILS</a>	<a href="#">VIEW DETAILS</a>

**Geological Survey of Tanzania**  
Geoscientific Data Web Market

HOME / GEOLOGICAL DATASETS / MINERAL & METALLOGENIC MAPS / GEOPHYSICAL DATASETS / GEOCHEMICAL MAPS

## Welcome to the Data Sales Portal of the Geological Survey of Tanzania

As a new service we offer our valued clients the online sale of various Tanzanian geo-scientific datasets.

For comments and remarks please reply to [gstmaster@gst-datashop.com](mailto:gstmaster@gst-datashop.com).

The Portal GST Datashop is operated by Geok Consultants GmbH (Germany) on behalf of the Geological Survey of Tanzania.

**Geological Survey of Tanzania**  
Geoscientific Data Web Market

HOME / GEOLOGICAL DATASETS / MINERAL & METALLOGENIC MAPS / GEOPHYSICAL DATASETS / GEOCHEMICAL MAPS

### SHOPPING CART

QDS 004 NORTH MARA (TARIME) has added to your shopping cart.

PRODUCT	PRICE	QTY	SUBTOTAL
QDS 004 NORTH MARA (TARIME)	€30.00	1	€30.00
QDS 005 NORTH MARA (TARIME)	€30.00	1	€30.00
QDS 006 NORTH MARA (TARIME)	€30.00	1	€30.00

**GRAND-TOTAL €100.00**

HOME / GEOLOGICAL DATASETS / MINERAL & METALLOGENIC MAPS / GEOPHYSICAL DATASETS / GEOCHEMICAL MAPS

### USE STORED PAYMENT DATA

VISA 5371980  
Andreas Gahr

Mastercard  
Andreas Gahr

Verified by VISA  
MasterCard SecureCode

### USE ALTERNATIVE PAYMENT DATA

VISA

CARD NUMBER:

CARD NUMBER:

EXPIRY DATE:  /

CARD NAME:

CARD NUMBER:

CVN:  Info

Powered by PaySystems SE

## Case Study 2: Tanzania – *Benefits*

- **Centralised database implemented:**
  - User policies implemented
  - People are really using the system
  - Geological and archive data under one roof
  - Link to mining cadastral data implemented
- **Interactive web site implemented:**
  - Approx. between 100 and 400 visits / week
  - Data sales platform ready
- **Infrastructural environment:**
  - Acceptable
  - Central Server, Back up services,
  - Intranet, Internet
- **Personnel:**
  - Qualified IT, GIS, database staff available

# Summary: Lesson's Learned

## Information Management Systems (IMS):

- **Small but reliable system** is better than a big system with bad data, bad software, slow infrastructure  
→ Unused systems will die
- Must be **integrated into working processes**
- **Stakeholder involvement** integration from the beginning
- Expensive, **life time is short: 5 – 8 years**
- **Bad environmental conditions may destroy** a good system
- **Correct & complete data** is a must
- **Require clear procedures and policies**



# Outlook: The Job Goes On

## Documentation Centre:

- Serving clients and investors
- Maintaining hardware and network
- Constantly updating all information systems
- Filling the website with news
- Further training for staff

## **GEOLOGICAL SURVEY OF TANZANIA**



Ministry of Energy and  
Mineral Development



Department of  
Geological Survey and Mines

[www.uganda-mining.go.ug](http://www.uganda-mining.go.ug)

# Beak Consultants GmbH

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*Your Partner for Mineral Exploration,  
Information Management and Investment Attraction !*

