NORWEGIAN PETROLEUM DIRECTORATE

International Metadata standards for Petroleum database management

Workshop on CCOP metadata standard & requirement analysis for the CCOP Natural Gas Metadata Database

Shanghai, China 1 – 3 April 2009

Mr. Kjell Reidar Knudsen, Norwegian Petroleum Directorate

Topics given in program:

- What are the various international standards
- Comparison of various standards
  - advantages & disadvantages
- History of development - evolution
- What are the technologies required?
- Required capacities for data manager

My agenda

- What is metadata?
- What is a “standard”?
- What does it mean to “use” a standard
- Which standards are around which may be relevant for the EPPM-project
  - Pro’s and cons (Advantages and disadvantages)

What is metadata.

- My approach to metadata
  - Metadata, generally speaking ....
  - Metadata, in the EPPM project
    - To make the result useful for

      Natural gas research & administration
    - To make useful output at early stage
    - To focus on what is special for petroleum

Who are the stakeholders?

Metadata (generally speaking….)

Metadata: Data about the data/information

Data/Information
(Data resource)

People can

- read metadata to see if the box is worth opening/using
- search for information inside a lot of boxes by reading the metadata

Computers can

- store the metadata to make it possible to search for specific information
- use the metadata to be able to connect to the server where data is stored
- use the metadata to read the data (and use it)

Purpose decide what is “the black box”

Metadata may be made on all levels of details:

A map/report/sample:

Description, Keywords, ownership, contact person

The item structure (ex document format) :

Drawing, text, picture, map, size, weight

The medium:

Magnetic medium, optical medium

The digital file:

Protocol, file format, Header type

Which level of metadata is useful for the EPPM

What is a “ standard”

- International standards (ex ISO, CEN..)

  International obligations

- National standards/ (ex NS)

  regulations/guidelines (often according to ISO)

- Industry standards

  Interest groups (ex Energistics, SPE, SEG, API..)

  Proprietary “open-” or “restricted standards” (ex MS-OOXML)

- Commonly used way of doing things

  “best practices”

What does it mean to “use” a standard

- Comply totally
  - Completeness, authorized profiles,
- Pick elements from the standard specifications
  - Some of it (structure, content, format etc)
  - Mixed parts from different standards

(“based on”)

Metadata Standards

(What are the various international standards)

- “Data discovery”metadata standard
- Data package metadata standards
- Metadata standards for Data file formats
- Data Models
- Ontology standards
- Other relevant classification systems

Metadata Standards

(What are the various international standards)

- "Data discovery"metadata standard
  - BGS for Geology, NERC-data discovery service
  - GeoNorge incl NPD WMS-metadata for Petroleum
- Data package metadata standards
  - ISO 19 115 (geographic information) Ex Inspire
  - ISO 15 836 Dublin Core
  - ISO 19 139 XML-schema for metadata
  - ISO 19 128 WMS
  - ISO 19 119 Architecture patterns for Service Interface
- Metadata standards for Data file formats
  - Various XML-definitions (WITSML, PRODML etc)
  - Various petroleum technical format standards (SEG-Y, UKOOA etc)
- Data Models
  - Energistics/POSC, PPDM,
- Ontology standards (documented or just implemented)
  - W3C: Semantic web
  - ISO 15 836 Dublin Core
  - ISO 15 926 , OLF/RDL
  - NPD fact pages/regulations, DISKOS, CDA,
- Other relevant classification systems
  - WPC/SPE Resource classification system, CCOP resource classification system

Comparison of various standards- advantages & disadvantages

“Data discovery metadata” standard (1):

- British Geological Survey (BGS)
  - Used for Geoscience
  - Based on ISO 19115
  - Describes all datasets held by BGS
  - Discovery Metadata Database
  - Internet portal to Metadata Database

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Geoscience for decision making

Our services
- NGDC information & data
- Online data
  - *Online data index*
  - Borehole materials
  - Discovery metadata
  - GeoIndex
  - Geological photographs
  - Lexicon of rock units
  - PalaeoSaurus
  - Rock classification
  - Rock collections
  - Taxonomy Online
  - Vocabularies
  - Water watch
  - Web services

BGS Discovery Metadata

BGS discovery metadata describes the datasets held.
These pages are derived from our discovery metadata database, which complies with ISO standard 19115:2003 for geographic information metadata.

List of all datasets

This page has a list of all available Discovery Metadata datasets, sorted alphabetically by name with links to the full details for each dataset.

Browse by keywords

This page has an A to Z list of all the keywords used to describe the Discovery Metadata datasets. Each keyword links to a list of matching datasets, or directly to the full details of single dataset matches.

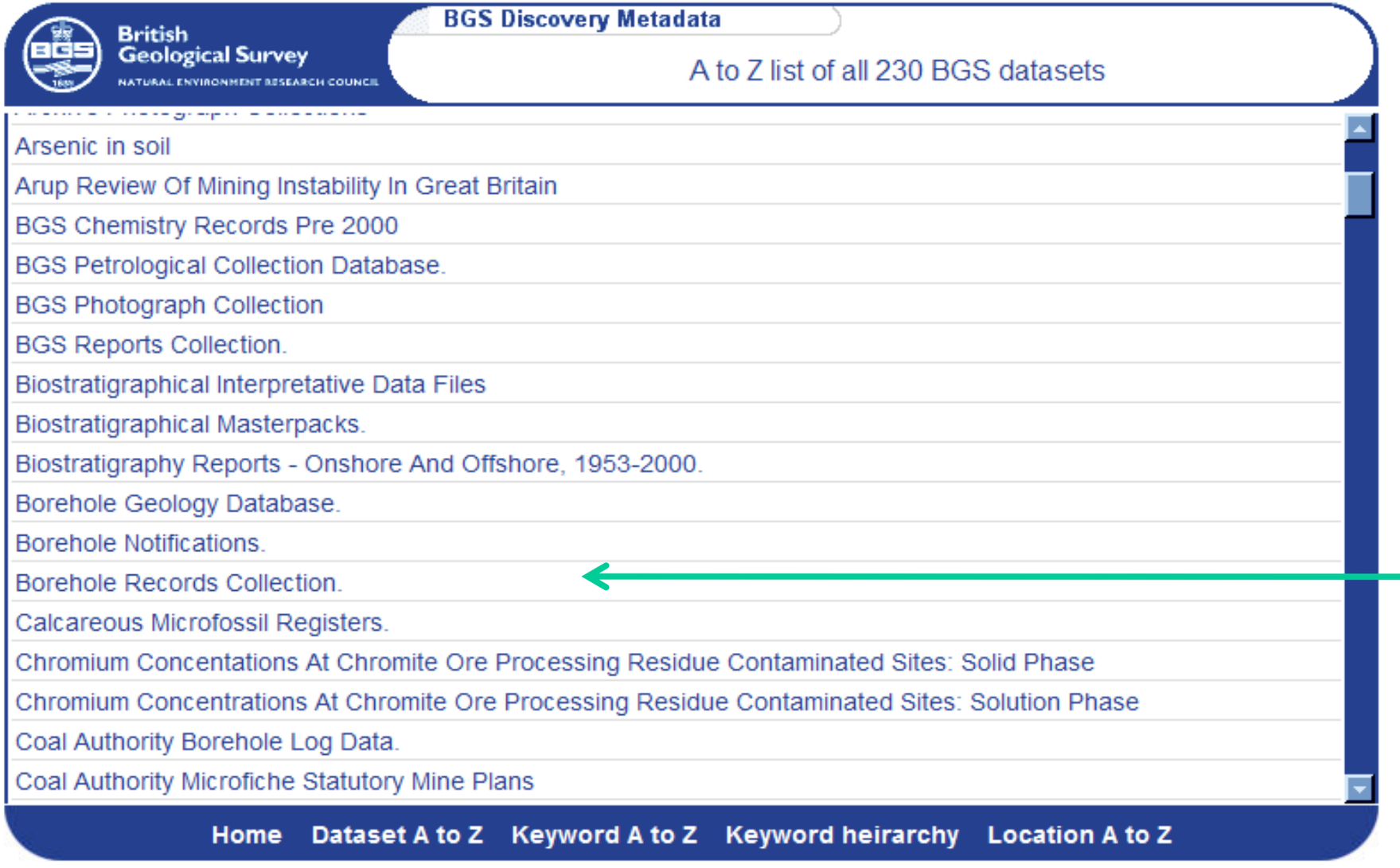
Keyword hierarchy

This page shows a hierarchy of keywords used to describe the Discovery Metadata datasets. Each keyword links to a list of matching datasets, or directly to the full details of single dataset matches.

Browse by location

See also
- Library
- NGDC
- Enquiries
- Geoscience information

List of metadata sets (230 pcs)
(with links to more detailed metadata)



Click..

More detailed metadata on:

borehole records collections

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS Discovery Metadata Dataset

Borehole Records Collection.

Dataset description

Records of all onshore (or near shore) boreholes, trial pits, shafts and wells held in the BGS archives in either paper, microfilm or digital format. The records range from simple single page lithological logs through to hydrocarbon completion reports. Spatial coverage will vary considerably depending on drilling activity, collecting activity and donations. The majority of new data is from site investigation reports with concentrations in urban areas and along transport routes. Current collection over 1million records covering the whole of Great Britain with 50,000 new records added per annum. Some records date back to 1600 but the majority date from 1900 onwards. Copies of records are available in hard copy or digital formats subject to confidentiality.

Location

W -8.65 | 60.84 N

S 49.77 | 2 E

Constraints

Some borehole records have been deposited with commercial-in-confidence restrictions. In this case the position of most boreholes can be given but no other index information such as depth. BGS standard conditions of use apply and any copyright constraints.

For more information please contact :

Enquiries
British Geological Survey
Keyworth
Nottingham
NG12 5GG

Tel : +44 (0)115 936 3143
Fax : +44 (0)115 936 3276
Email :enquiries@bgs.ac.uk

Associated dataset(s)

Scanned images of the BGS Borehole Records Collection.

Single Onshore Borehole Index

Reviewed 6th August 2008

More detailed metadata on:

borehole records collections

Further details [close]

Dataset details	
Language	English
Curator	British Geological Survey
Supply media/format	IMAGE FILE DIGITAL PAPER - Copies will be produced by the most appropriate methods available
Storage format	Hardcopy:Paper copy Digital:Scanned Image
Frequency of update	continual
Start of capture	After 1876
End of capture	Not applicable

Contact details	
Department	Enquiries
Organisation	British Geological Survey
Address	Kingsley Dunham Centre, Nicker Hill, Keyworth
City	Nottingham
County	Nottinghamshire
Country	United Kingdom
Postcode	NG12 5GG
E-mail	enquiries@bgs.ac.uk
Telephone	+44 (0)115 936 3143
Fax	+44 (0)115 936 3276

Keywords	
Keywords and Keyphrases	GEOLOGY
Keyword source	BGS Keyphrases

More detailed metadata on:

borehole records collections

Postcode	NG12 5GG
E-mail	enquiries@bgs.ac.uk
Telephone	+44 (0)115 936 3143
Fax	+44 (0)115 936 3276

Keywords

Keywords and Keyphrases	GEOLOGY
Keyword source	BGS Keyphrases

Spatial details

Spatial Reference System	Not available

Dataset extent

Coverage (Lat/Long)	North boundary : 60.84 East boundary : 2 South boundary : 49.77 West boundary : -8.65

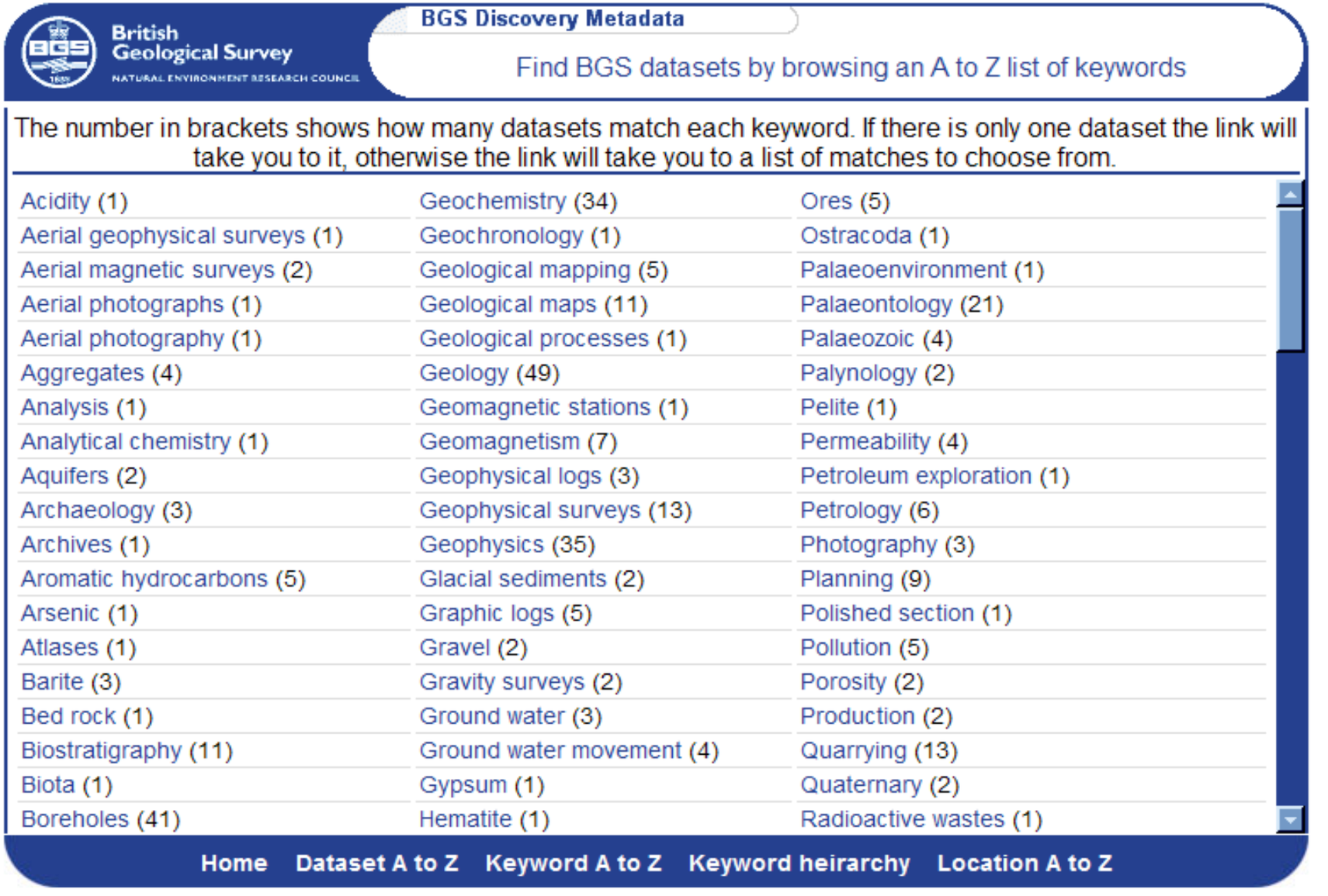
Metadata

Metadata language	English
Metadata last updated	6th August 2008
Metadata standard	ISO standard 19115:2003

Copyright and IPR

Reviewed 6th August 2008

Search on keywords (233 keywords)



Comparison of various standards- advantages & disadvantages

- Data discovery" metadata standard: BGS
  - \+ IT-solution already exist.
  - \- No access to the real data

! Need good keywords definitions to get useful searches

- Not too many (233), but the right ones

! Which data resources to include?

- For which purpose (Everything for everybody?)

! When can usage start?

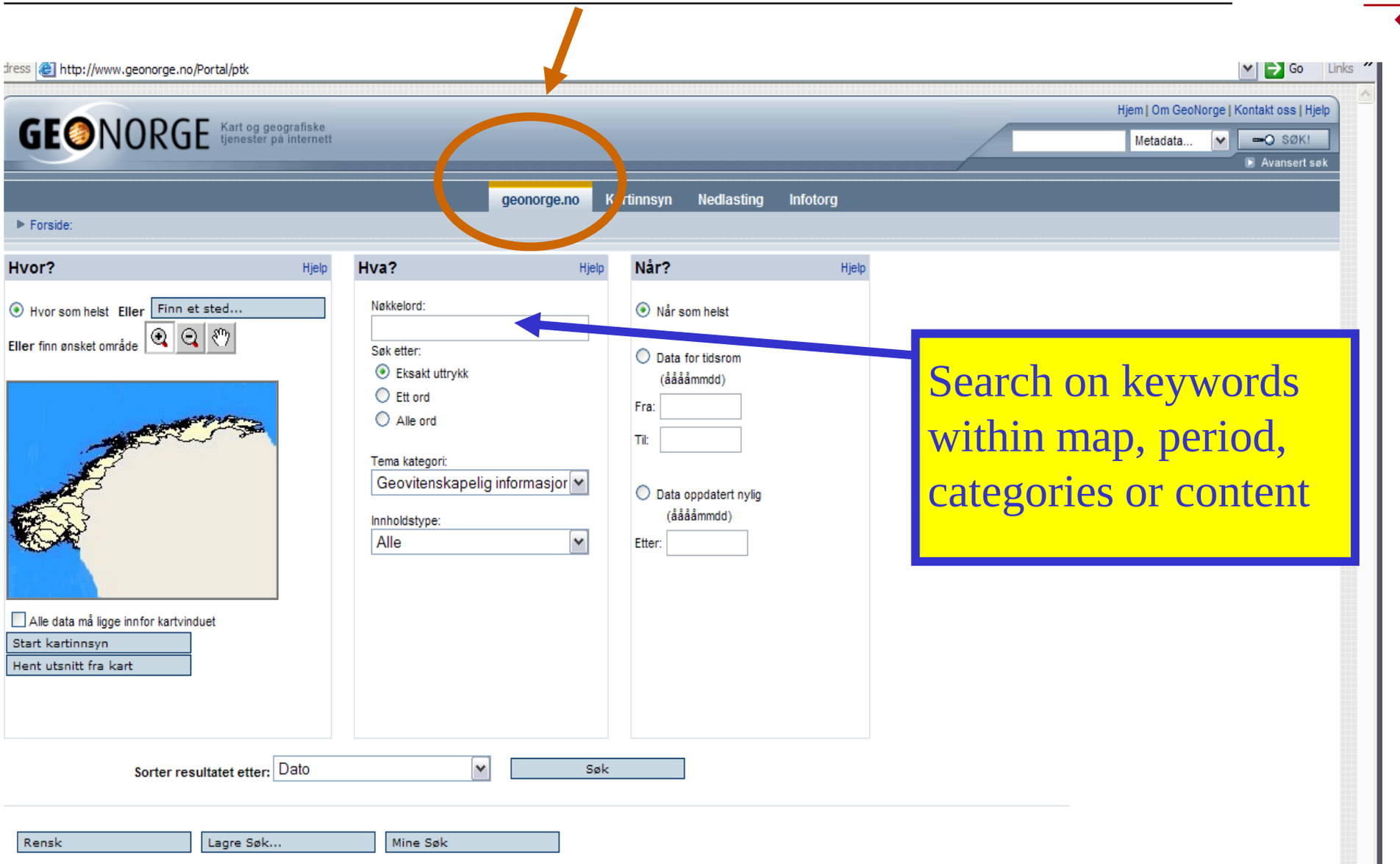
+ Make a focused start

“Data discovery metadata” standard (2):

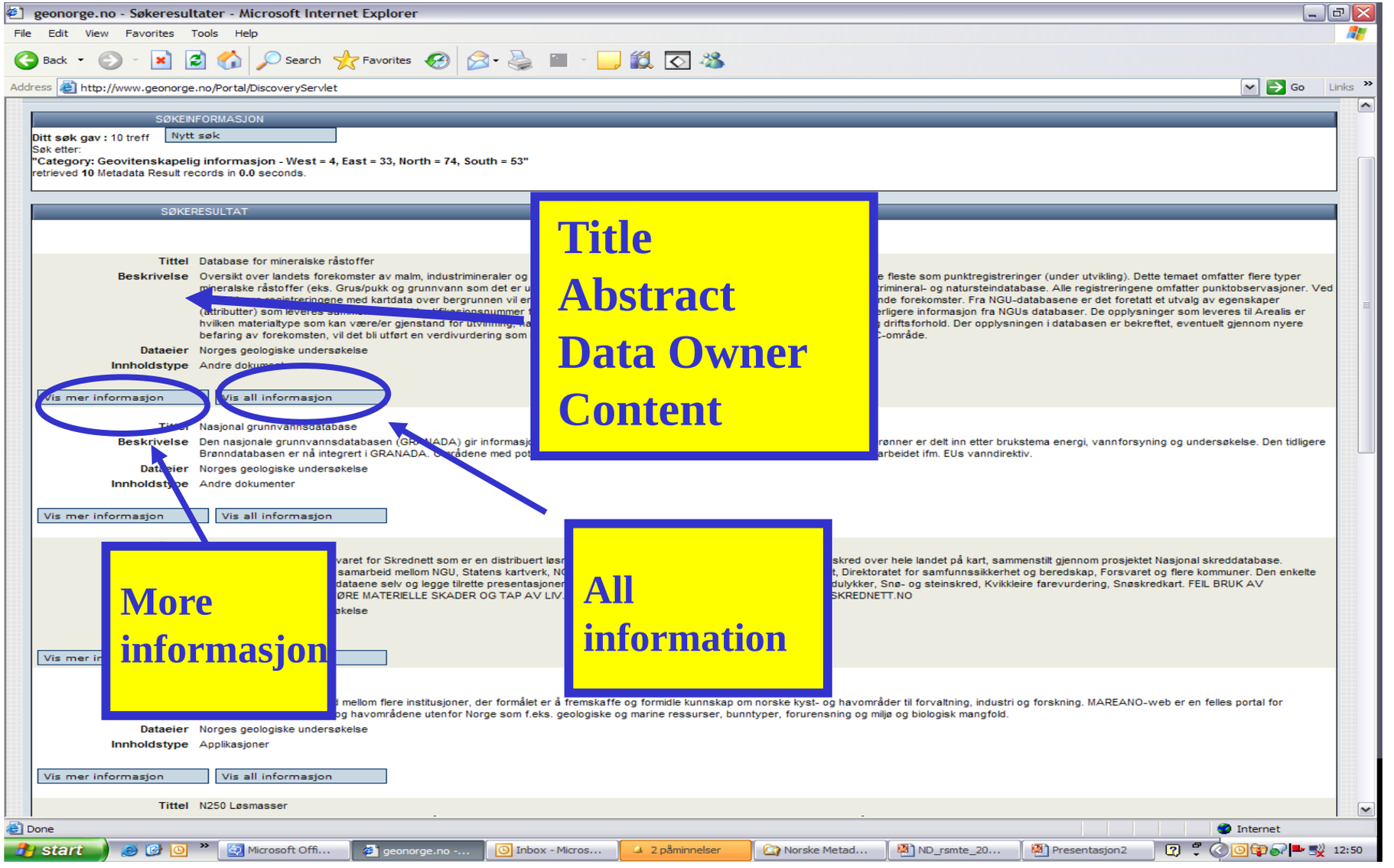
- GeoNorway:
- Integrated with NPD WMS-metadata for Petroleum
- According to the Norwegian Profile of ISO 19 115
- Metadata file format according to ISO 19 139

  defines Geographic Metadata XML (gmd) encoding, which is a XML Schema implementation derived from ISO 19115.
- WMS according to ISO 19 128

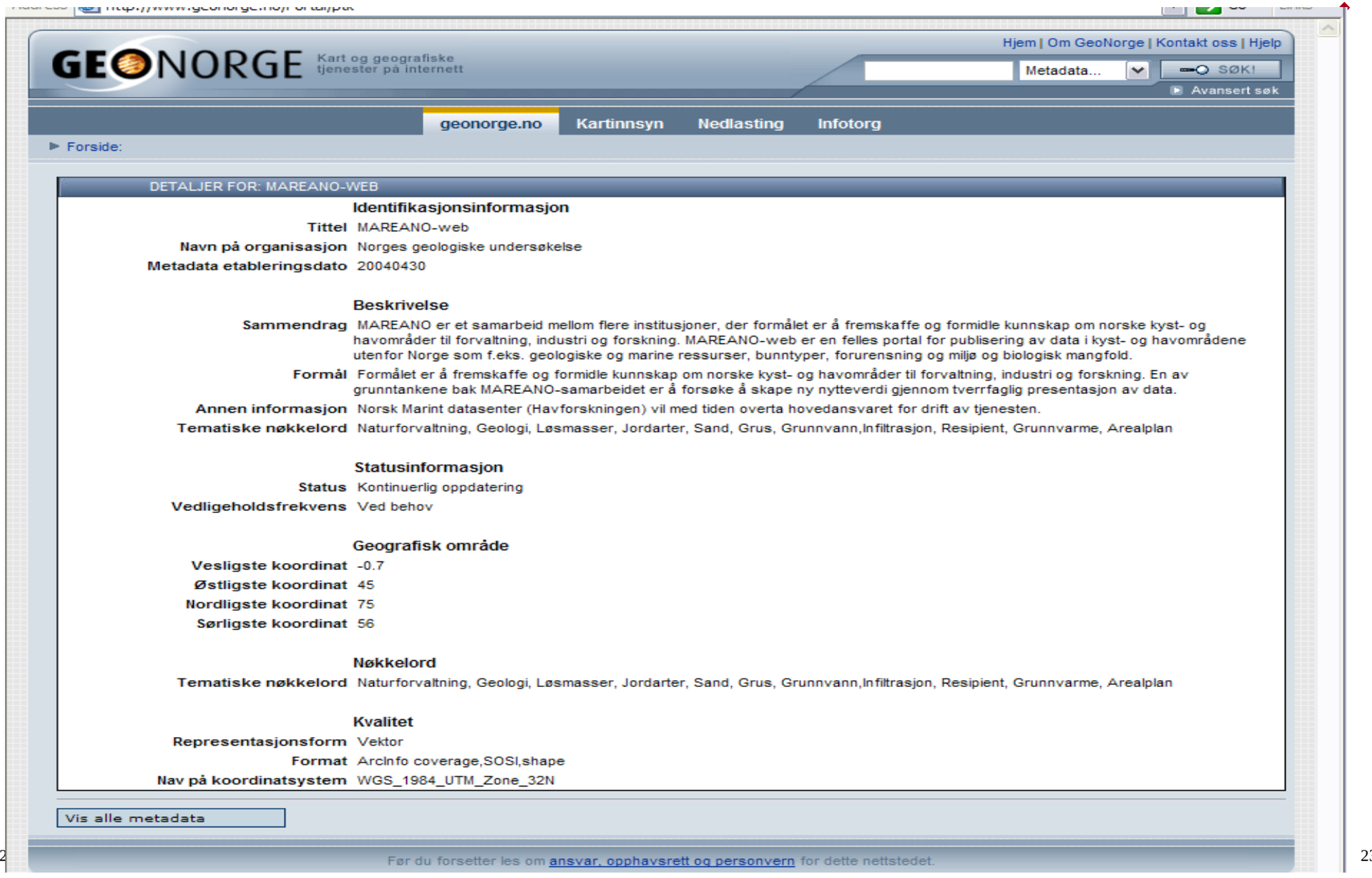
Metadata search



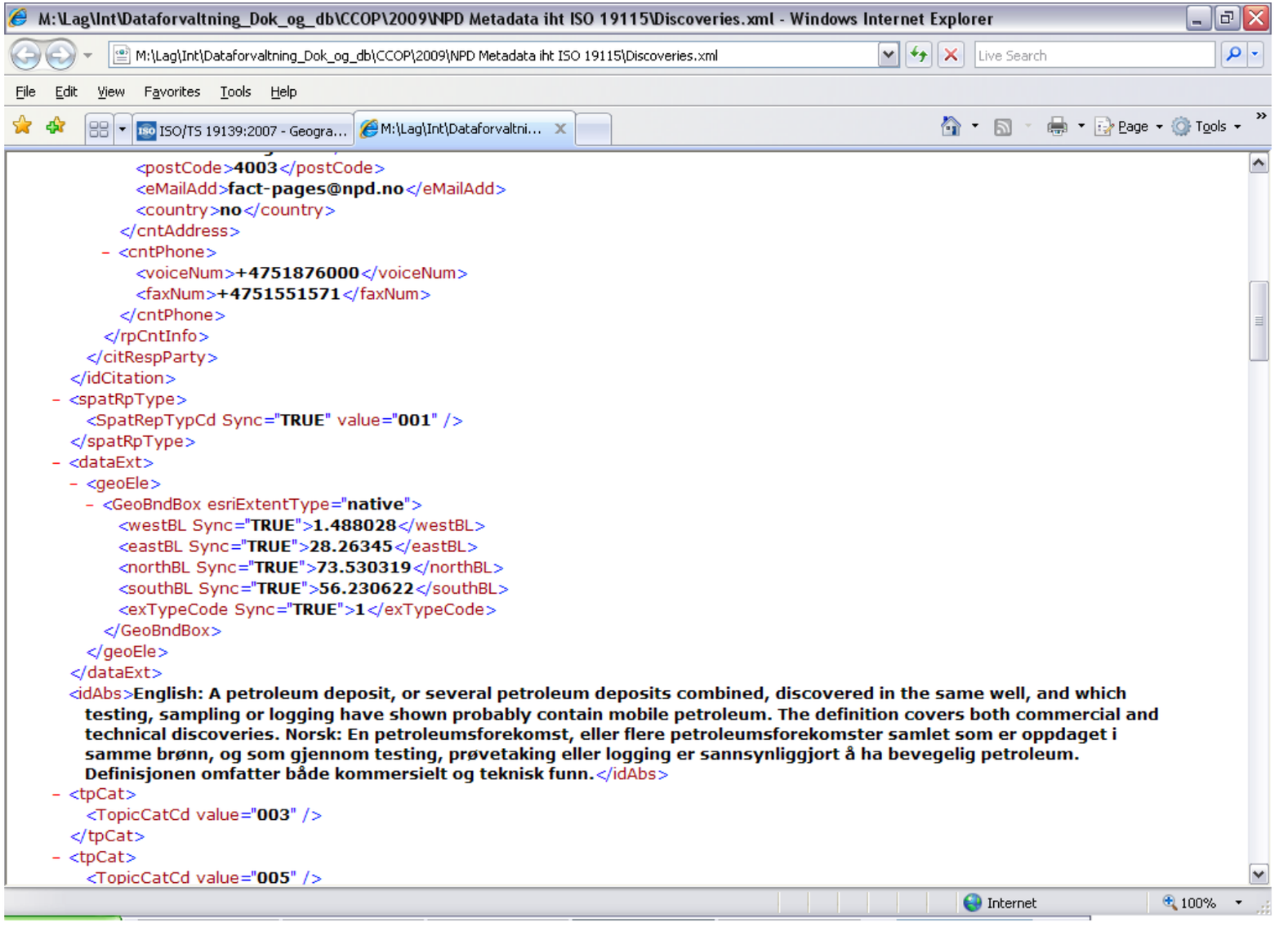
Results from the metadata search



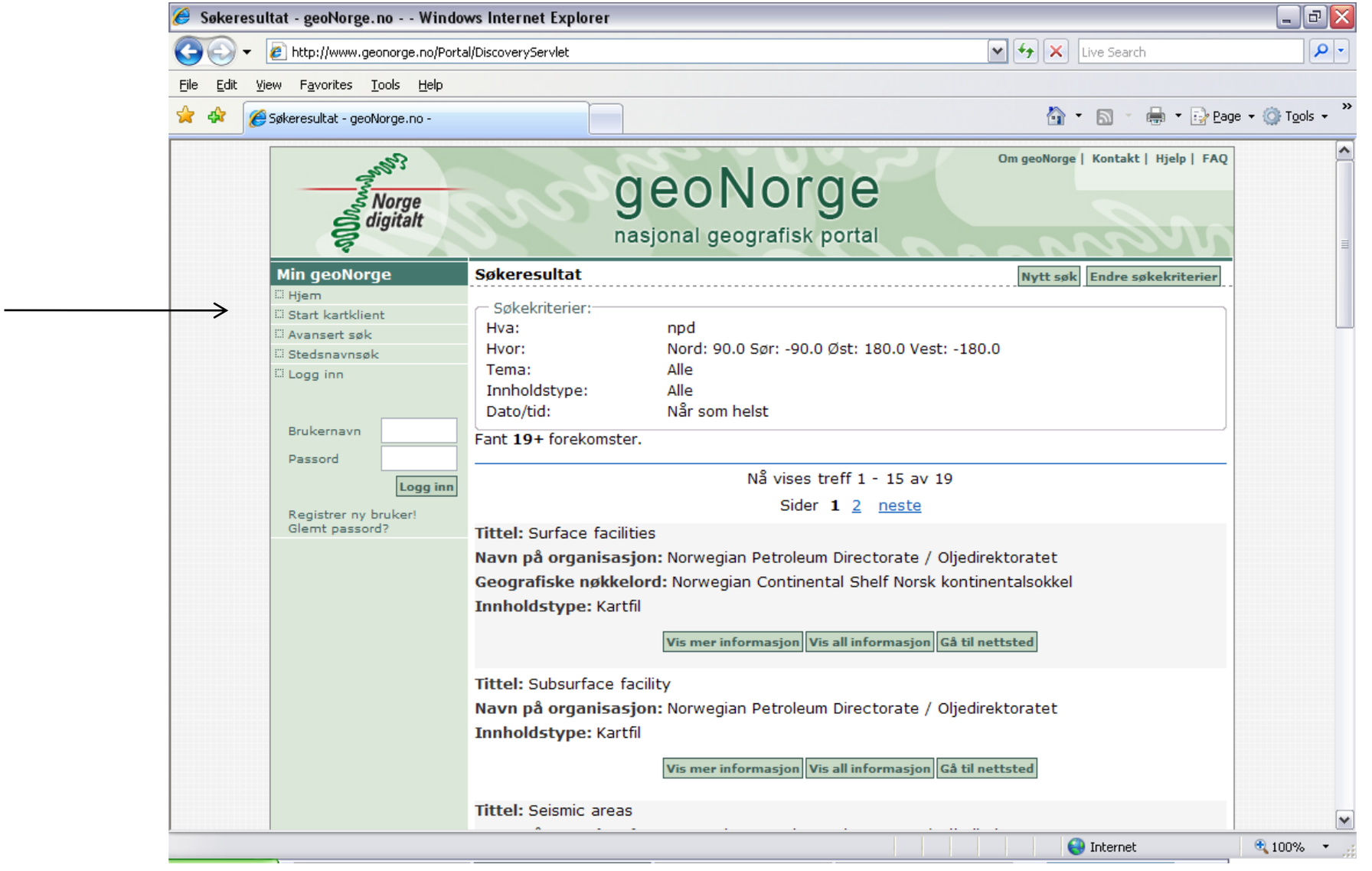
….more information according to portal display



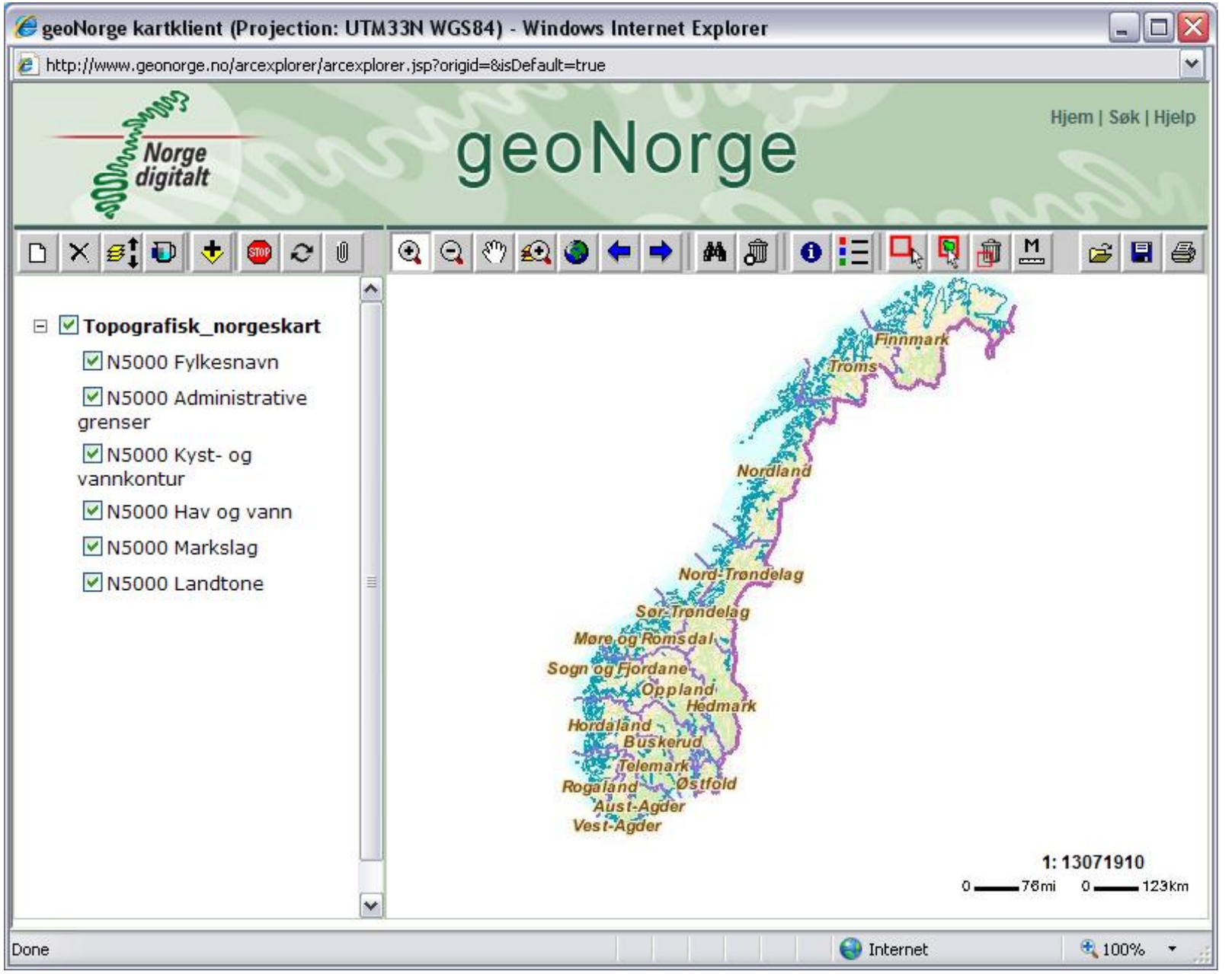
NPD Metadata file according to ISO 19 139



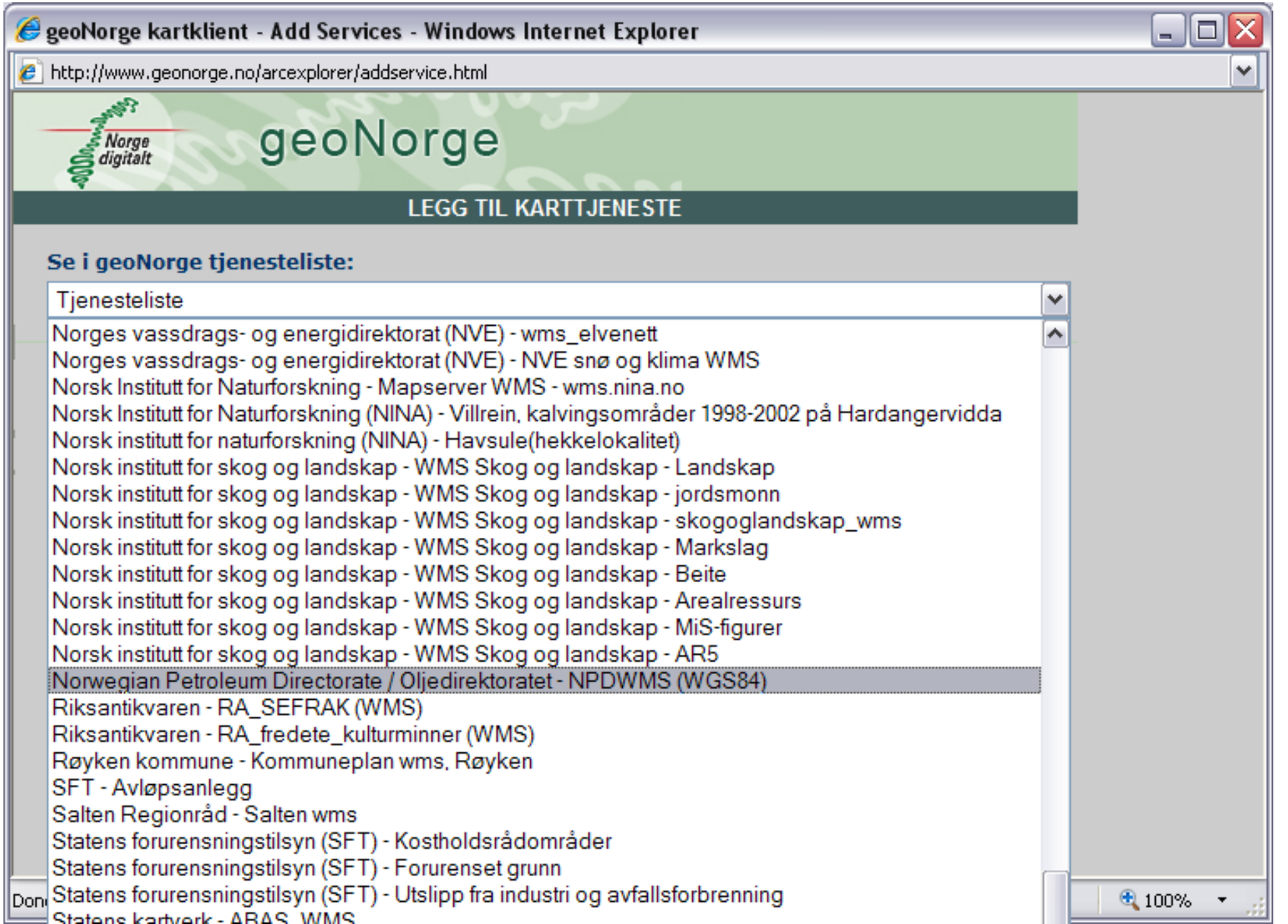
Open the map interface (map client)



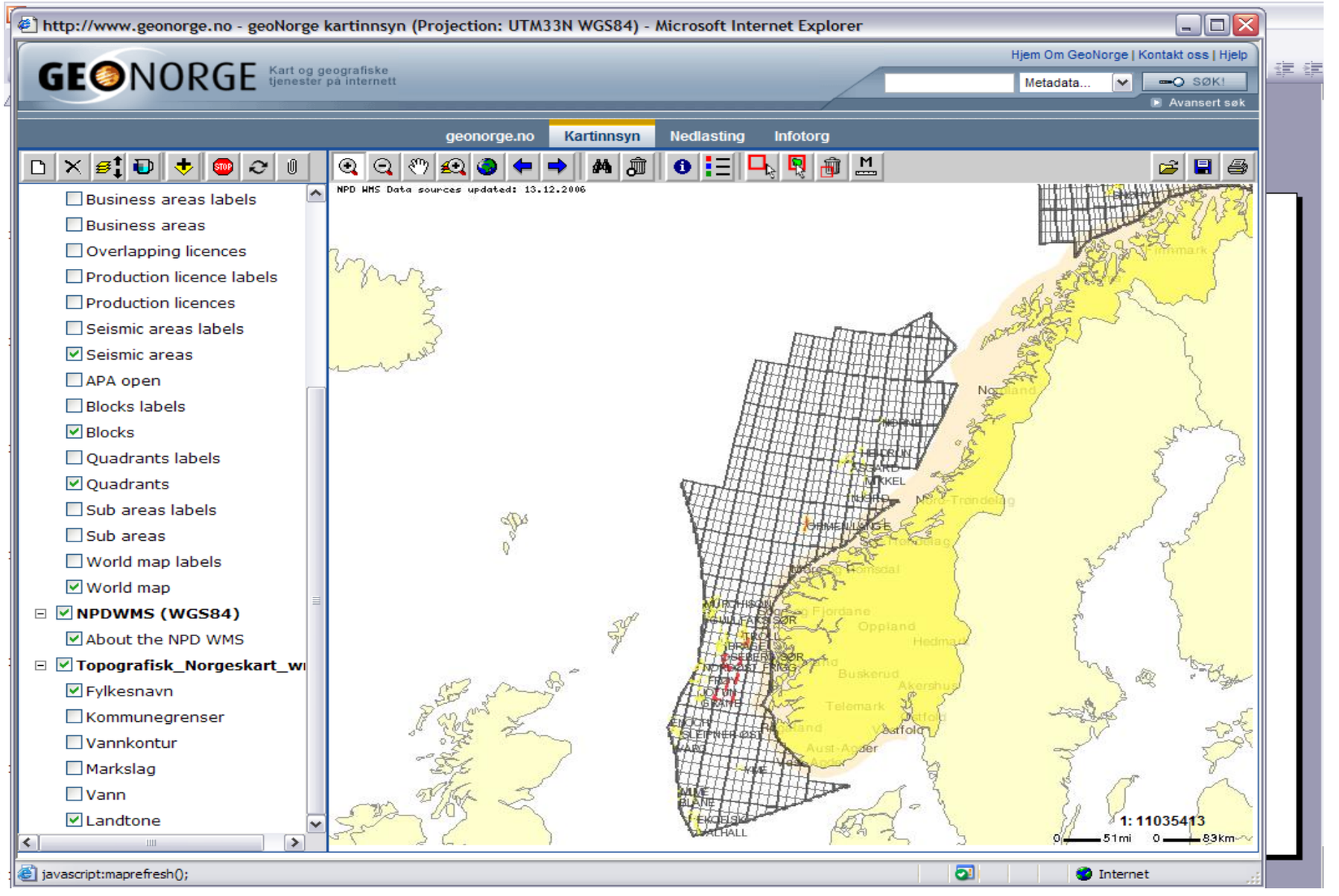
Opens the Map Client



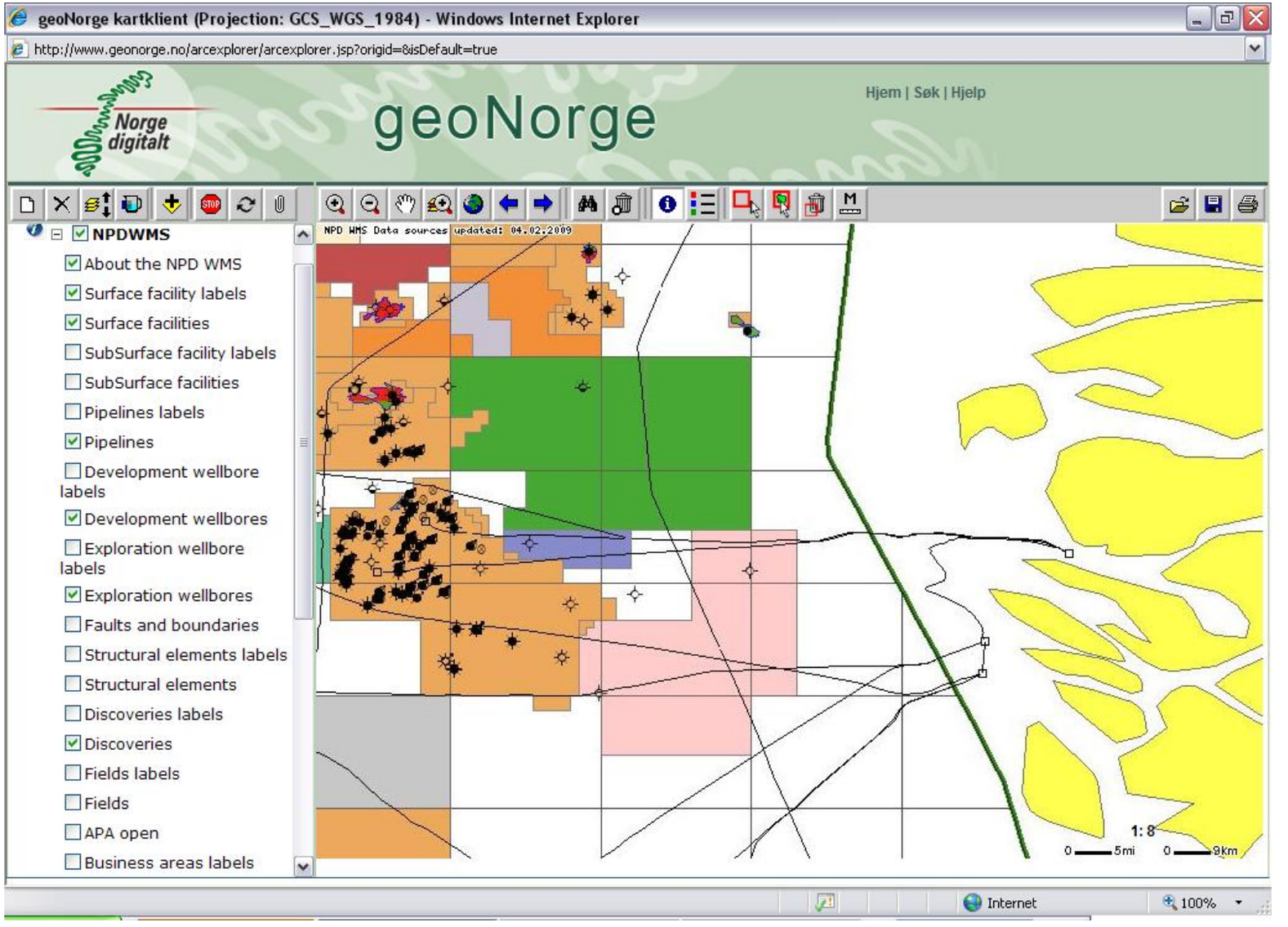
Choose which data provider



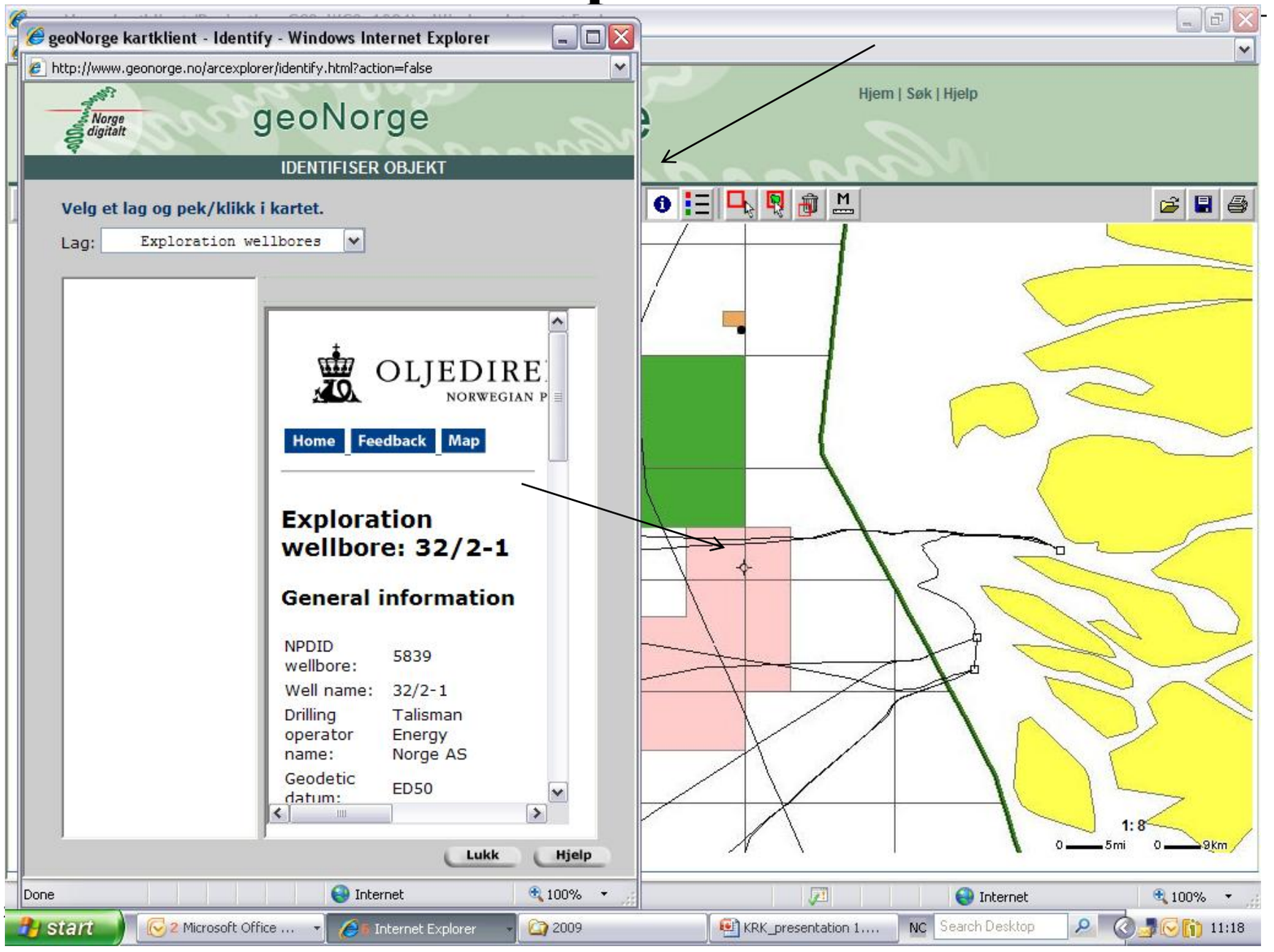
NPD-map imported into GeoNorge WMS



NPD-map imported into GeoNorge WMS



Hot-link from Map to Well information



Integration Metadata – WMS - Ref db

- Each map layer = one dataset = has a metadata title
- Each dataset = on information carrier in reference database
- Unique ID for each instance of all information carrier

Comparison of various standards- advantages & disadvantages

- GeoNorge Data discovery" metadata standard integrated with NPD WMS-metadata for Petroleum
  - Integrated with other organizations datasets and maps
  - Classification of Data Resources compatible with Reference database
  - Hotlinks from metadata to real data
  - Hotlinks between metadata and maps
  - Hotlinks between maps and real data

Inspire

INSPIRE DIRECTIVE

Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) was published in the official Journal on the 25th April 2007. The INSPIRE Directive entered into force on the 15th May 2007

- INSPIRE Directive 2007/03/14
- INSPIRE Metadata Regulation 2008/12/04

Inspire, Standards used

- The INSPIRE Implementing Rules shall take account of relevant, existing international standards and user requirements.
- In the context of metadata for spatial data and spatial data services, the standards
  - ISO 19115,
  - ISO 19119, and
  - ISO 15836 (Dublin Core)

  have been identified as important standards.

ISO 15 836
The Dublin Core Metadata Element Set

- The Dublin Core Metadata Element Set is a vocabulary of fifteen properties for use in resource description.
- The fifteen element "Dublin Core" described in this standard is part of a larger set of metadata vocabularies and technical specifications maintained by the Dublin Core Metadata Initiative (DCMI).

Dublin core metada

	A	B	C
1		The Elements	
6	Contributor	Definition:	An entity responsible for making contributions to the resource.
11	Coverage	Definition:	The spatial or temporal topic of the resource, the spatial applicability of the resource, or the jurisdiction under which the resource is relevant.
17	Creator	Definition:	An entity primarily responsible for making the resource.
22		Definition:	A point or period of time associated with an event in the lifecycle of the resource.
28	Description	Definition:	An account of the resource.
33	Format	Definition:	The file format, physical medium, or dimensions of the resource.
39	Identifier	Definition:	An unambiguous reference to the resource within a given context.
44	Language	Definition:	A language of the resource.
50	Publisher	Definition:	An entity responsible for making the resource available.
55	Relation	Definition:	A related resource.
60	Rights	Definition:	Information about rights held in and over the resource.
65	Source	Definition:	A related resource from which the described resource is derived.
70	Subject	Definition:	The topic of the resource.
75	Title	Definition:	A name given to the resource.
80	Type	Definition:	The nature or genre of the resource.
83			

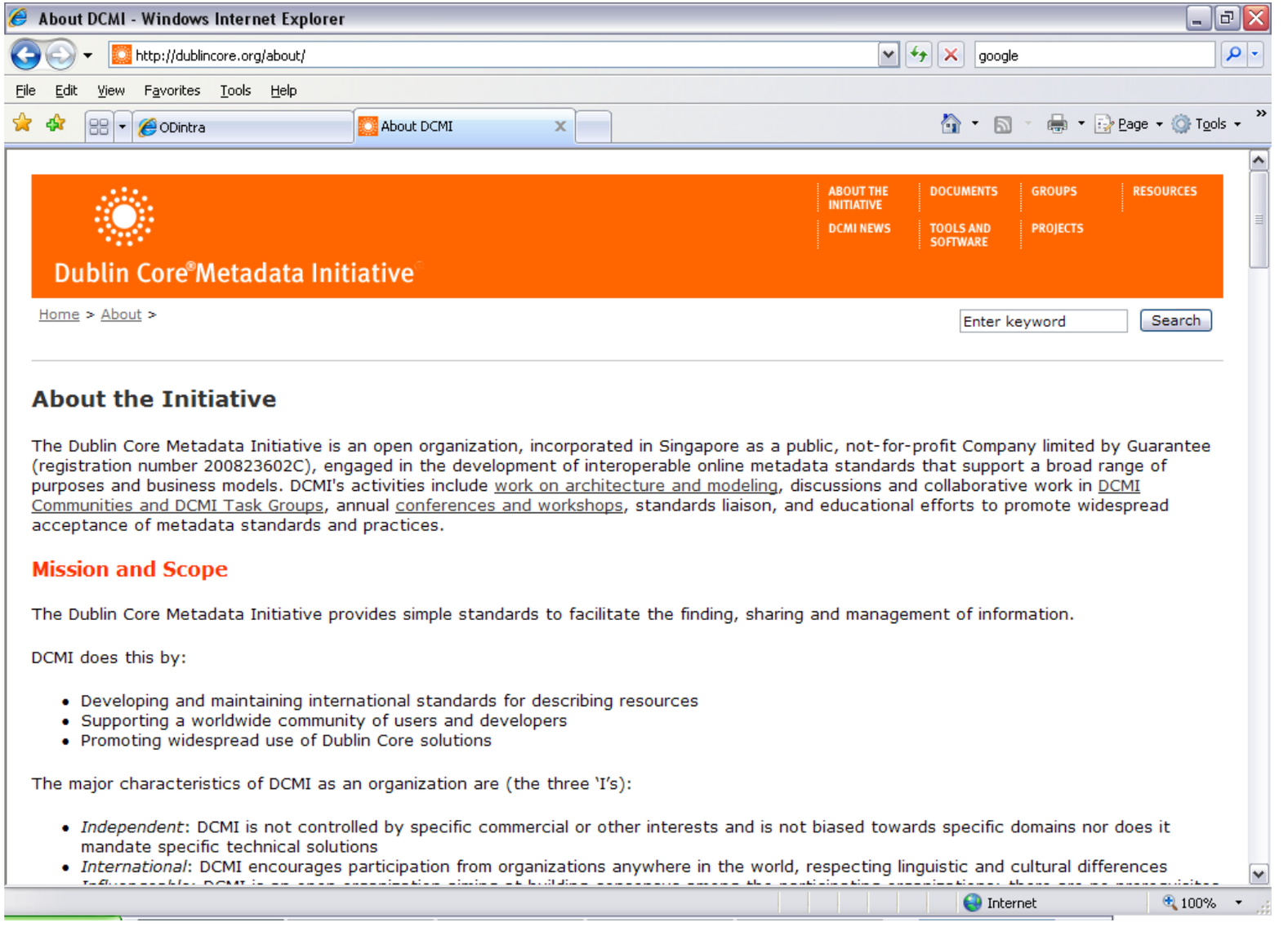
Subject Based classification

- Controlled vocabulary
- Taxonomies
- Thesaurus
  - ISO 2788 Monolingual
    BT, SN, USE, TT, RT
  - ISO 5964 Multilingual
- Faceted classification
  - Personality - (ex engineering)
  - Matter (ex steel)
  - Energy (ex procedure)
  - Space (ex. Thailand)
  - Time (ex 2004)

Subject Based classification

- Ontology
  - Types
  - Properties
  - Relation ship types
- Topic Map
  - A more flexible approach

Dublin Core --- more



http://dublincore.org/

More .....

Home | Call for Papers | Programme | Session | Author Info | Organisation

Registration | Call for Sponsors | Call for Exhibitors | Conference Venue | Accommodation | About SEOUL

DC-2009 "Semantic Interoperability of Linked Data"

(메타데이터와 온톨로지의 의미적 상호운용)

DC-2009 will focus on linked data and the enabling of the Semantic Web. Conference participants will explore the conceptual and practical issues in breaking the constraints of data silos and connecting pieces of data, information, and knowledge. Metadata is a key to these processes supporting publishing and interlinking structured data on the Semantic Web. There is a growing interest in the metadata community in connecting existing and future data contained in silos within and across organizations in a meaningful way that supports extraction and correlation of the data. The linking of data from disparate data silos presents technical and social challenges that will be explored at DC-2009 through full papers, project reports, posters, special sessions and workshops.

Metadata Standards

(What are the various international standards)

- "Data discovery"metadata standard
  - BGS for Geology, NERC-data discovery service
  - GeoNorge incl NPD WMS-metadata for Petroleum
- Data package metadata standards
  - ISO 19 115 (geographic information) Ex Inspire
  - ISO 15 836 Dublin Core
  - ISO 19 128 WMS
  - ISO 19 139 XML-schema for metadata
  - ISO 19 119 Architecture patterns for Service Interface

Metadata for datasets at high level

- Metadata standards for data files
  - Various XML-definitions (WITSML, PRODML etc)
  - Various petroleum technical format standards (SEG-Y, UKOOA etc)
- Data Models
  - Energistics/POSC, PPDM,
- Ontology standards (documented or just implemented)
  - W3C: Semantic web
  - ISO 15 926 , OLF/RDL
  - NPD fact pages/regulations, DISKOS, CDA,
- Other relevant classification systems
  - WPC/SPE Resource classification system, CCOP resource classification system

Metadata standards for data files

(used in petroleum E&P data management)

- The files are used for moving digital data between computers or between application software
- The files contain the “real data”. The metadata to the files inform about the structure and definitions of the various data including how each data element shall be identified.
- These metadata are often not according to “formal standards” (ex. ISO) but they are made/maintained and documented by
  - companies
  - organizations like SEG, Energistics or PPDM,
  - by government bodies

Metadata standards for data files
(used in petroleum E&P data management)

- Various petroleum technical format standards

  Binary

  - LIS (Log Information Standard, Schlumberger)
  - DLIS (Digital Log Interchange Standard, From API RP66)
  - SEG-Y, (for seismic data, Society of Exploration Geophysicists)
  - SEG-D
  - UKOOA-P1 (Seismic Navigation Format, org. United Kingdom)

  Ascii

  - LAS (Log ASCII Standard) org. Canada
  - SPWLA (Society of Petroleum Well Analysts) org Aberdeen
  - XML (Extendable Mark-up Language)

Metadata standards for data files
(used in petroleum E&P data management)

- Various XML-definitions used in petroleum
  - WITSML (Wellsite Information Transfer Mark-up Language)
  - PRODML (PRODuction xML,)

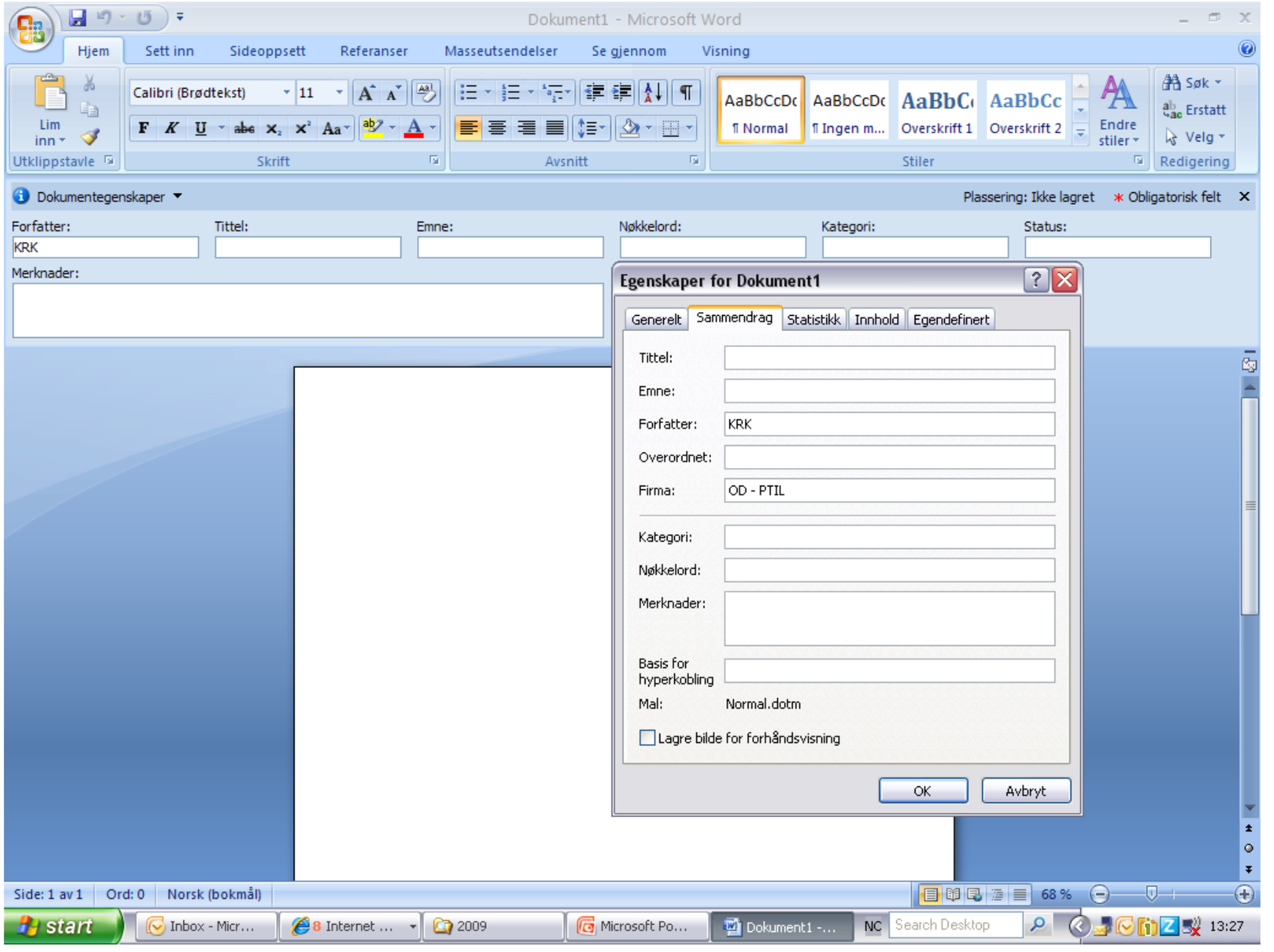
energistics
The Energy Standards Resource Centre

http://www.energistics.org/posc/default.asp?SnID=239249707

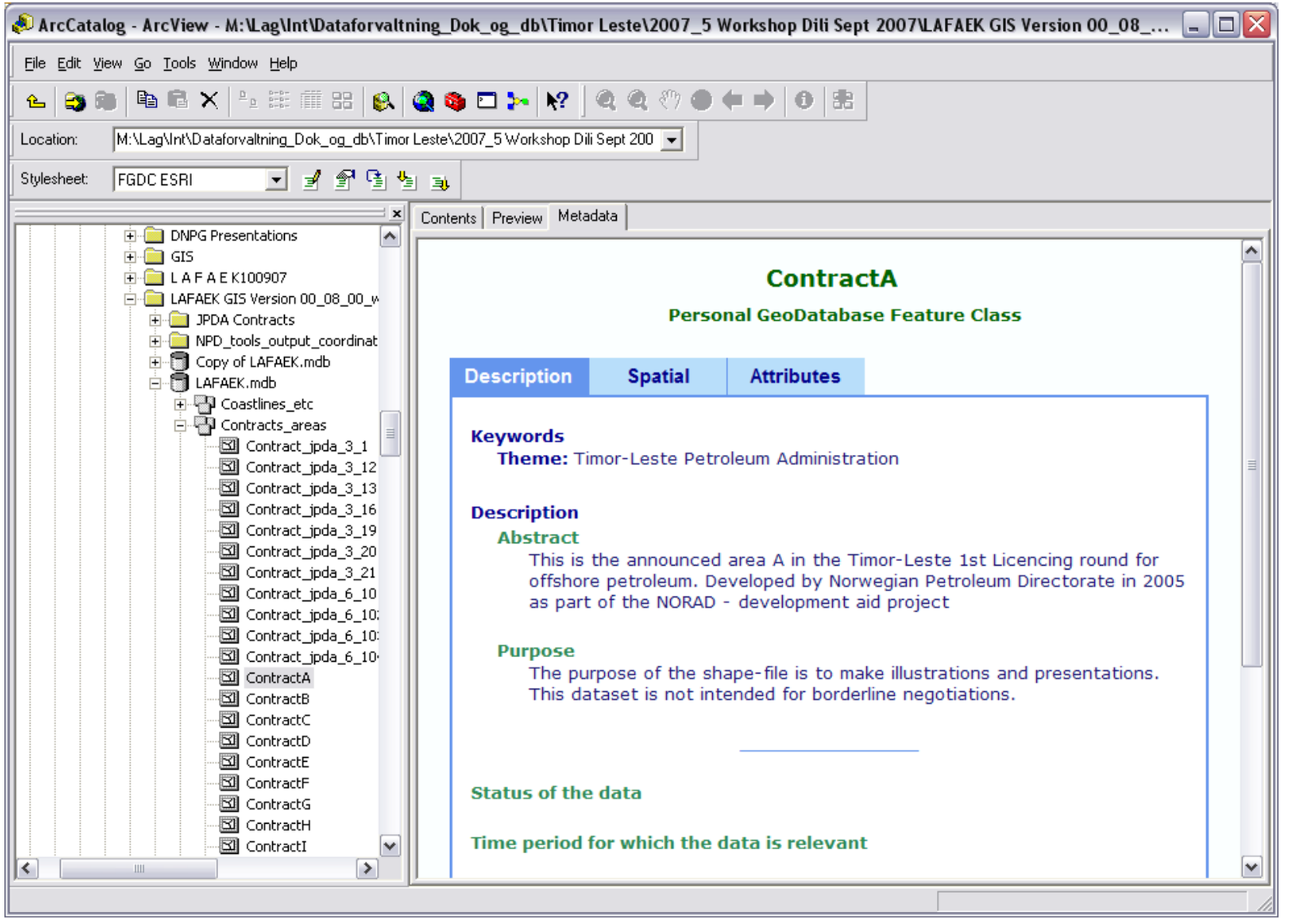
Metadata standards for Data file formats
(used in petroleum E&P data management)

- Image formats
  - TIFF (Tagged Image File Format)
  - JPEG (Joint Photographic Expert Group)
  - GIF (Graphic Interchange Format)
  - PNG (Portable Network Graphic)
  - BMP (Microsoft Windows Bitmap
- Document formats
  - OOXML (Office Open XML, Microsoft)
  - PDF or PDF/A (Portable Document Format)
  - ODF for documents to be edited.

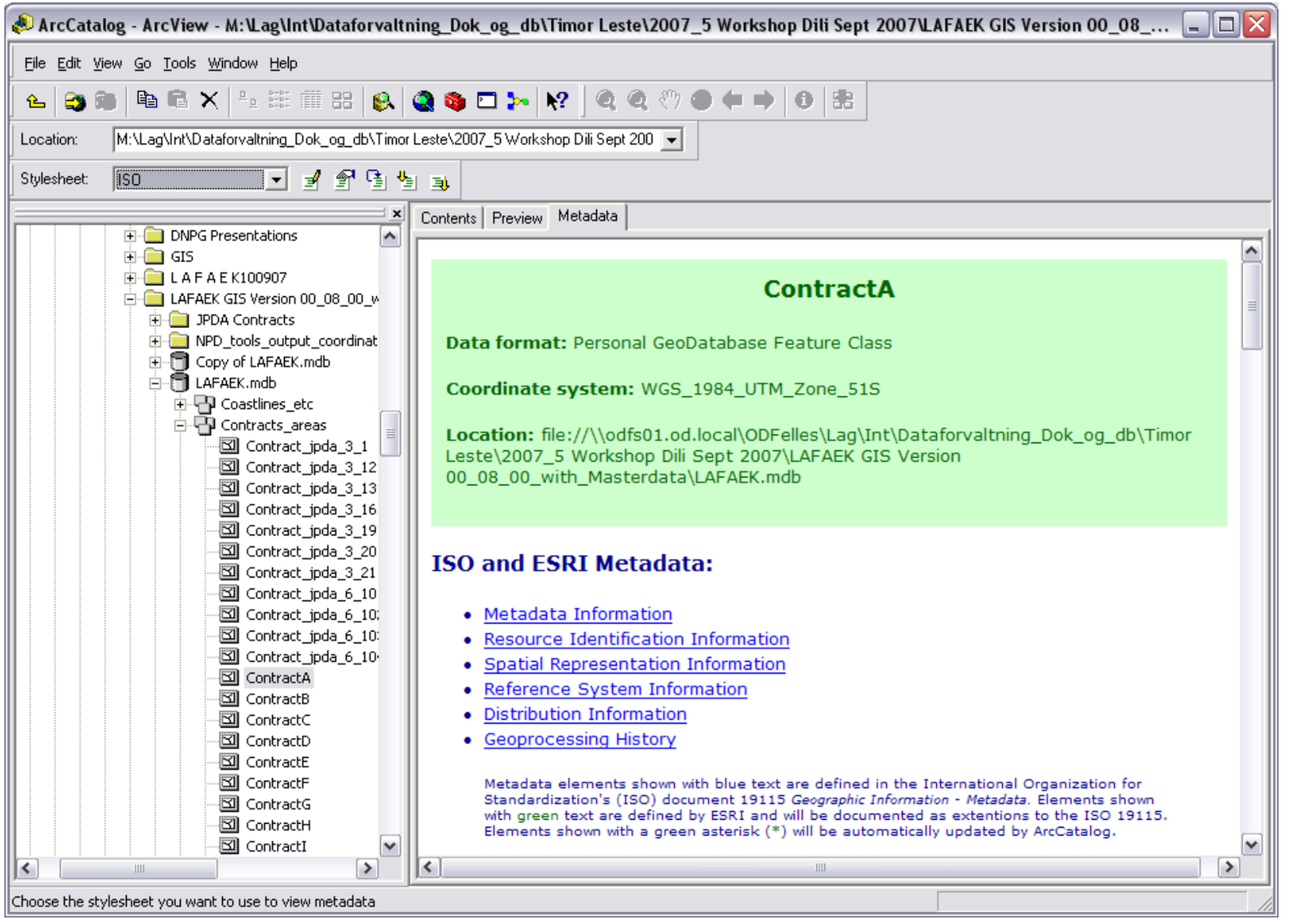
MS-Word (2007) Metadata



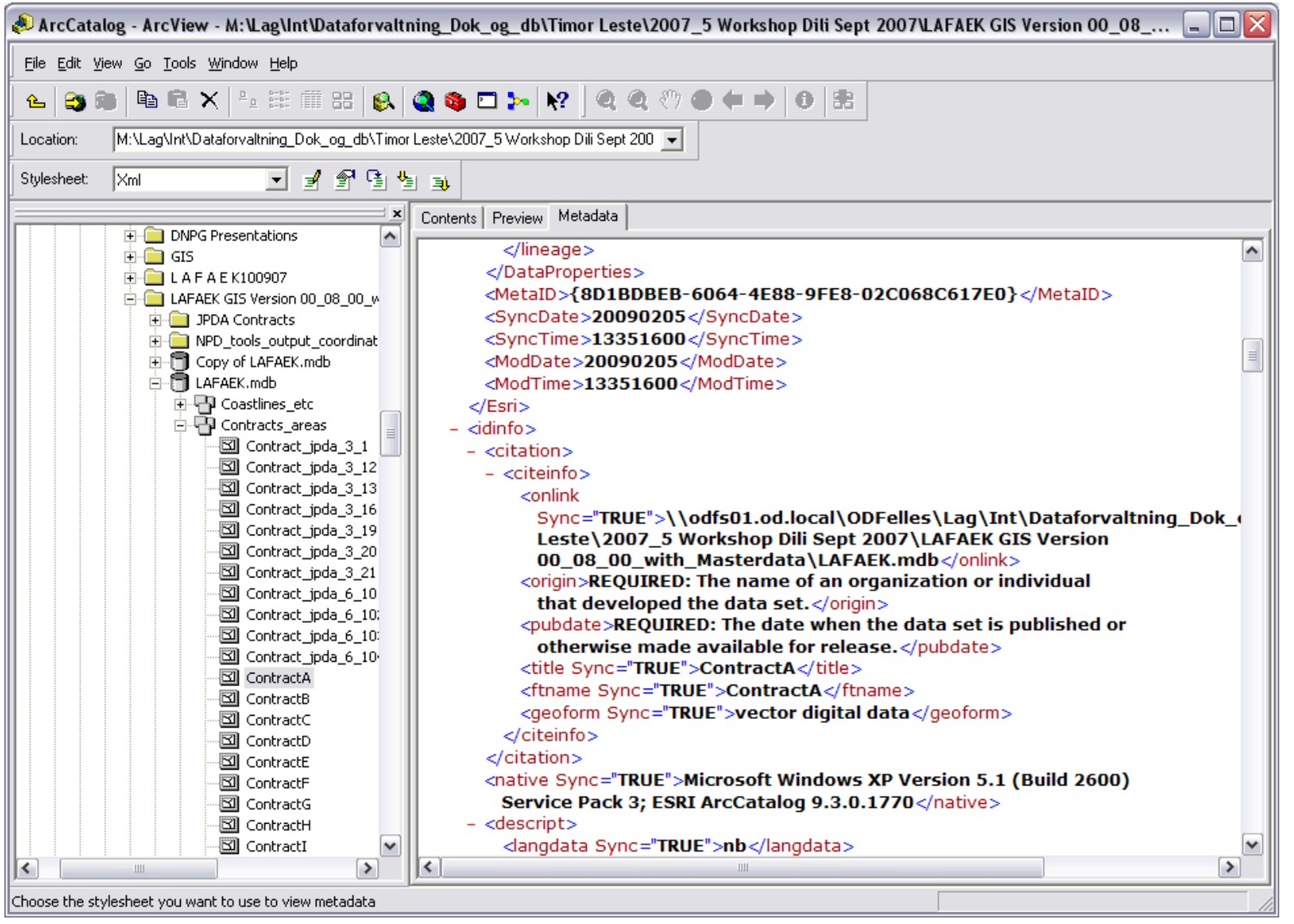
ESRI: ArcCatalog Metadata



ESRI: ArcCatalog Metadata



ESRI: ArcCatalog Metadata



Data models

- EPICENTER (POSC)
- NPD -SAMBA
- PPDM

NDR

http://www.energistics.org/posc/NDR_Work_Group.asp

Other metadata standards
(used in petroleum E&P data management)

- Standards on how to organize information
  - Naming conventions & definitions

    wells

    fields

    seismic surveys

    etc

Semantic Web Initiatives

- Computers can speak together (structured databases not needed ?)
  - Semantic Web

    An evolving extension of the World Wide Web in which the semantics of information and services on the web is defined, making it possible for the web to understand and satisfy the requests of people and machines to use the web content
  - Ontology

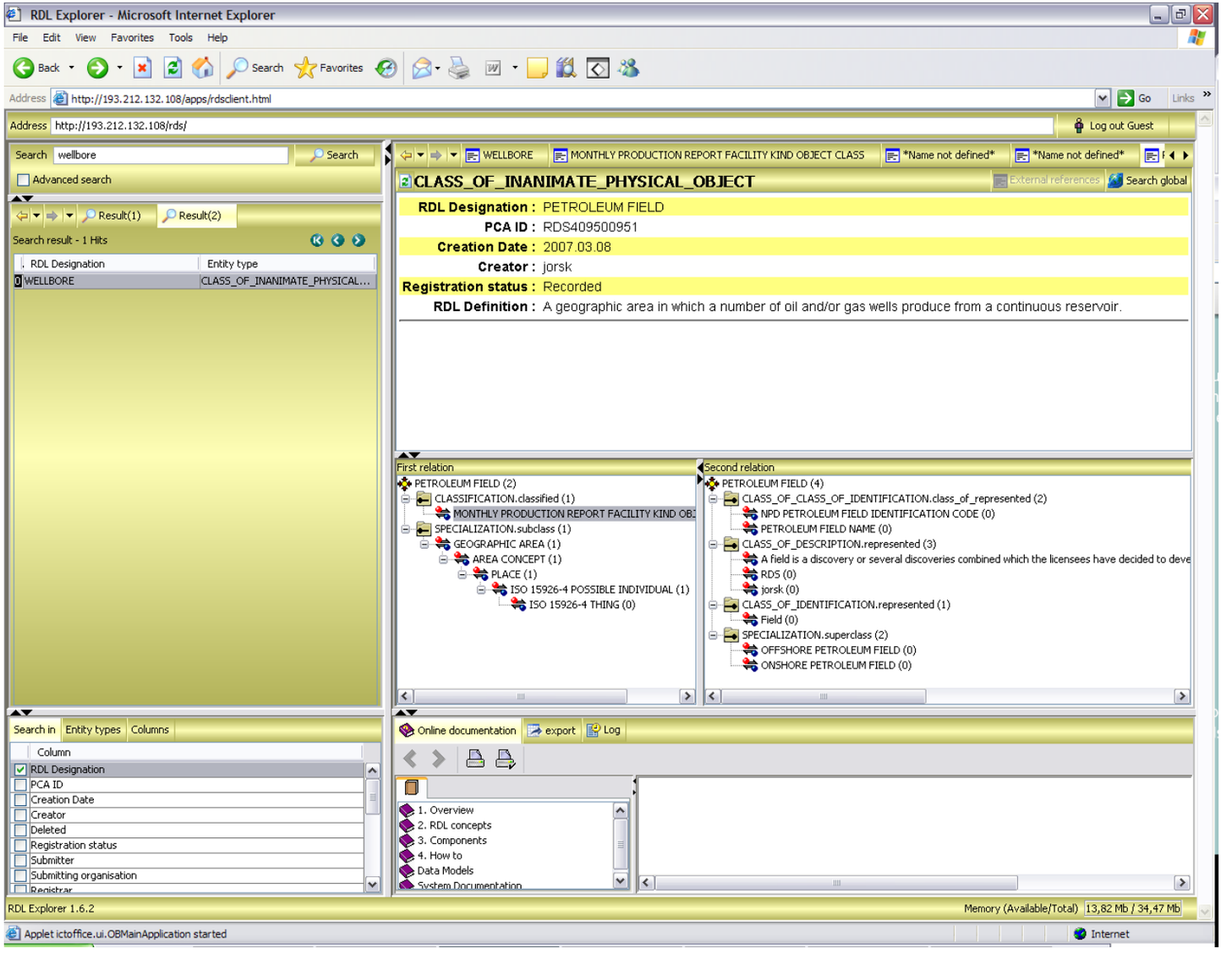
    An ontology provides a shared vocabulary, which can be used to model a domain – that is, the type of objects and/or concepts that exist, and their properties and relations.

Semantic Web Initiatives

- OLF (Oil companies interest organization, Norway)
  - initiative on Petroleum Integrated Operation (Smart Field)

    Project IIP (Integrated Information Platform)
- ISO 15 926
  - is a standard for data integration, sharing, exchange, and hand-over between computer systems.
- POSC/CAESAR RDL
  - Reference Data Library to ISO 15 926 Part 4

RDL (Reference Data Library for ISO 15 926)



Petroleum Field

http://rds.posccaesar.com/apps/rdsclient.html

Resource classification systems

400 Mill SM

- What does the number reflect?
  - A discovered resource?
  - Recoverable oil or gas?
  - Only primary recovery?

Must have some information about the number in the box

Resource classification systems

- The CCOP Petroleum Resource Classification System
- SPE/WPC/AAPG/SPEE PRMS (SPE PRMS 2007)
  - Petroleum Resources Management System
- Norwegian Petroleum Resource Classification System
  - Norwegian Petroleum Directorate
- United Nation Framework Classification for Fossil Energy and Mineral Reserves and Resources
  - UNFC-2009

The CCOP Petroleum Resource Classification System (1999)

http://www.ccop.or.th/onlinepub_detail.asp?ID=2

SPE PRMS 2007

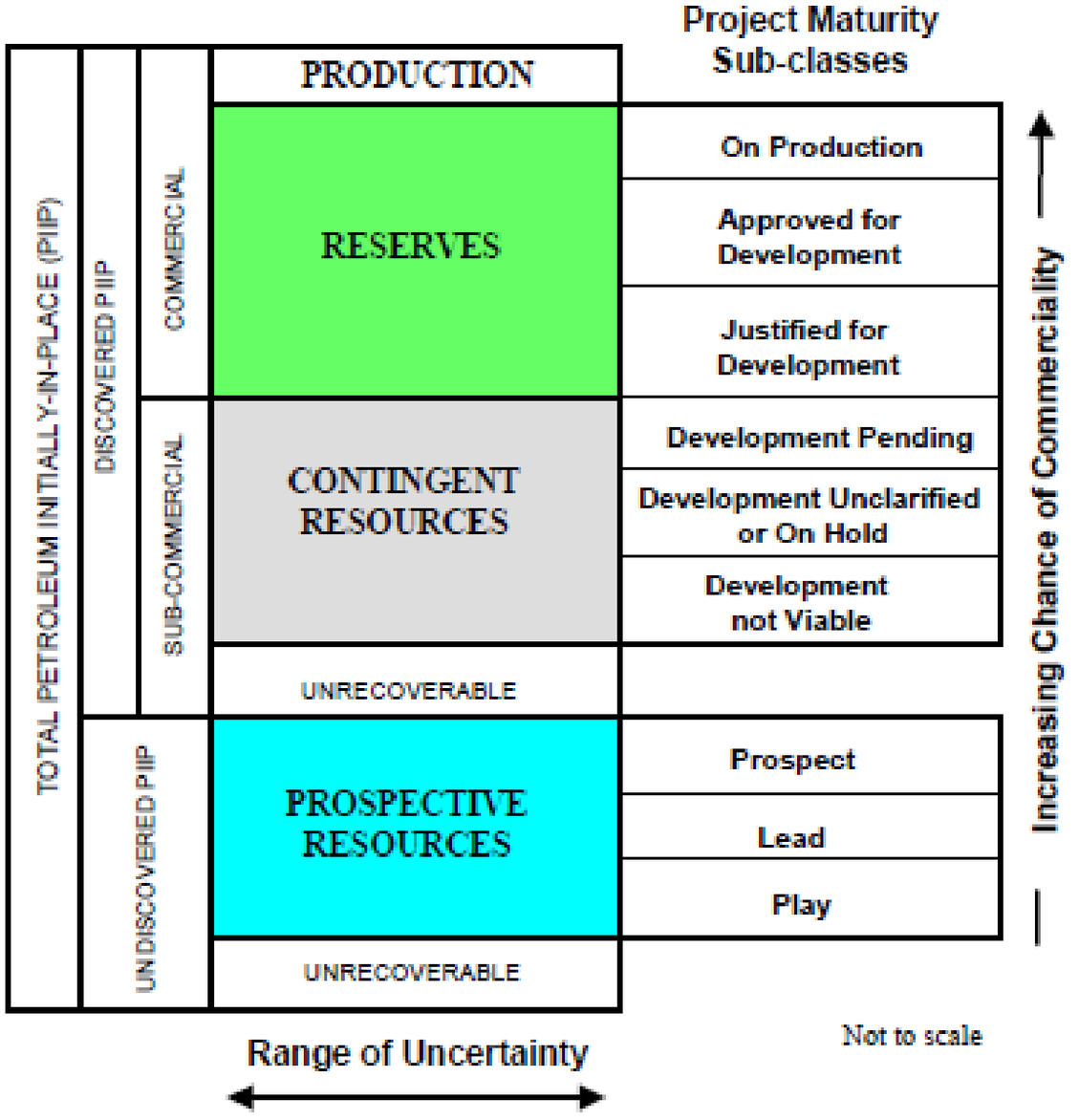
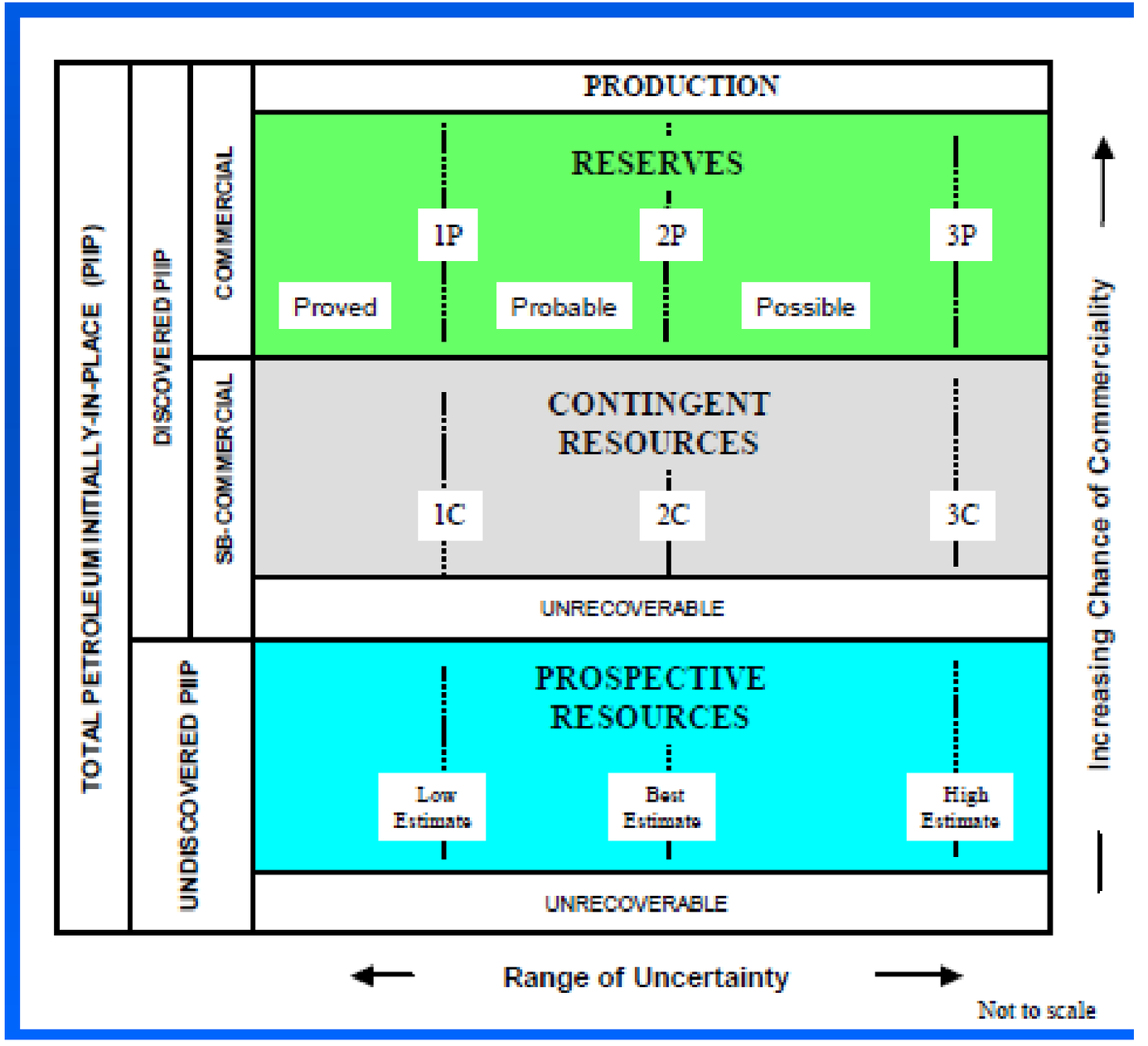


Figure 2-1: Sub-classes based on Project Maturity.

SPE PRMS


TOTAL PETROLEUM INITIALLY-IN-PLACE (PIIP)
DISCOVERED PIIP
UNDISCOVERED PIIP
COMMERCIAL
SB-COMMERCIAL
PRODUCTION
RESERVES
1P
2P
3P
Proved
Probable
Possible
CONTINGENT RESOURCES
1C
2C
3C
UNRECOVERABLE
PROSPECTIVE RESOURCES
Low Estimate
Best Estimate
High Estimate
UNRECOVERABLE
Increasing Chance of Commerciality
Range of Uncertainty
Not to scale

The Norwegian Resource Classification system

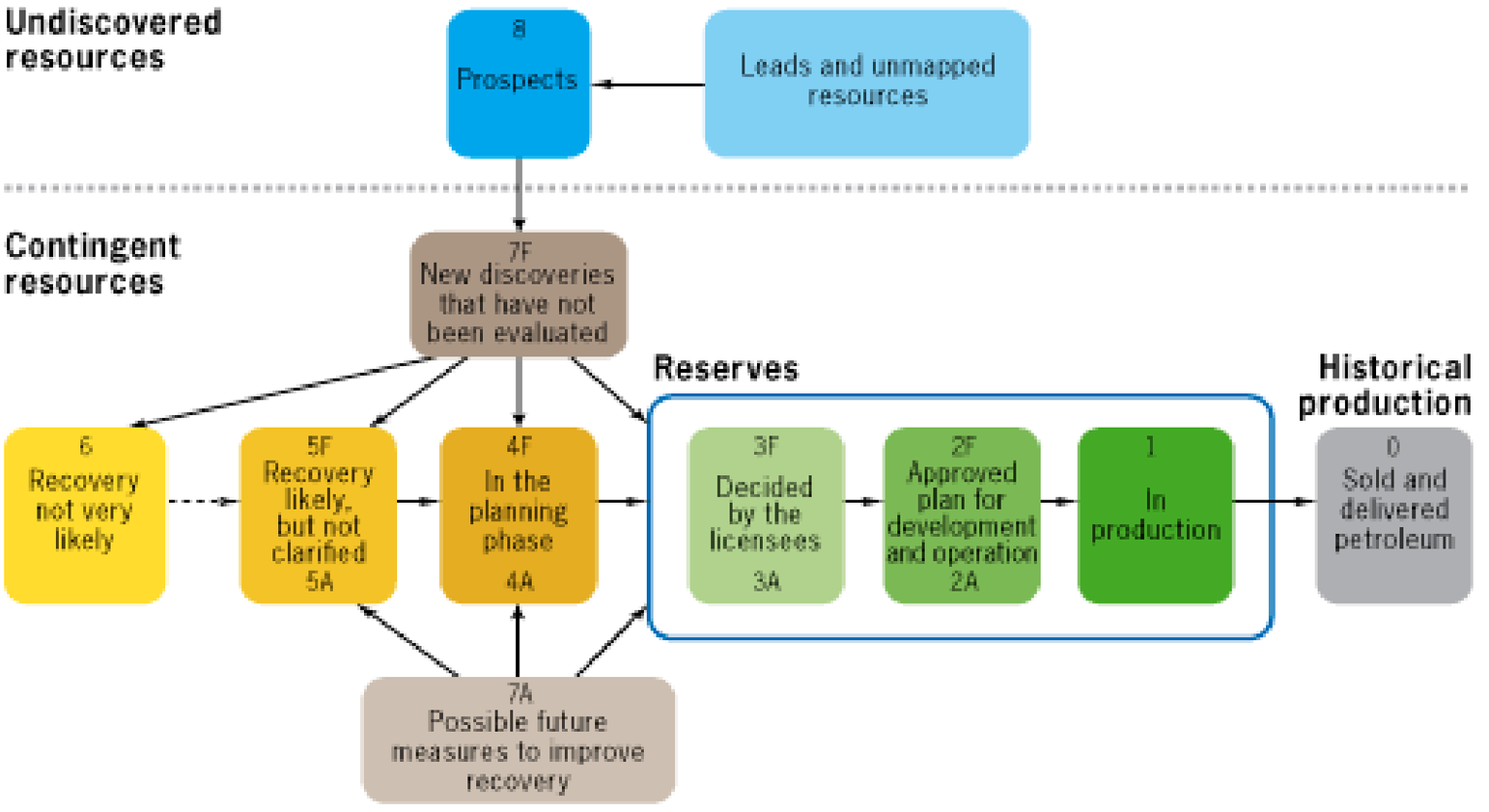


Figure 2.3. The Norwegian Petroleum Directorate's classification of the petroleum resources

The total Norwegian Petroleum Resources (2006)

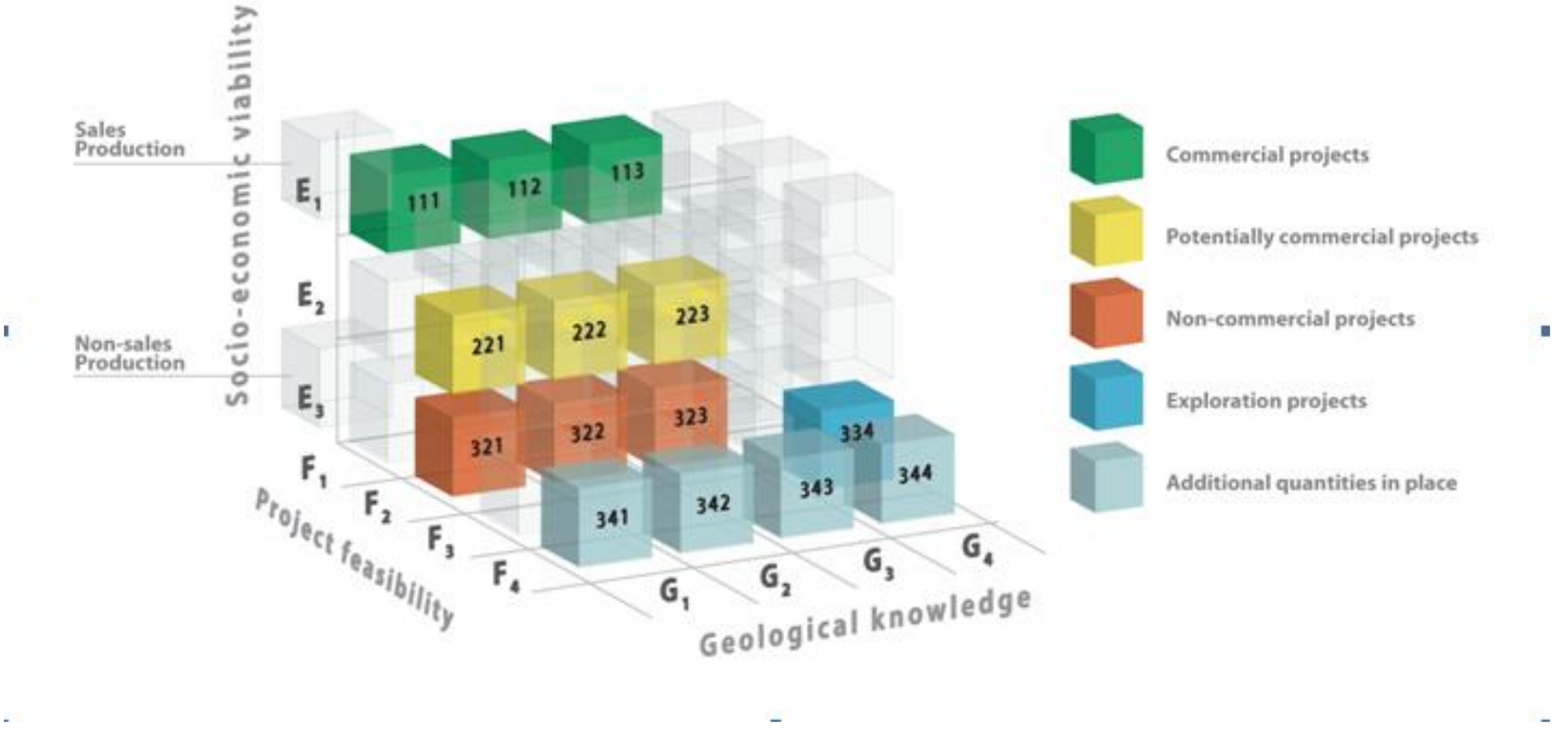
Status		Resource class	Category	Project status	Oil mill. Sm³	Gas mrd. Sm³	NGL** mill. t.	Cond. mill. Sm³	Sum o.e. mill. Sm³
Discovered	Field	Historic production	0	Sold and delivered	3 155	1 142	99	89	4 573
		Reserves	1	In production	944	1 371	96	-0	2 497
			2	Approved plan	105	607	14	42	781
			3*	Decided by the licensees	26	324	13	7	381
			Sum reserves		1 075	2 302	123	49	3 659
		Contingent resources	4	In the planning phase	187	79	12	3	291
			5	Recovery likely, but not clarified	177	87	8	2	282
			7F	New discoveries tied to fields being evaluated	12	1	0	0	13
			7A	Possible future measures for increased recovery	140	130			270
			Sum contingent resources in fields		515	296	20	5	855
		Sum reserves and contingent resources in fields			1 591	2 599	143	53	4 514
	Discovery	Contingent resources	4F	In the planning phase	102	104	14	12	243
			5F	Recovery likely, but not clarified	48	318	9	23	405
			7F	New discoveries being evaluated	2	2	0	0	5
		Sum contingent resources in fields			152	424	22	35	654
Undiscovered		Undiscovered resources	8 and 9	Prospects and unmapped resources	1 260	1 875		265	3 400
Total resources				Sum total resources	6 158	6 040	263	442	13 141
				Sum remaining resources	3 003	4 897	165	354	8 568

* Includes reserves from discoveries

** 1 tonne of NGL = 1,9 Sm^3 o.e.

UNFC-2009

Figure 1. UNFC categories and examples of classes



UNFC-2009

DRAFT (16 March 2009)

Figure 2. Abbreviated version of the UNFC, showing primary classes

Total commodity initially in place					
	Extracted	Sales Production			
		Non-sales Production[2]			
		Class	Categories		
			E	F	G[3]
	Future recovery by commercial development projects or mining operations	Commercial Projects[4]	1	1	1, 2, 3
	Potential future recovery by contingent development projects or mining operations	Potentially Commercial Projects[5]	2[6]	2	1, 2, 3
		Non-Commercial Projects[7]	3	2	1, 2, 3
	Additional quantities in place associated with known deposits[8]		3	4	1, 2, 3
	Potential future recovery by successful exploration activities	Exploration Projects	3	3	4
	Additional quantities in place associated with potential deposits[8]		3	4	4

Joint Oil Data Initiative (JODI)

Challenge:
What level metadata in the EPPM-project?

- According to needs
- According to ambitions
- For future extension to online data

End of presentation..

Extra for the discussions

Arguments (Discussion topics)

- The EPPM project is not an IT-project
  - Templates exist already (ex BGS, CCOP-metadata portal)
  - Challenge is to put in the right data

    What is relevant (not too much, start in the right end, which search criteria)

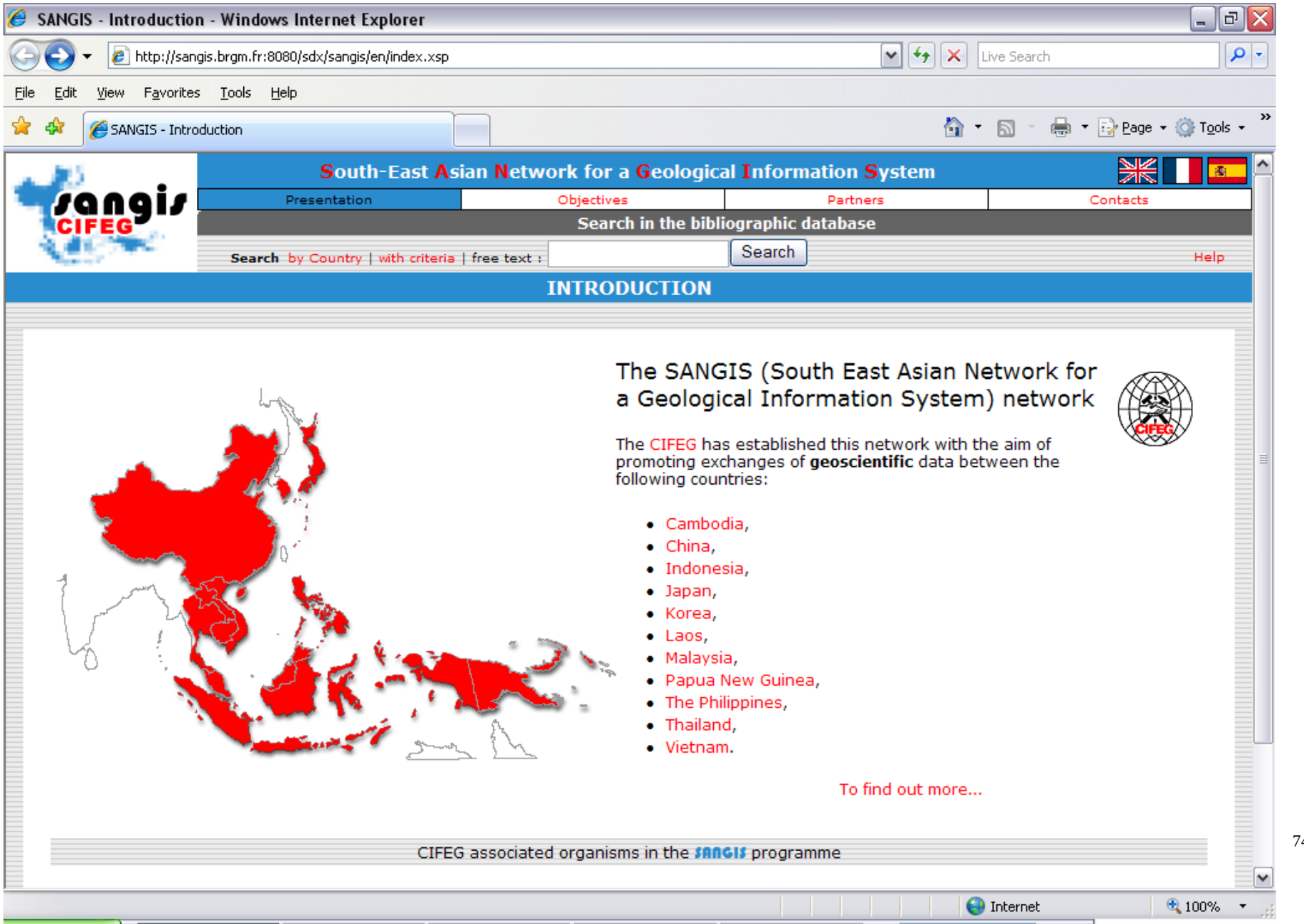
    Compatible with emerging technology (free text search, metacarta(spacial data retreival),semantic web)
- The focus must be on
  - Define a short keyword hierarchy that is relevant (classification)
  - Use “best practice ontology”
  - Harmonize regional reference databases to allow for future dataflow between databases

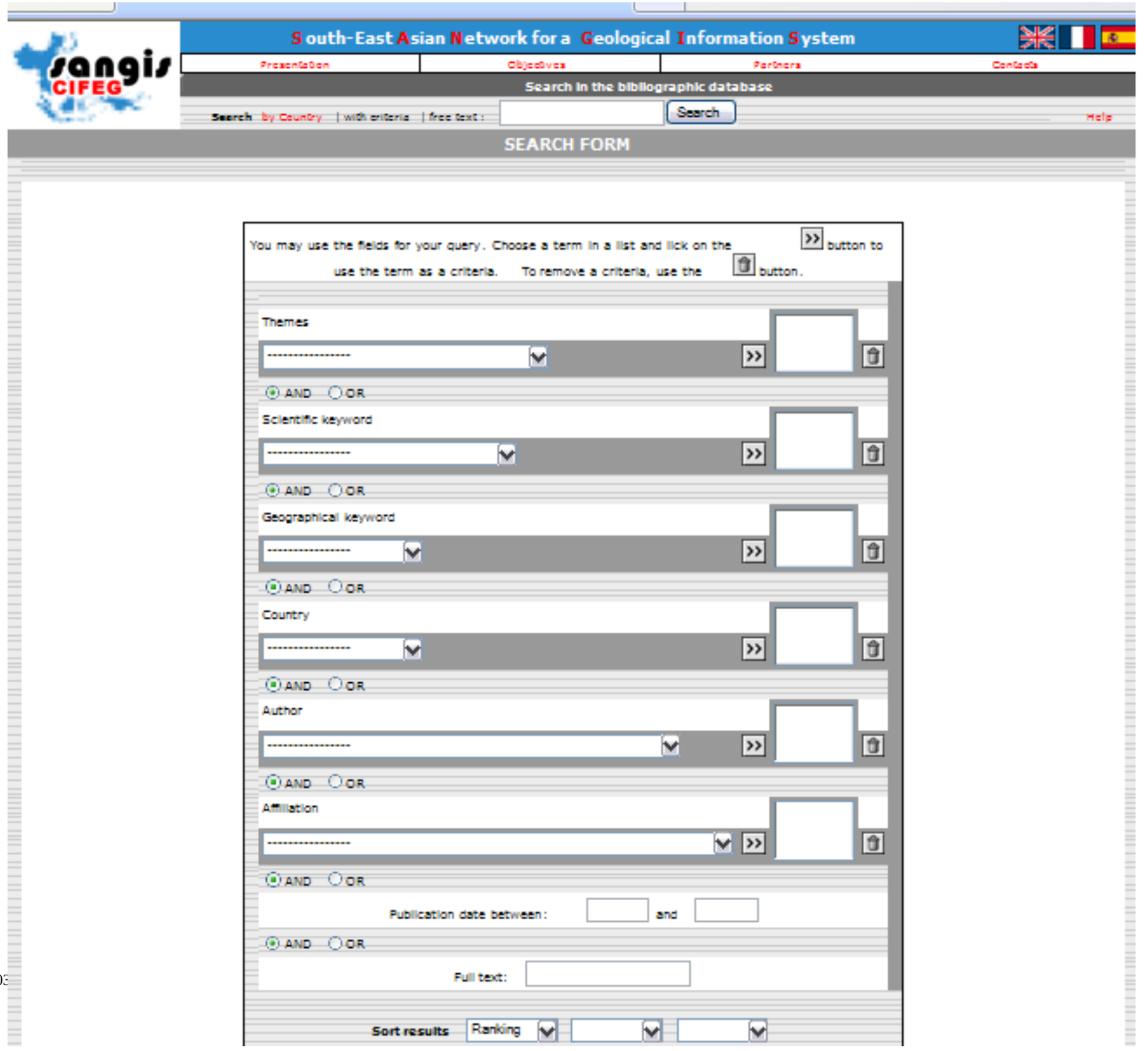
Technical standards bodies

- Society of Exploration Geophysicists (SEG)
  - http://seg.org/publications/tech-stand/
- American Petroleum Institute (API)
- Public Petroleum Data Model (PPDM) Assosiation
- Energistics (former POSC)
- POSC/CAESAR


NDR9 Save the Date! - Melding (HTML)
Melding
Svar
Svar til alle
Videresend
Slett
Overfør til mappe
Lag regel
Andre handlinger
Blokker avsender
Sikker-lister
Ikke søppelpost
Kategoriser
Følg opp
Marker som ulest
Søk
Relatert
Velg
Send til OneNote
Svar
Handlinger
Søppelpost
Alternativer
Søk
OneNote
Fra: Jerry Hubbard [membership@energistics.ccsend.com] på vegne av Jerry Hubbard [jerry.hubbard@energistics.org]
Sendt: ti 03.02.2009 00:26
Til: Knudsen Kjell-Reidar
Kopi:
Emne: NDR9 Save the Date!
National Data Repository
Press Release
NDR9
DGH
NEW DELHI 2009
SAVE THE DATE!
When: 31st August - 3rd September 2009
Where: New Delhi, India
Sponsored by the Directorate General of Hydrocarbons (DGH) of India, NDR9 will be held at the Vigyan Bhavan in New Delhi. Please mark the dates on your calendars and diaries and plan to join us for informational presentations on data management topics for regulatory agencies and government ministries charged with managing oil and natural gas data. More information will follow soon on hotels and the agenda.
NDR
NATIONAL DATA REPOSITORY

CCOP Sangis


SANGIS - Introduction - Windows Internet Explorer
http://sangis.brgm.fr:8080/sdx/sangis/en/index.xsp
File Edit View Favorites Tools Help
SANGIS - Introduction
South-East Asian Network for a Geological Information System
Presentation
Objectives
Partners
Contacts
Search in the bibliographic database
Search by Country | with criteria | free text :
Search
Help
INTRODUCTION
The SANGIS (South East Asian Network for a Geological Information System) network
The CIFEG has established this network with the aim of promoting exchanges of geoscientific data between the following countries:
Cambodia,
China,
Indonesia,
Japan,
Korea,
Laos,
Malaysia,
Papua New Guinea,
The Philippines,
Thailand,
Vietnam.
To find out more...
CIFEG associated organisms in the SANGIS programme
Internet
100%


sangis
CIFEG
South-East Asian Network for a Geological Information System
Presentation
Objectives
Partners
Contacts
Search in the bibliographic database
Search by Country | with criteria | free text :
Search
Help
SEARCH FORM
You may use the fields for your query. Choose a term in a list and lick on the button to use the term as a criteria. To remove a criteria, use the button.
Themes
Scientific keyword
Geographical keyword
Country
Author
Affiliation
AND OR
Publication date between:
and
Full text:
Sort results
Ranking

CCOP Metadata Project

- **CCOP Metadata Project Phase I**
  - To seek the location database of the information in each country for the advanced utilization of geological publications.
  - CCOP countries jointly own and mutually exchange some of these information under XML standardization of metadata through the internet
  - To introduce the distributed system of the metadata clearinghouse for the information
- **CCOP Metadata Project Phase II**
  - It is planned to publish the final CCOP Metadata Standard in 2008, and to start the development of the CCOP Metadata System Software for data collection and data search and retrieval in 2009.