

Using DISKOS to share and distribute production data

Passion for Geoscience



Agenda

- About CGG and DISKOS
- The NPD production data
- The Akon solution for production data submission and sharing
- Conclusion

About CGG and Diskos



What is Diskos ?

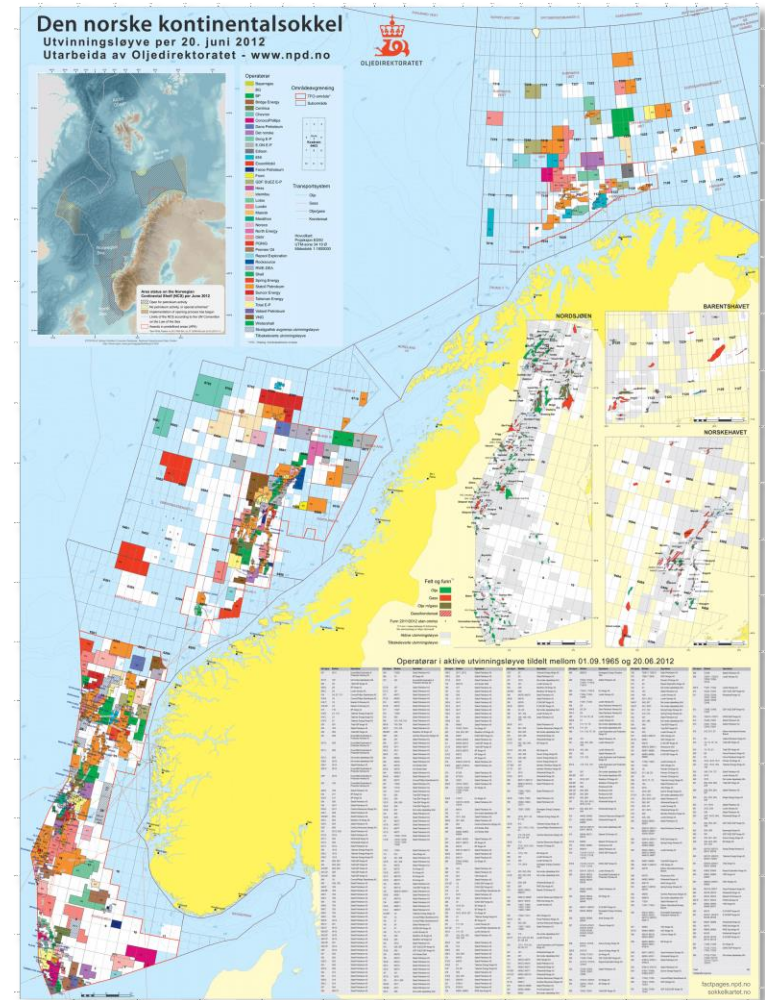
- The Norwegian (NPD) National Data Repository for exploration and production related data.
- A consortia of 76 organisations including the Norwegian Petroleum Directorate, operators, contractors and associated members.
- An efficient and cost effective way of fulfilling statutory obligations.
- A software and hardware solution to enable data selection, retrieval, release/entitlements and data trading.
- A defined set of quality standards to which all data conforms published in the Blue Book (Wells), Yellow Book (Seismic) and in a so called Brown Book for production data

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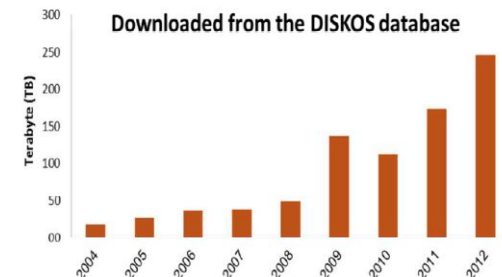
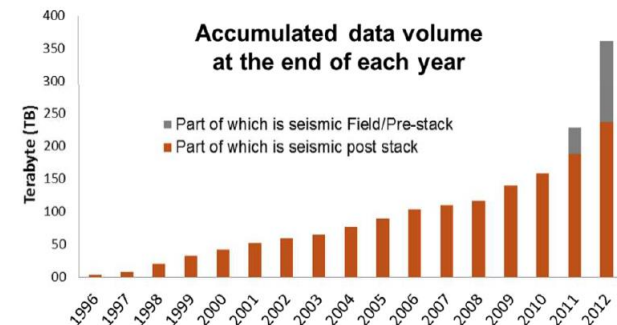
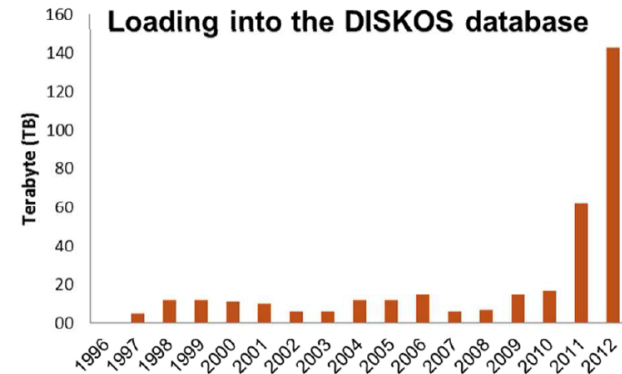
Diskos – An History

- 1993 – Diskos project is launched by the NPD with the support of 5 operators. Initial idea: Efficient data governance and cost reduction by sharing the data management.
- 1993 – Bluebook first release.
- 1995 - PetroBank is implemented and operated by PetroData. Since 1998, the operations are regularly sub-contracted by tenders.
- 1995 – 1998 Additional sponsors (now 56+)
- 2000' Secure high speed bandwidth (100 mbs LAN/WAN) dedicated to Co to view and download data.
- 2013 New software solution implementation and data management operations for Diskos awarded to CGG in 3 separated contracts.



Data Types & Volumes

- Includes all data-types for seismic, well, production and cultural data
- End 2012: 420 TB
- Growing rapidly due to the increasing size of seismic data and to the addition of field and pre-stack seismic.
- Estimated to be 600TB at end 2014
- Increasing volume of data downloading.

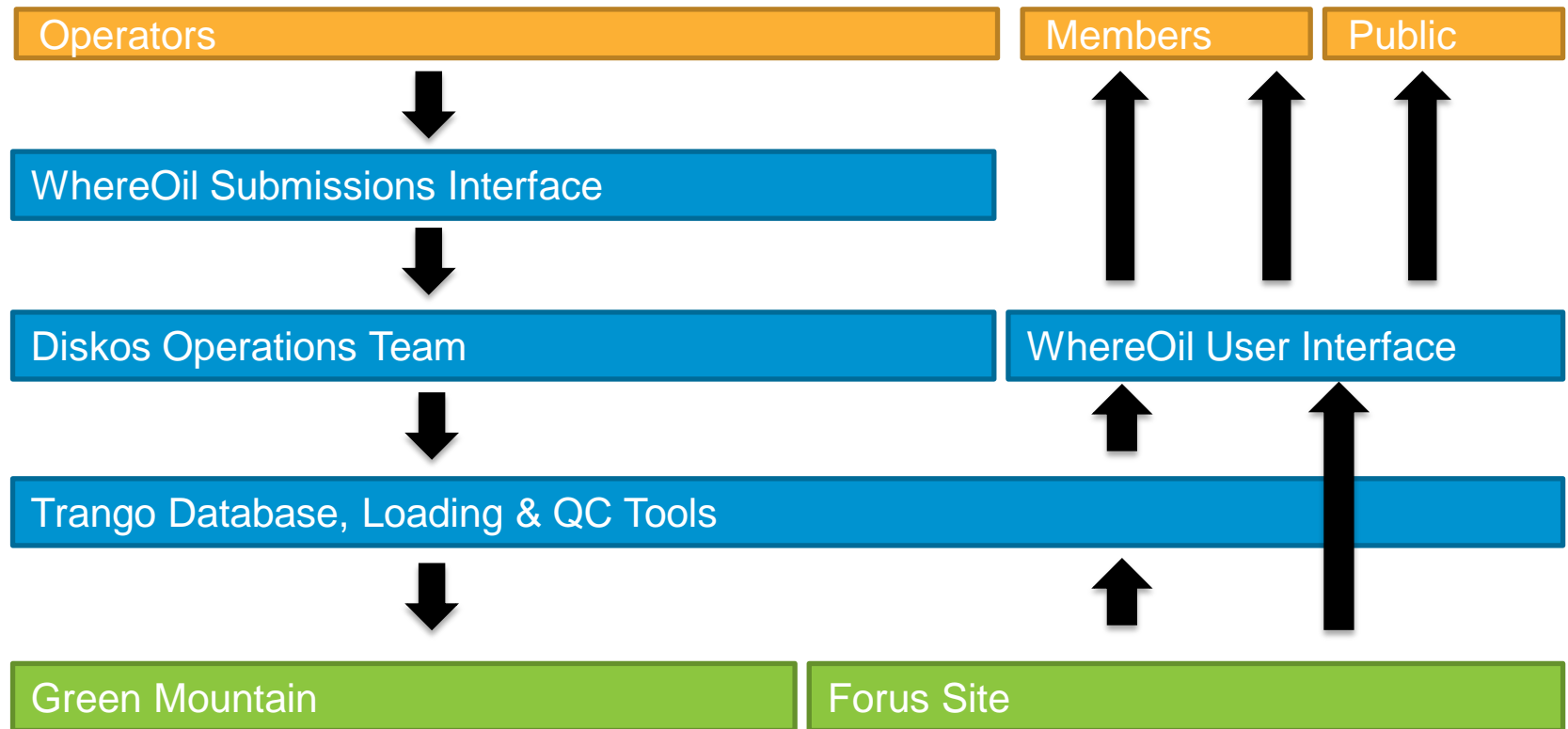


Main focus as a bidder.

- No software refresh since it's inception in 1993. Opportunity to change the software, **submit data online** and **automate manual tasks**.
- Submission regulations for seismic updated and require operators to submit field and pre-stack data. Changed requirements, plus new technologies mean that data volumes are set to explode.
- Costs need to be controlled during this data growth with the potential to offer **extendible storage**
- Monitored and securized web solution to submit and retrieve the data
- Limited environmental foot print despite the data volume growth is also a concern for all Diskos members.



Akon, the CGG's Winning Solution



Solution Elements



- Contract holder
- Project management, policies, procedures and coordination
- Trango: Data loading, QC, invoicing and data and entitlements repository
- Data output: Cut-outs / partials and transcription



- WhereOil: Public and user interface, search, retrieve and order.
- Data submission portal, automated verification of data



- Green Mountain data hosting centre
- IT infrastructure and storage architecture
- Security, business continuity and disaster recovery

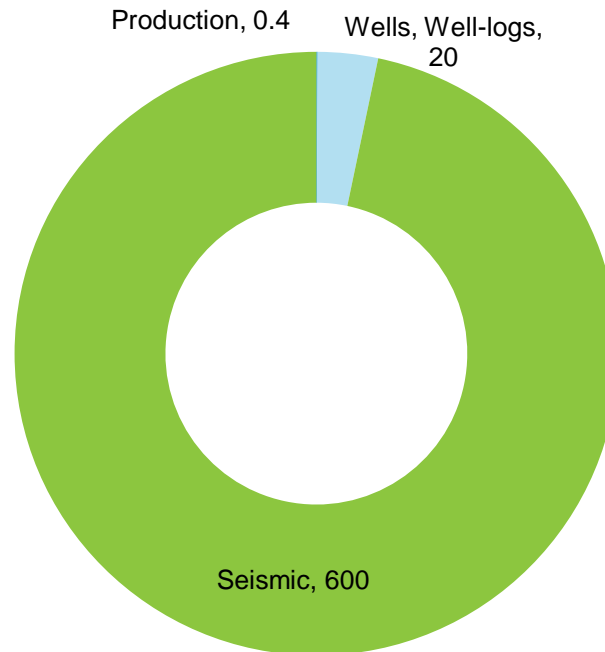


NPD production data



NPD production data is not ...

- Not a volume issue.



- Not a real time / near real time data management issue.

NPD production data is

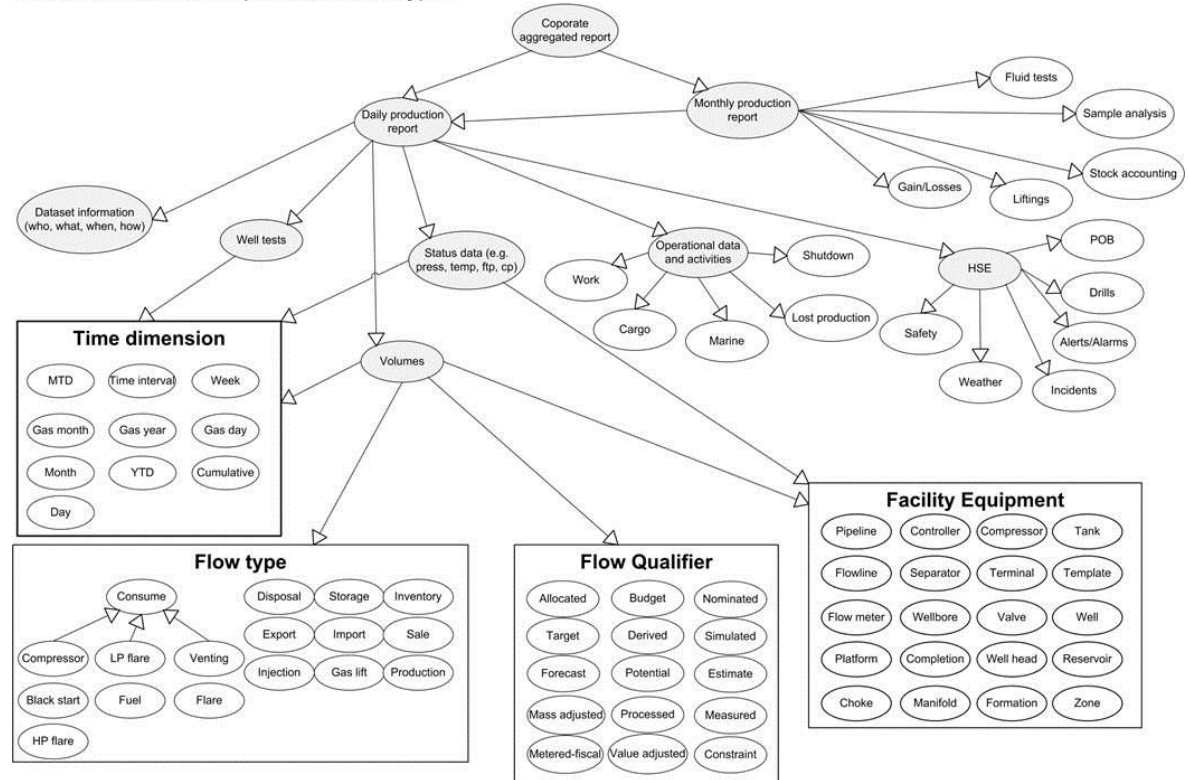
- A diverse and multidisciplinary data set

		wellbore	prod. installation	prod. field	sealable product	injection well	injection installation	injection field	cold vent	flared gas	fiscal production	fuel & diesel at ho	cargo	gas sale export	gas sale inv	field
Volume	oil															
	gas															
	water															
	condensates															
	LNG															
	GNL															
	cuttings															
	CO2															
Mass	fuel gas and diesel															
	oil															
	gas															
	water															
	cond.															
	LNG															
	GNL															
	cuttings															
energy	CO2															
	fuel gas and diesel															
	oil															
	gas															
	water															
	cond.															
	LNG															
	GNL															
density	cuttings															
	CO2															
	fuel gas and diesel															
	oil															
	gas															
	water															
	cond.															
	LNG															
CWC Gas coloring	GNL															
	cuttings															
	CO2															
	oil															
	gas															
	water															
	cond.															
	LNG															

NPD production data is

- A diverse and multidisciplinary data set
- Connected to a complex measurement environment.

Overview of time based production data types



NPD production data is also 2 different formats

■ COPEX

- Common Petrotechnical Exchange
- Since 2000
- ASCII
- Blocks, hierarchy
- Parsing
- Valid for submission until 1/1/2016

1. Example::COPEX::

```
DateTimeFormat=   YYYY-MM-DD       # Oracle format
TimeZone=         +01:00           # Can also use A or CET
```

Heading1: "Periodically Production Reporting"

```
ReportDuration=    1 month
ReportPeriodStart= 1997-01-01
ReportName=        Gullfaks-Jan97:Data
ReportComments=    "Production data from Gullfaks for January 1997."
DataPeriod=        monthly
DataPeriodStart=   1997-01-01
ReportCompany=     Statoil
```

Heading2: "Well Injection"

```
PBWellID:=         34/10-A-11
ActivePeriod=       25.67 d
InjectionPress=     157.56 bar
ChokeDiameter=      45.6 mm
GasVol=             234563 kSm3
```

```
PBWellID:=         34/10-A-17
ActivePeriod=       28.67 d
InjectionPress=     167.56 bar
ChokeDiameter=      42.6 mm
WaterVol=           134563 Sm3
```

Heading2: "Well Production"

Table with nine columns

PBWellID:=

ActivePeriod=

WellHeadPress=

ChokeDiameter=

Heading3:

Product:= Vol= Mass= Dens=

Table units

Void d bar mm Void Void Sm3 t kg/Sm3

Table data

34/10-A-6 28.67 147.56 35.6 "Specific Product Attributes"

~ ~ ~ ~ ~ "crude oil" 23465 19416 827.45

~ ~ ~ ~ ~ "natural gas" 123221 562 4.56

~ ~ ~ ~ ~ "water" 12332 12616 1023

34/10-A-7 23.45 132.5 32.5 "Specific Product Attributes"

~ ~ ~ ~ ~ "crude oil" 24335 Void 825.45

~ ~ ~ ~ ~ "natural gas" 1233321 Void 3.2

~ ~ ~ ~ ~ "water" 3223 Void 1021

::Goodbye::

NPD production data is also 2 different formats

■ MPRML

- Based on Energistic PRODML (see also DPRML)
- XML format
- EPIM / NPD / Energistics work
- 1st submission, Asgard field data in 2013

```
<product>
  <kind>oil - net</kind>
  <period>
    <kind>month</kind>
    <dateStart>2009-01-01</dateStart>
    <dateEnd>2009-01-31</dateEnd>
    <volumeValue>
      <volume uom="m3">948.4</volume>
      <temp uom="degC">15</temp>
      <pres uom="atm">1</pres>
    </volumeValue>
    <volumeValue>
      <volume uom="m3">1048.4</volume>
      <temp uom="degC">0</temp>
      <pres uom="atm">1</pres>
    </volumeValue>
    <mass uom="kg">377.33</mass>
    <densityValue>
```

Volume registered at standard conditions in this case meaning 948.4 Sm³

Volume registered at normal conditions in this case meaning 1048.4 Nm³

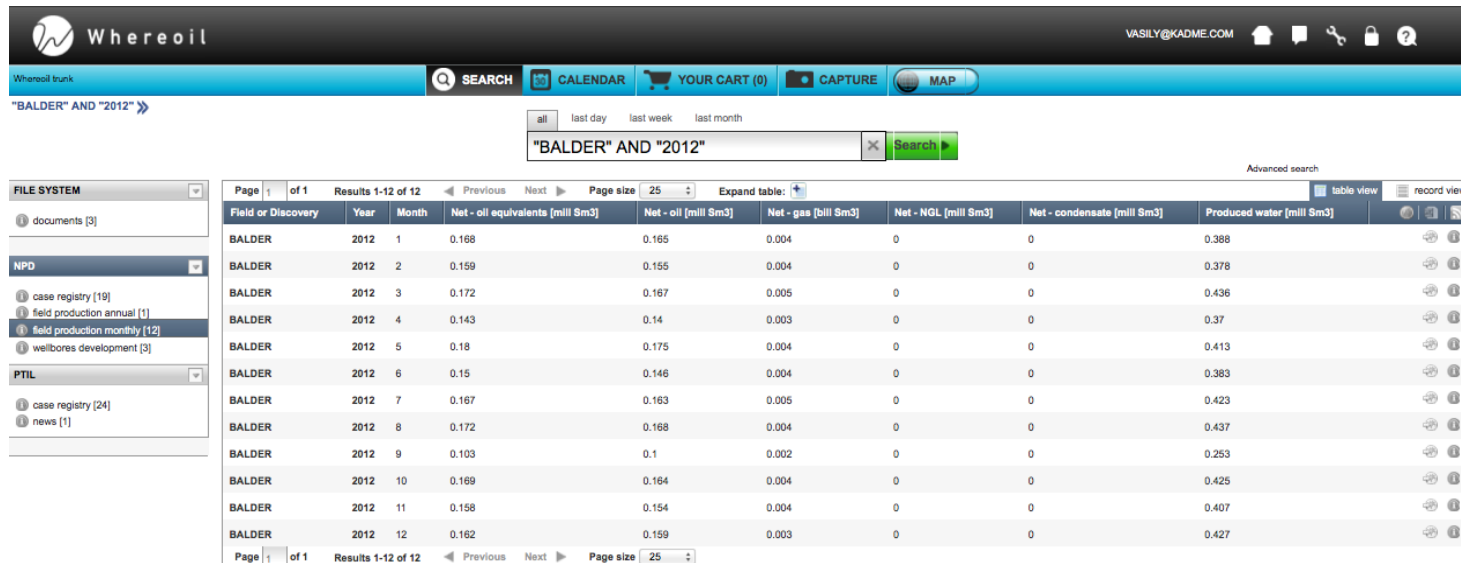
[EPIM doc](#)

AKON, the new DISKOS
production data solution.



Based on KADME / WhereOil solution

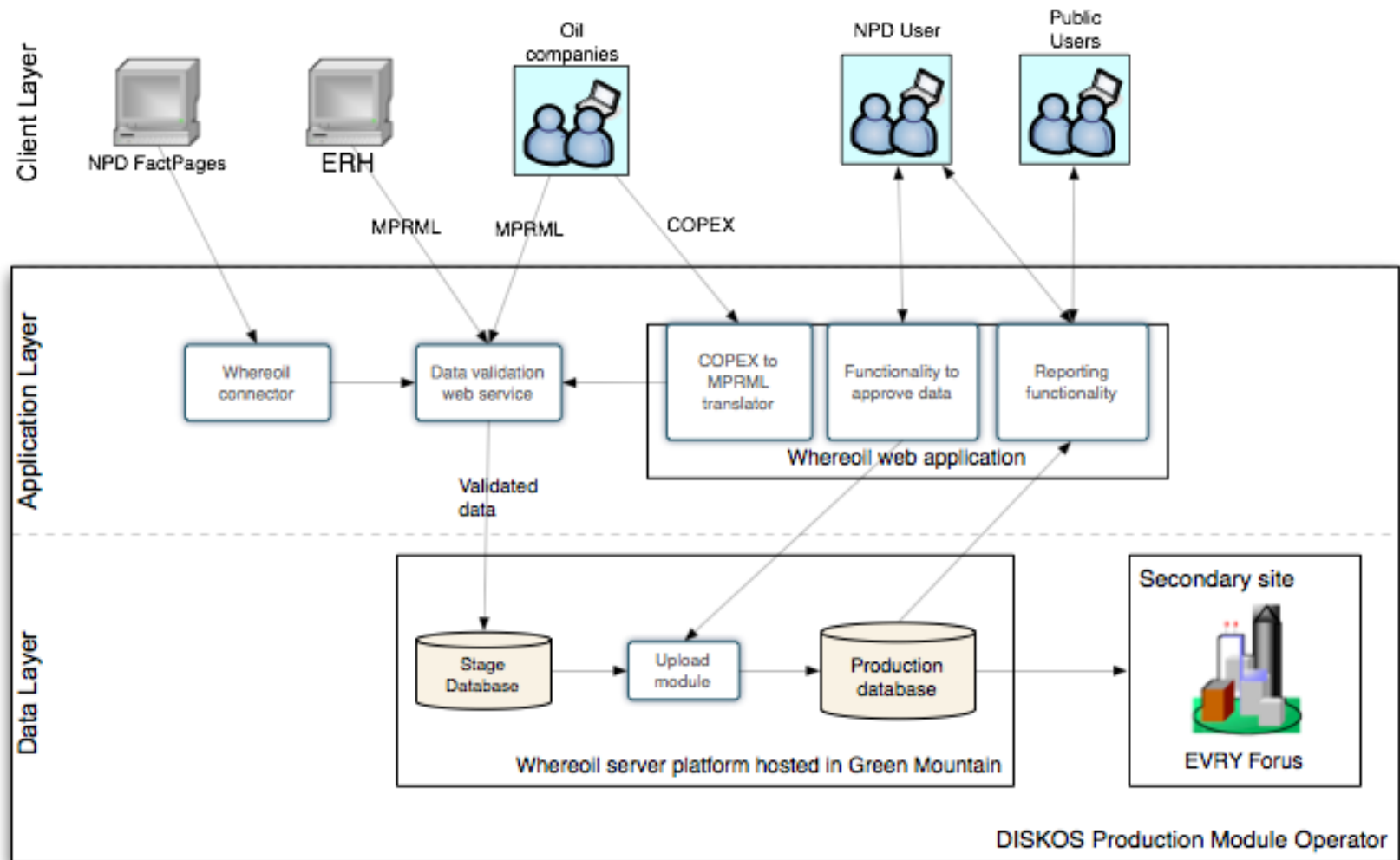
- Advantages and benefits of WhereOil
 - Kadme experience on the MPRMS project and DISKOS member experience on WhereOil
 - To reduce the development effort to fit the NPD specifications
 - WhereOil is a Schema-based data store
 - Existing Data validation framework
 - Existing Reporting framework
 - Existing Data connectors to NPD Fact Pages and IHS Enerdeq Web Services.
- Same interface as for 2 others modules (+ sale/exchange module), integration with well and seismic at the interface level.



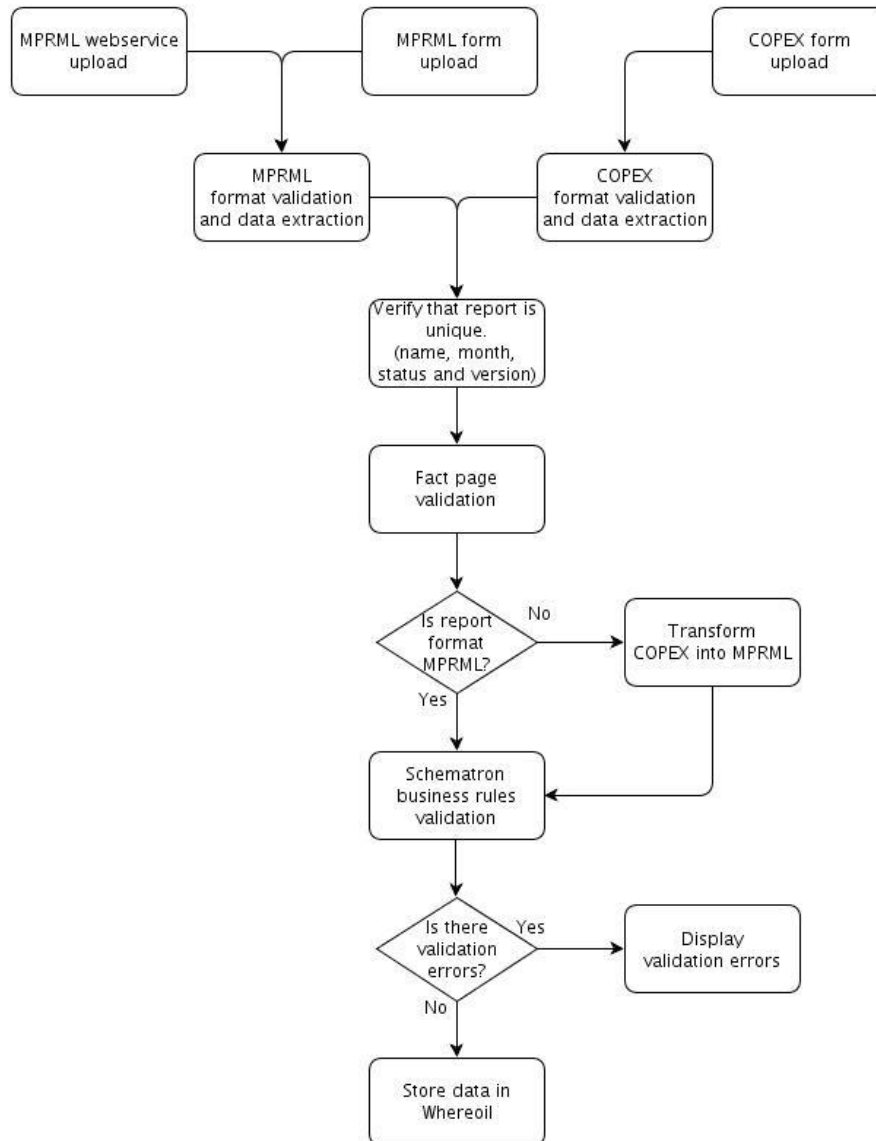
The screenshot displays the WhereOil web application interface. At the top, there is a navigation bar with the WhereOil logo, user information (VASILY@KADME.COM), and various utility icons. Below this is a search bar containing the text "BALDER" AND "2012". The main content area shows a table with 12 rows of data, each representing a month from January to December 2012 for the field "BALDER". The table columns include Field or Discovery, Year, Month, Net - oil equivalents (mill Sm3), Net - oil (mill Sm3), Net - gas (bill Sm3), Net - NGL (mill Sm3), Net - condensate (mill Sm3), and Produced water (mill Sm3). The table is paginated, showing results 1-12 of 12. On the left side, there is a sidebar with a "FILE SYSTEM" section and a "NPD" section containing links to case registry, field production annual, field production monthly, and wellbores development.

Field or Discovery	Year	Month	Net - oil equivalents (mill Sm3)	Net - oil (mill Sm3)	Net - gas (bill Sm3)	Net - NGL (mill Sm3)	Net - condensate (mill Sm3)	Produced water (mill Sm3)
BALDER	2012	1	0.168	0.165	0.004	0	0	0.388
BALDER	2012	2	0.159	0.155	0.004	0	0	0.378
BALDER	2012	3	0.172	0.167	0.005	0	0	0.436
BALDER	2012	4	0.143	0.14	0.003	0	0	0.37
BALDER	2012	5	0.18	0.175	0.004	0	0	0.413
BALDER	2012	6	0.15	0.146	0.004	0	0	0.383
BALDER	2012	7	0.167	0.163	0.005	0	0	0.423
BALDER	2012	8	0.172	0.168	0.004	0	0	0.437
BALDER	2012	9	0.103	0.1	0.002	0	0	0.253
BALDER	2012	10	0.169	0.164	0.004	0	0	0.425
BALDER	2012	11	0.158	0.154	0.004	0	0	0.407
BALDER	2012	12	0.162	0.159	0.003	0	0	0.427

Implementation



Workflow



- A WhereOil monitored workflow implying all stakeholders
- COPEX and MPRML compatible
- Schematron integration and support

Conclusion



Akon, a 2.0 solution for the Diskos production data

■ Advantages:

- XML and web architecture for easy data sharing, upstream and downstream
- Integration in a unique interface with seismic and well data
- Based on monitored workflows, commonly defined with NPD and EPIM
- Based on industry recent standards
- Reduced environment impact

■ Benefits:

- Cost effective
- Rapid user training curve
- In line with generation Y expectations.

Akon, a web 2.0 solution

The screenshot displays the Whereoil web application interface. The top navigation bar includes links for SEARCH, CALENDAR, YOUR CART (0), CAPTURE, and MAP. The main content area shows search results for "BALDER" and "2012".

Search Results Table:

Field or Discovery	Year	Month	Net - oil equivalents [mill Sm3]	Net - oil [mill Sm3]	Net - gas [bill Sm3]	Net - NGL [mill Sm3]	Net - condensate [mill Sm3]	Produced water [mill Sm3]
BALDER	2012	1	0.168	0.165	0.004	0	0	0.388
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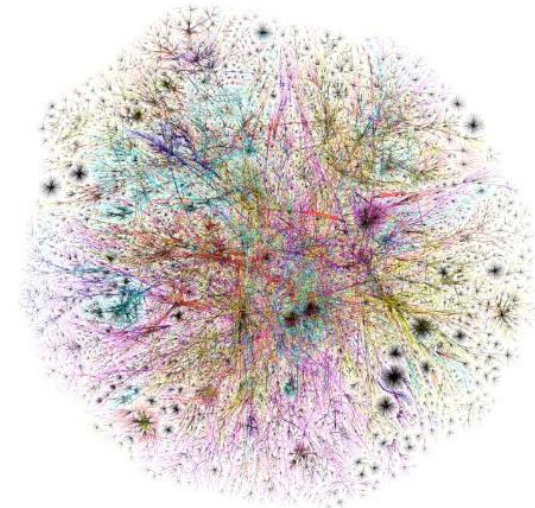
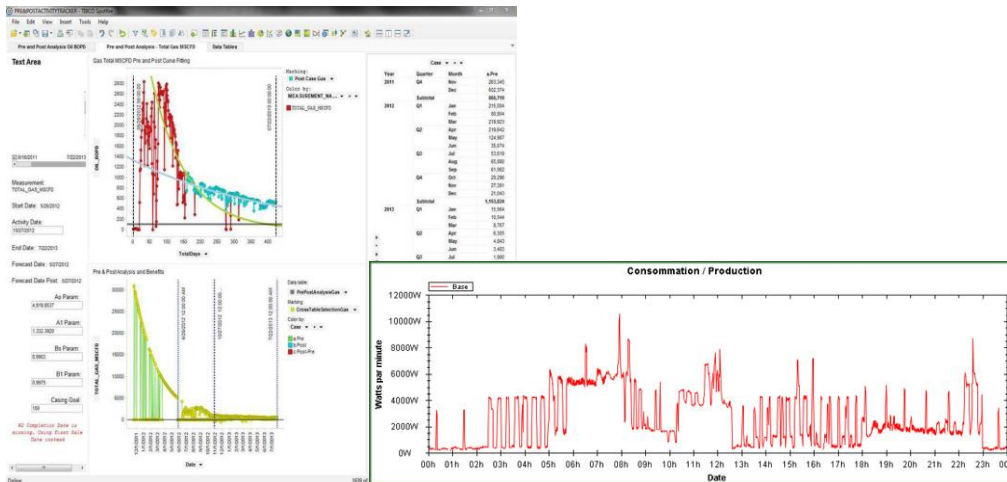
Map View: The map shows the North Sea region with various oil fields and infrastructure. Labels include "Fast Ice" and "Close Drift".

Data Table (Bottom):

Survey	Geometry set	Type	Kind	Operator	Year	Number of f...	Number of v...	Area	Description	Total linear km	Coord. system	Country	Geometry s...	Geometry s...	Path	Survey ID	Filter	Snap
ST12005	ST12005-N...	3D	NTRCMP	STATOIL	2012	2868	19	SNORRE	11394-307...	41299767	ED50	NORWAY	7941346315	7941449036	WSHAPE16...	7941346314	0	0
ST12001	ST12001-P...	3D	PSNTRCMP	STATOIL	2012	107	18	OSEBERG	11707-20...	1634461	ED50	NORWAY	7941155533	7941171950	WSHAPE16...	7941154643	0	0
LN10M05	LN10M05-...	3D	BIN	LUNDIN N...	2011	5481	132	NORTH SEA	20958 <=...	1043779307	ED50	NORWAY	7925909288	7925929152	WSHAPE16...	7776244627	250	100
ST10018	ST10018-E...	3D	ECHO SOU...	STATOIL	2010	11	10	SLEIPNER	11159-82...	84211	ED50	NORWAY	5421124634	5421124674	WSHAPE16...	5421104900	0	0
ST0830	ST0830-CMP	3D	CMP	STATOIL	2008	480	19	FRIGG NO...	9D06P102...	7655029	ED50	NORWAY	3132585453	3140481813	WSHAPE16...	3132585450	0	0
ST0819	ST0819-CMP	3D	CMP	STATOIL	2008	1008	21	MARINER...	S9-E <=...	13542086	ED50	NORWAY	3132712274	3132724475	WSHAPE16...	3132712273	0	0

Designed to be the 3.0 solution for the Z generation

- WISTML to replace .las, .lis, .dlis similarly ?
- XML is the natural format for big data analysis
- A production diagram is an unstructured data very close to a home electricity consumption diagram. Smartgrids optimization applied on electricity grids have proven their value on O&G production grids.





Merci !