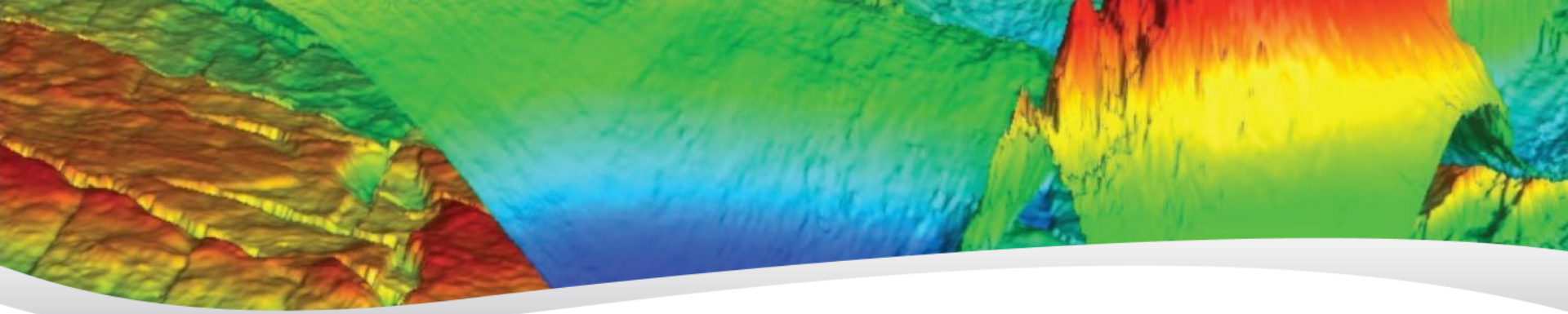

Using DISKOS to share and distribute production data

Passion for Geoscience

CGG

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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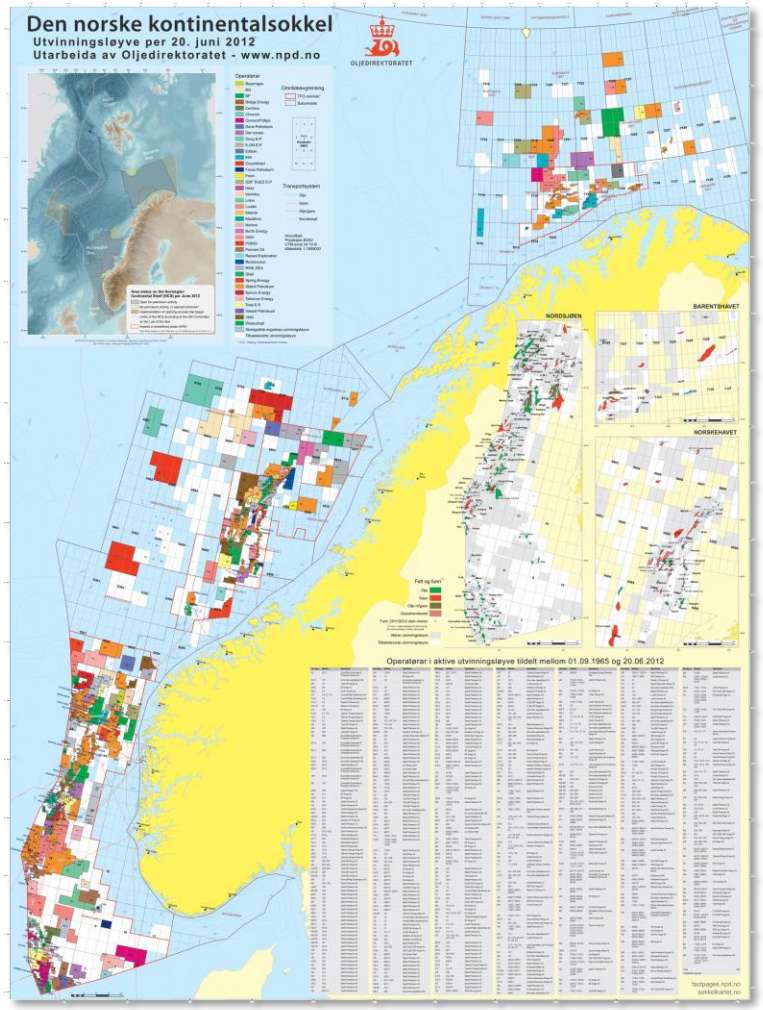
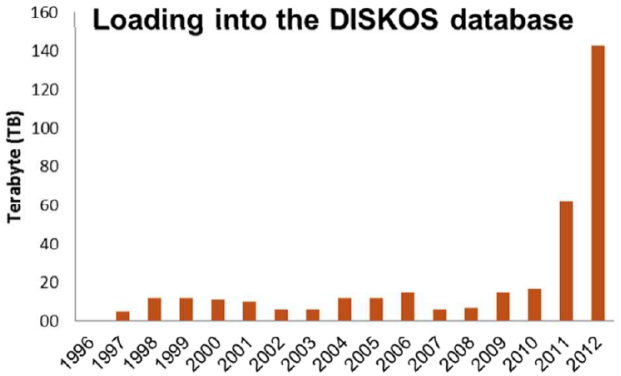
Diskos – An History

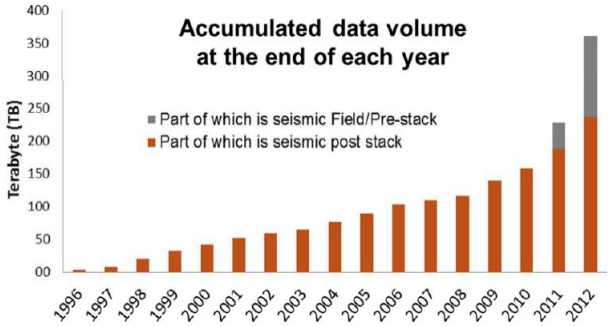
- 1993 – Diskos project is launched by the NPD with the support of 5 operators. Initial idea: Efficient data governance and cost reduction by sharing the data management.
- 1993 – Bluebook first release.
- 1995 - PetroBank is implemented and operated by PetroData. Since 1998, the operations are regularly 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.

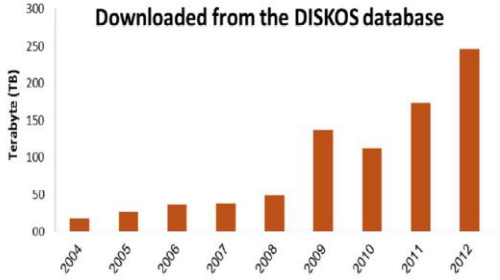


Data Types & Volumes

- 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.



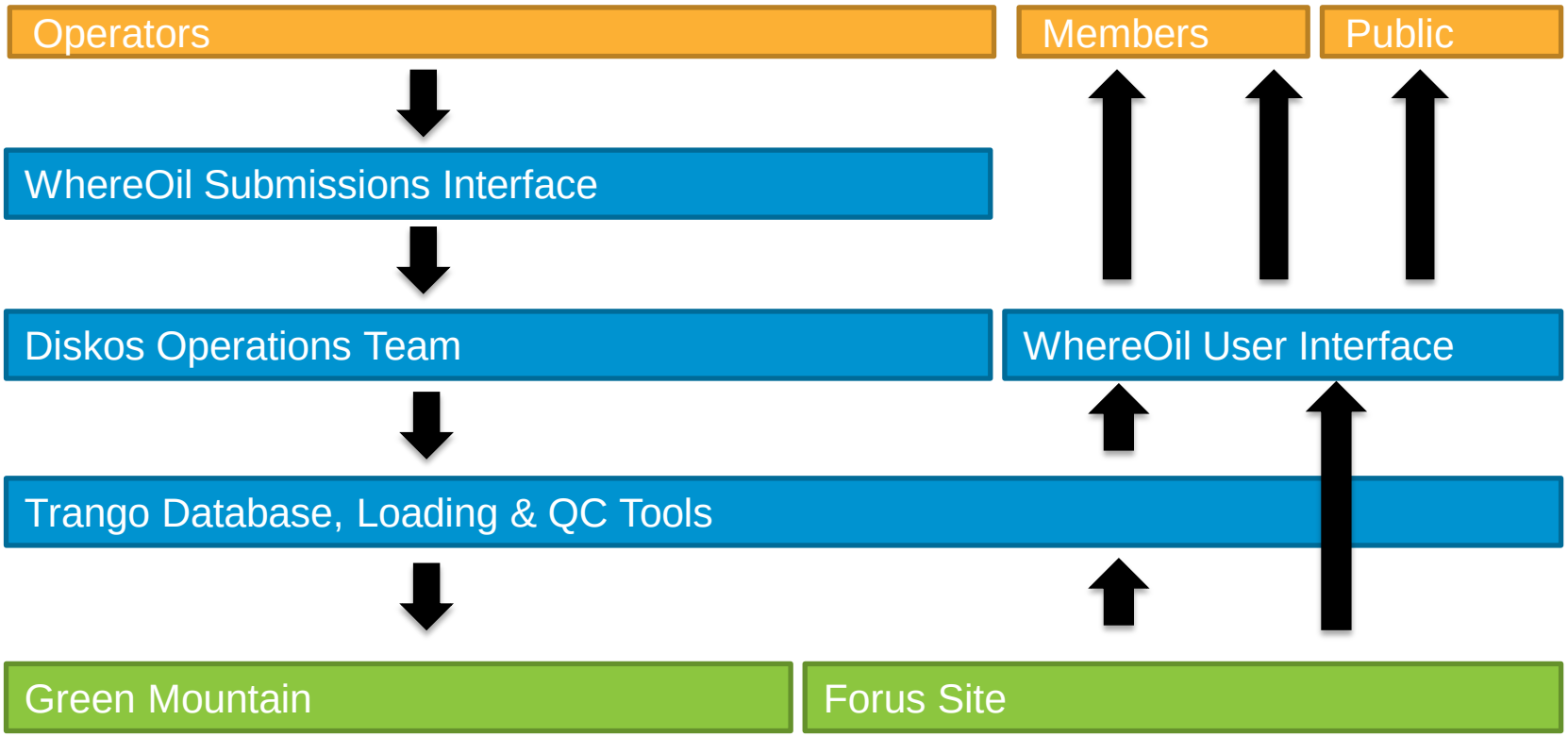




Main focus as a bidder.

- 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

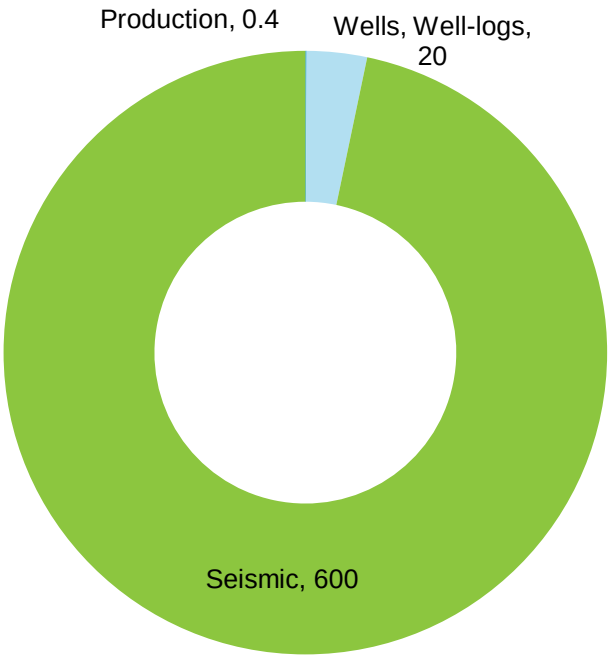
- WhereOil: Public and user interface, search, retrieve and order.
- Data submission portal, automated verification of data

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

NPD production data

NPD production data is not …

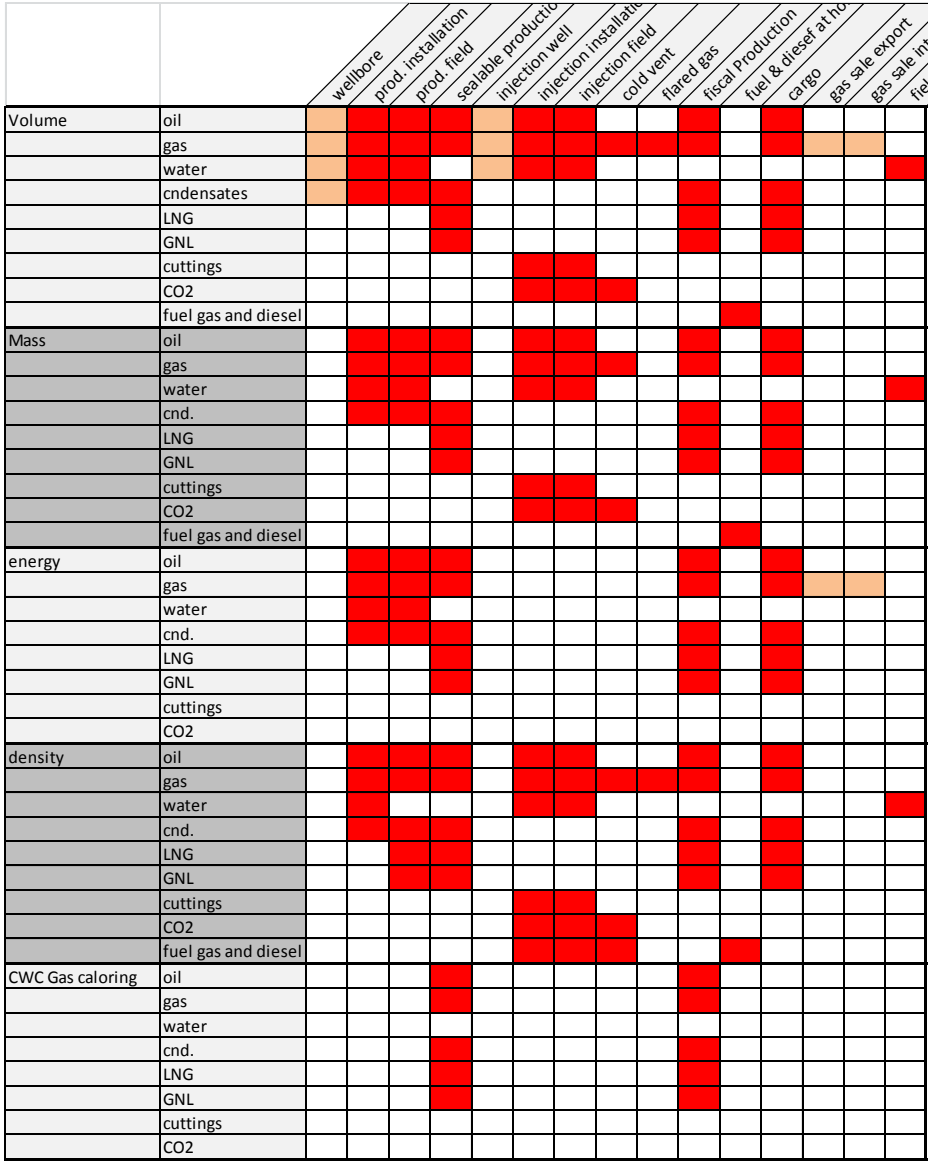
- Not a volume issue.



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

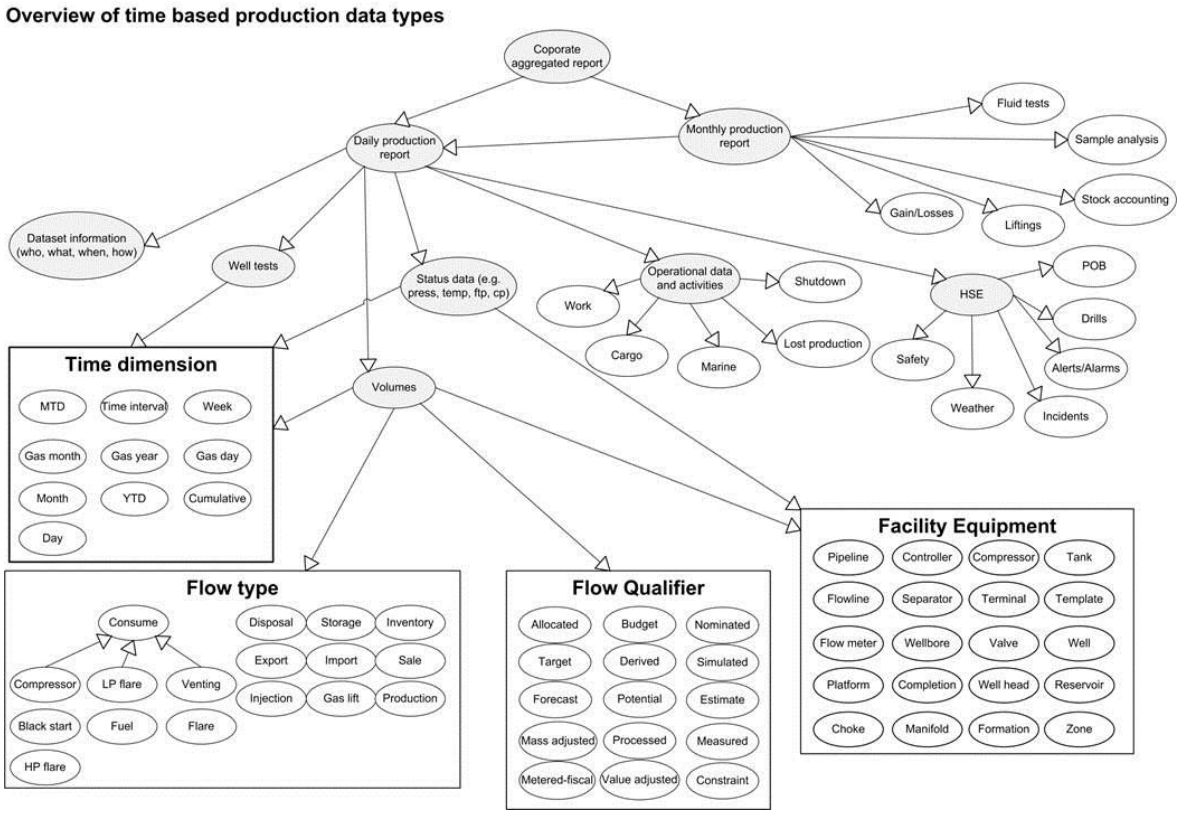
NPD production data is

- A diverse and multidisciplinary data set



NPD production data is

- A diverse and multidisciplinary data set
- Connected to a complexe measurment environment.



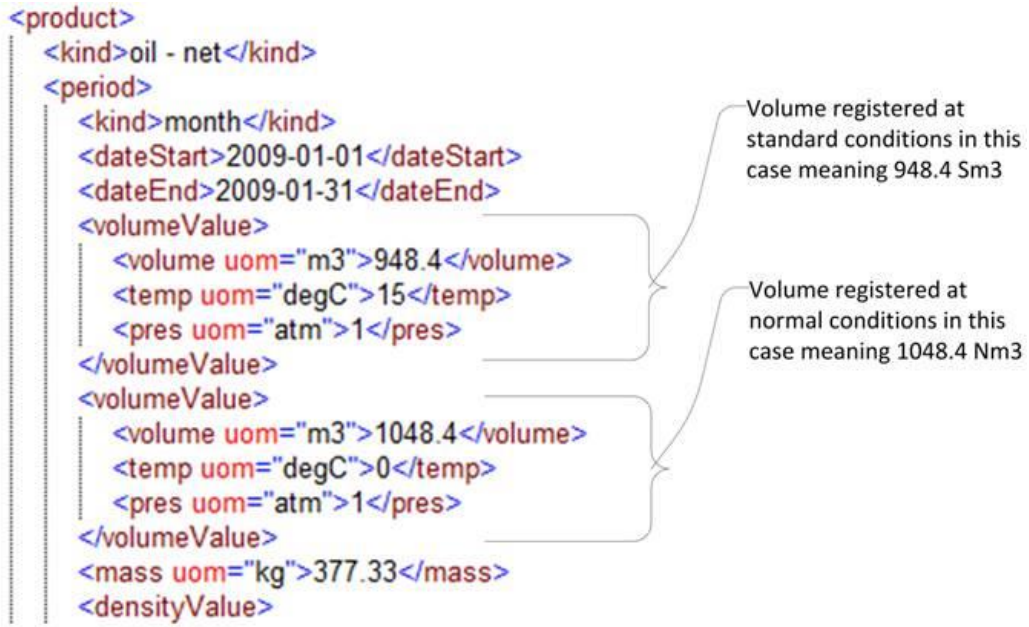
NPD production data is also 2 different formats

- COPEX
  - Commom 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
  - 1rst submission, Asgard field data in 2013

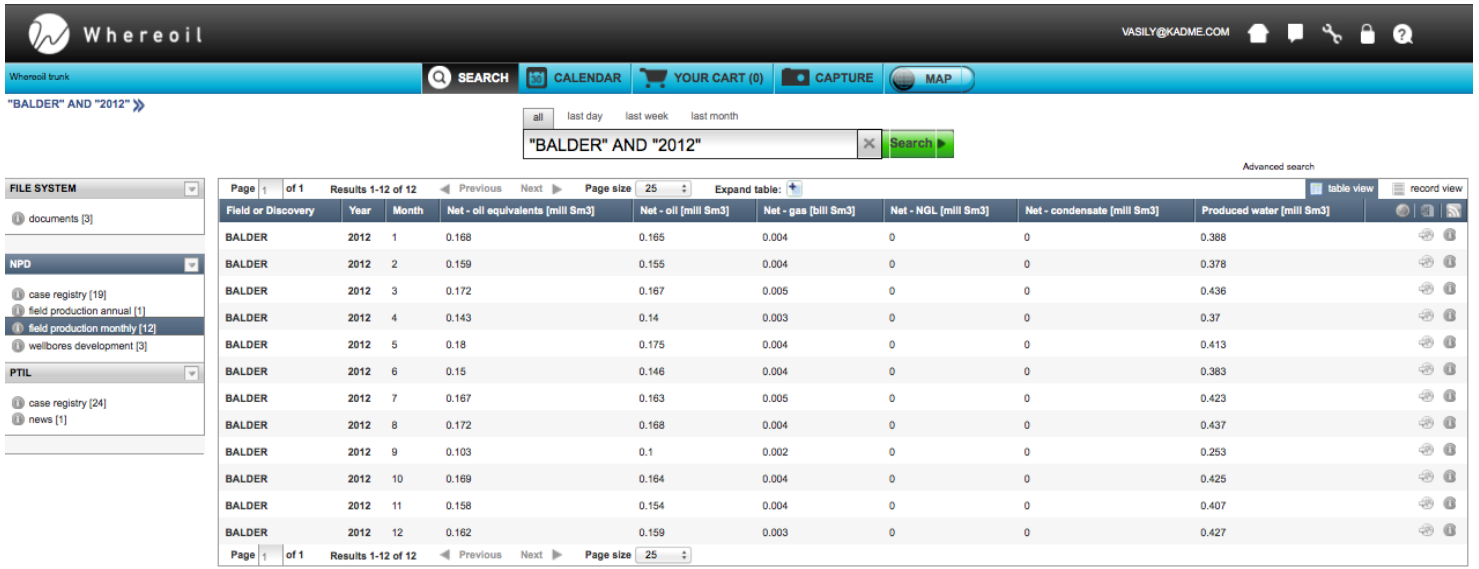


EPIM doc

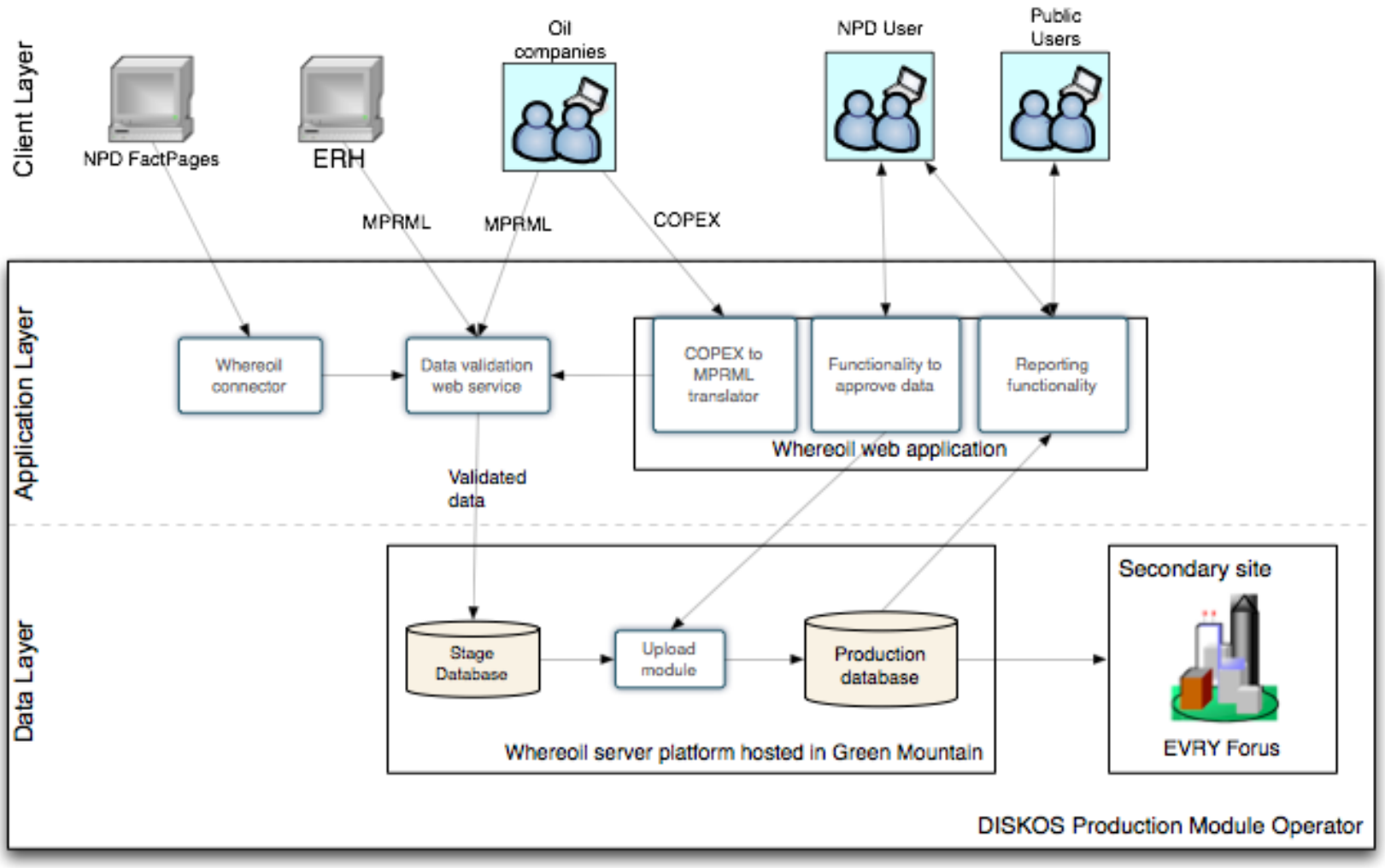
AKON, the new DISKOS production data solution.

Based on KADME / WhereOil solution

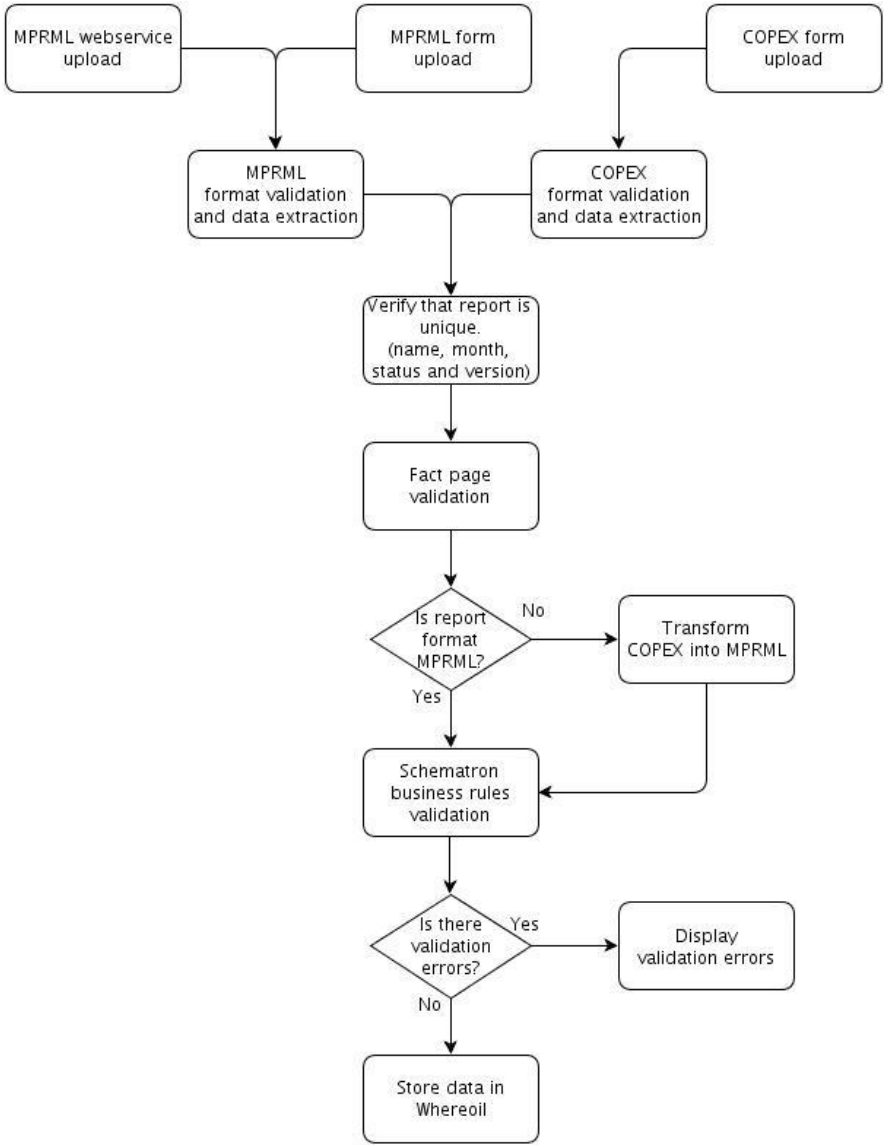
- Adavantages and benefits of WhereOil
  - Kadme experience on the MPRMS project and DISKOS member experience on WhereOil
  - To reduce the development effort to fit the NPD specifications
    - WhereOil is a Schema-based data store
    - Existing Data validation framework
    - Existing Reporting framework
    - 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.



Implementation



Workflow



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

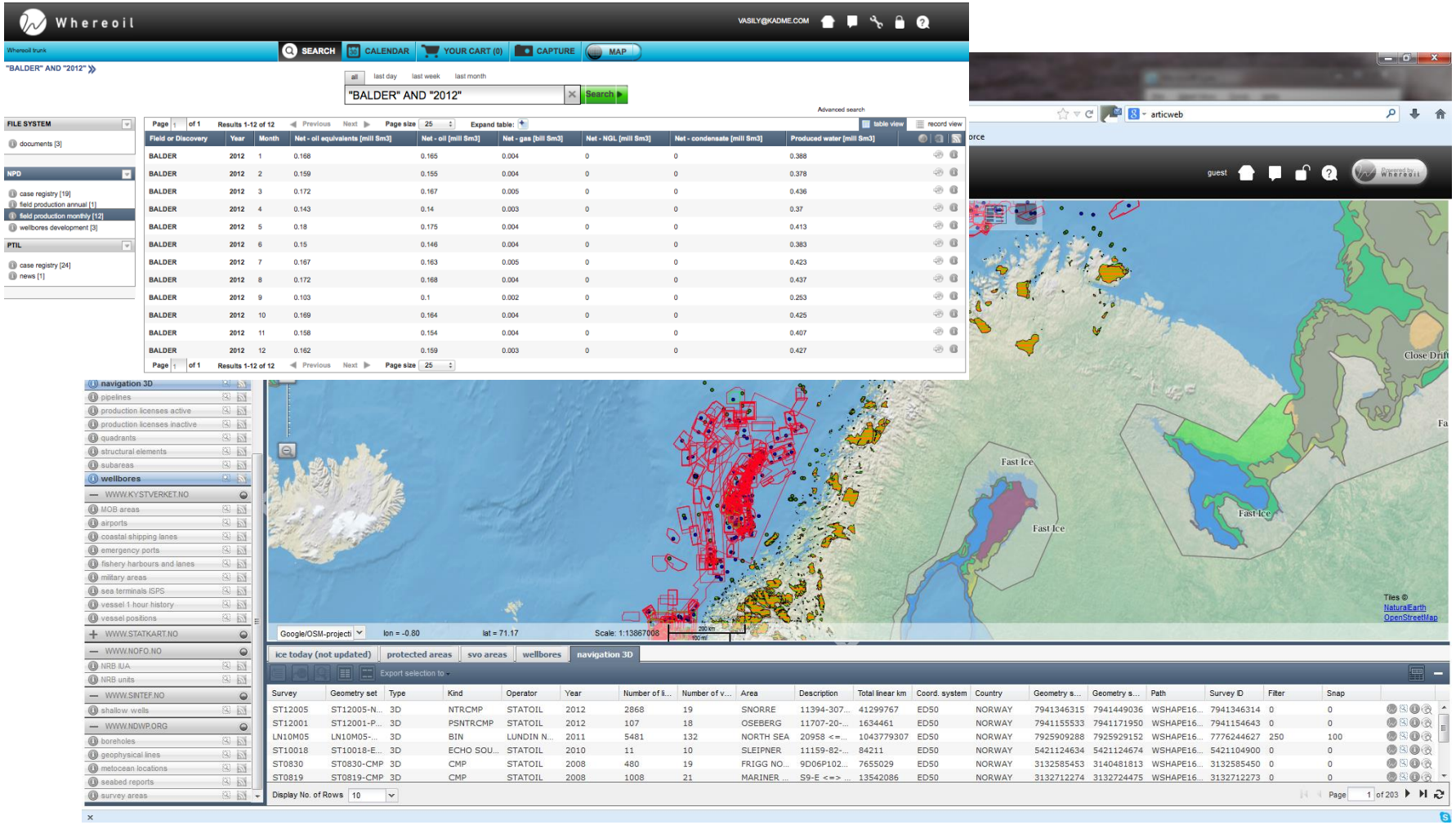
Conclusion

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

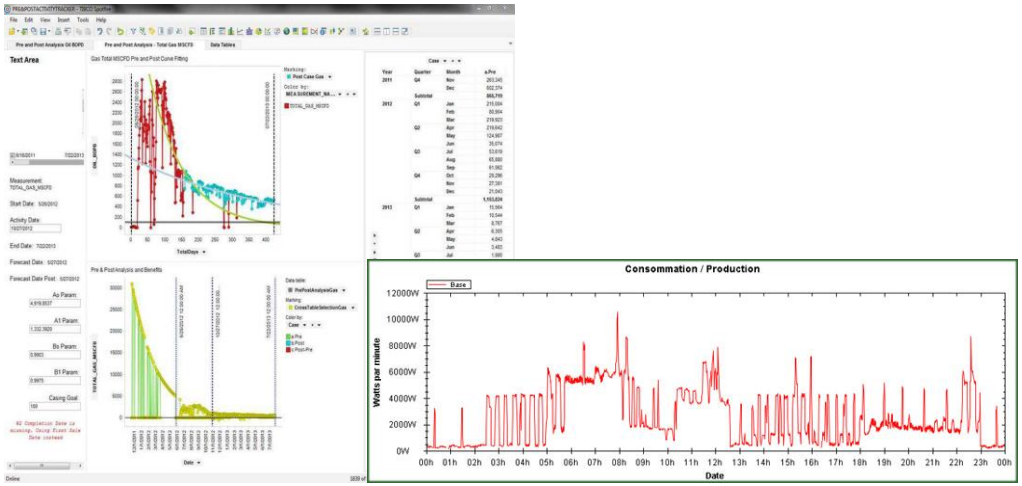
- Benefits:
  - Cost effective
  - Rapid user training curve
  - In line with generation Y expectations.

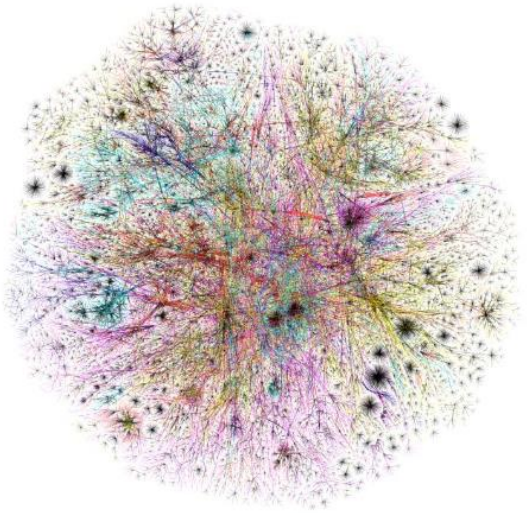
Akon, a web 2.0 solution



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 !

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