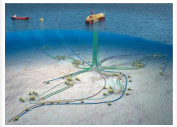
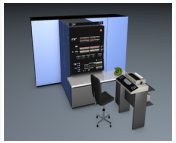
Scalable data access

Lower-cost, higher-impact environmental compliance

David Cameron, SIRIUS Centre for Research-based Innovation
BYTE Final Conference, London, 9th February 2017

My timeline

1982	1986	1988	1993	2000	2007	2011	2013	2015
Chemical engineering and trainee in steel industry. Thesis on physical properties of oil and CO_2	Blast furnace simulation and on-line systems. New steel technologies. 	Dynamic data reconciliation using process simulators. Apply Kalman filters to chemical processes.	Simulation and optimization of fertilizer, chemical and petroleum plants.	Whole plant simulators. Advanced control. On-line simulators. 	Virtual flow metering and on-line systems for complex sub-sea plants. 	Technical and business consultancy in chemicals and petroleum	Business development director in petroleum, energy & industrial sector	Centre for Scalable Data Access. Research entrepreneur and translator between business and academics
								

Scalable data access in the oil and gas domain

UiO : University of Oslo

[simula . research laboratory]

NTNU
Norwegian University of Science and Technology

DEPARTMENT OF COMPUTER SCIENCE

Capital-intensive industries have a burden of proof to earn their license to operate

we all need to think about this - if you aren't donating, please avoid buying anything from these companies.
Every penny we spend on their products goes to creating these terrible pesticides.

Keep the bee defenders' fight to save the bees going

A small, brave coalition of beekeeping organisations is taking on pesticide giants like Bayer, Syngenta, and BASF in court to save the bees. They're rapidly running out of money at this crucial time and they need your help to win this case. The...

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2

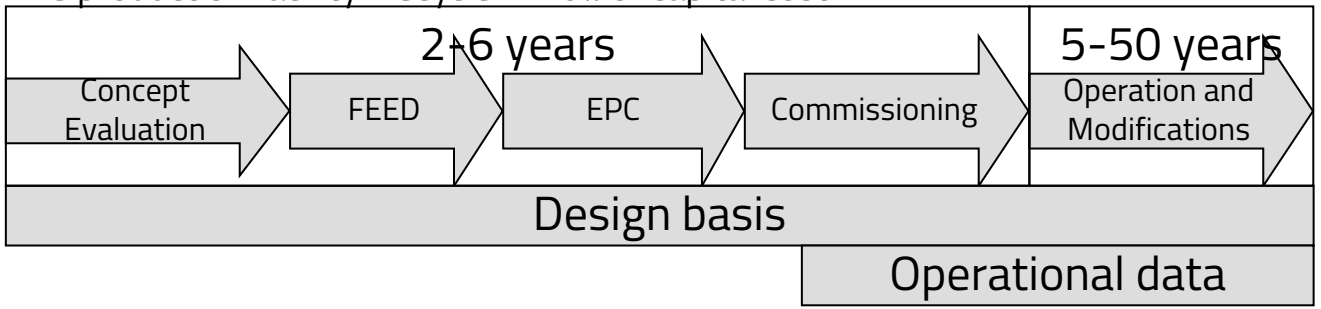
Maintenance of environmental impact throughout the facility lifecycle

Alphabet soup:

- EPC: Engineering, Procurement and Construction
- FEED: Front-end Engineering and Design

The sub-surface (underground) lifecycle: > 80% of capital cost

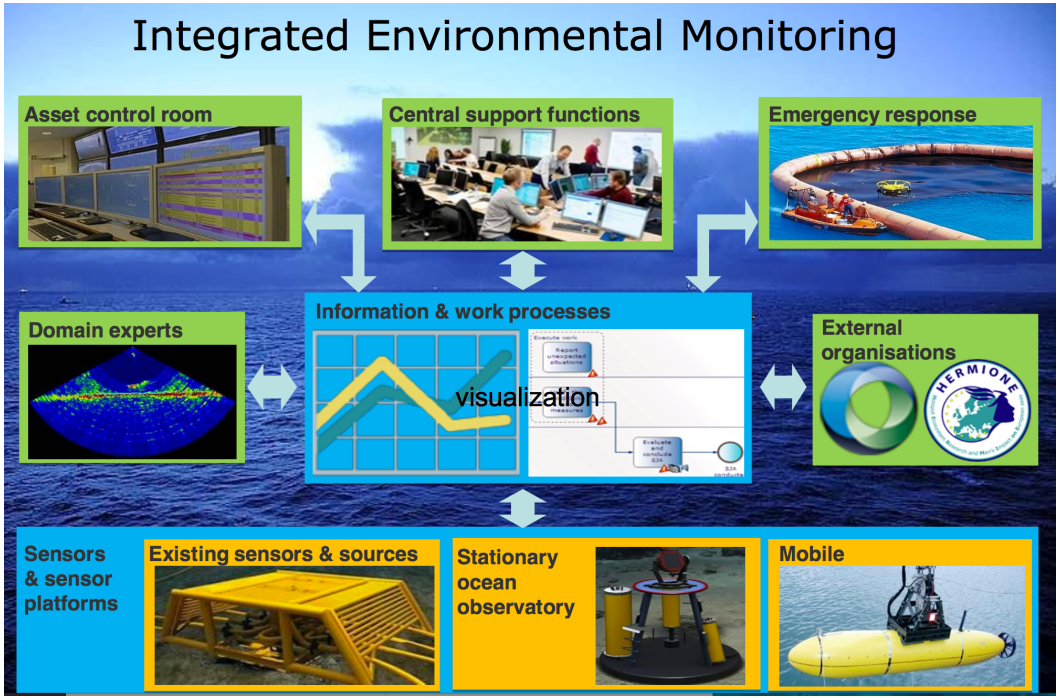
The production facility lifecycle: < 20% of capital cost



Common operational picture around facilities

Satellite data
Weather
Automatic Identification System
Process
Maritime Movements
Logistics
Drilling
Environmental state
Security
Personnel

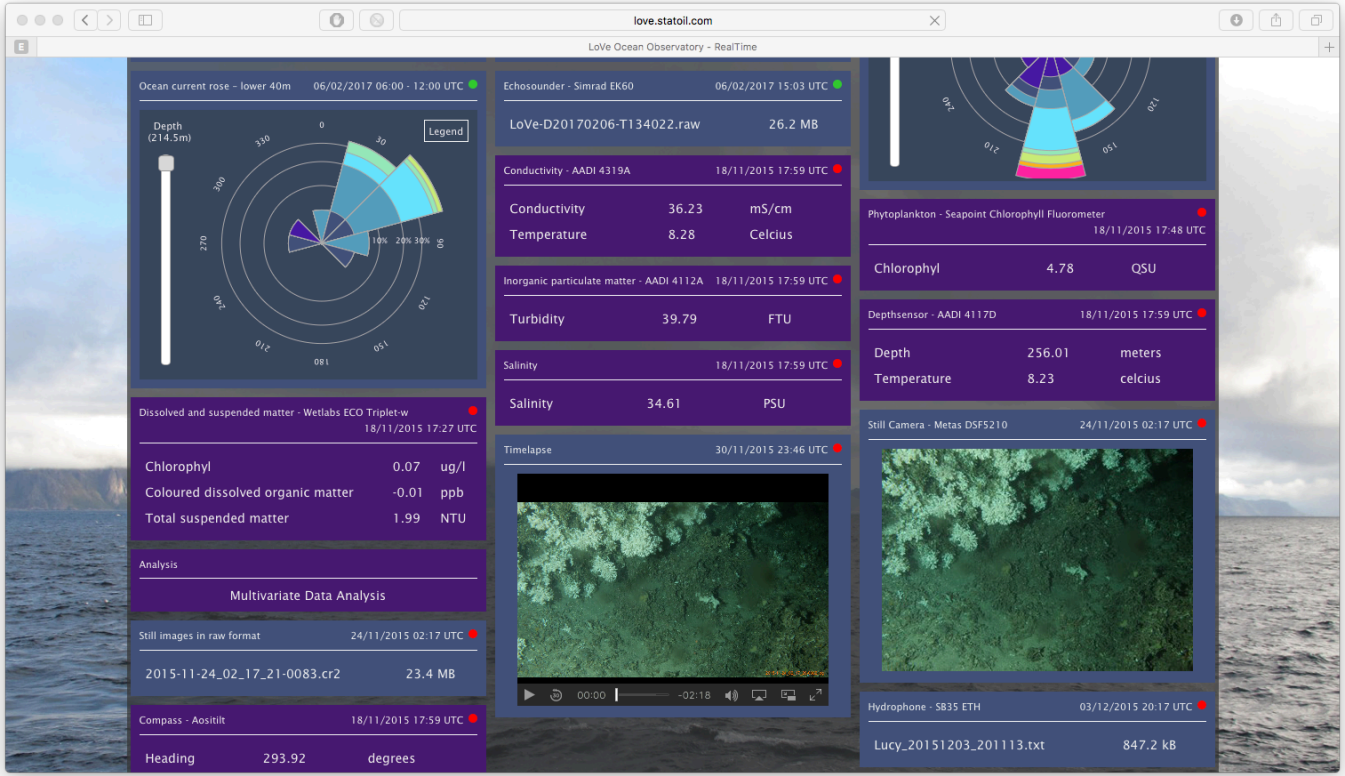
Not a new idea: Statoil, for example has worked on this for 8 years



Integrated Environmental Monitoring

Mona Låte
Environmental Technology
Statoil R&D
www.og21.no

love.statoil.com

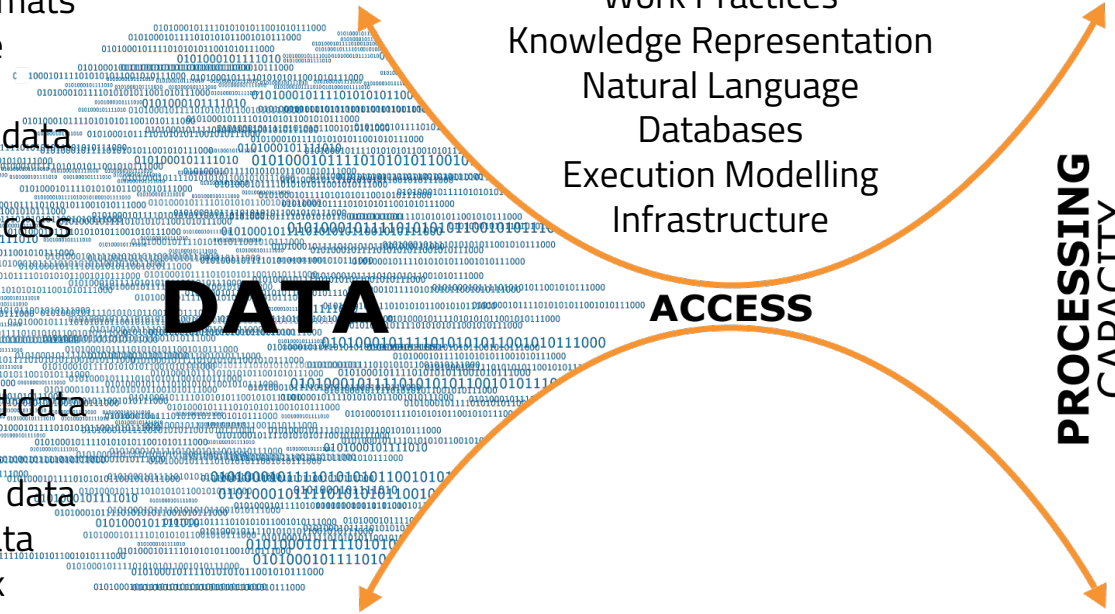


Challenges

- Demanding environments
  - Hot, cold, frozen, salty, sandy, wet.
- Specialised and site-specific domain knowledge
  - General methods must be subordinate to the specialised domain knowledge
- Diverse technical backgrounds
  - Biosciences vs physical/mathematical sciences
- Distributed data with different owners
  - Marine observatories, weather, shipping, fisheries, military, surveys
- Often more variety than velocity and volume
  - Long-term effects with daily or hourly sample
  - Assessments require access to old data to maintain history

Scalable data access environmental applications

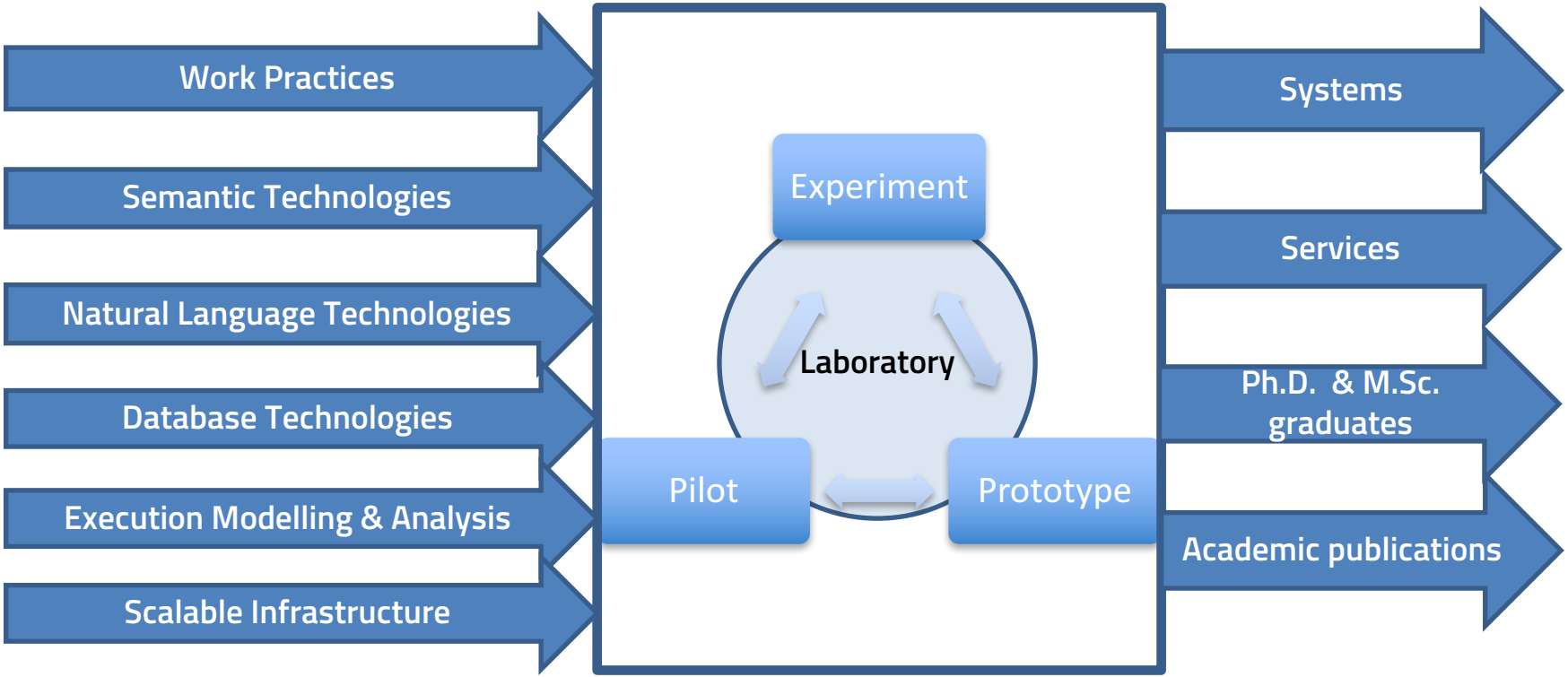
- Different formats
- Old software
- Complex, inconsistent data models
- Inefficient access methods
- Access and security
- Unstructured data
- Missing data
- Poor-quality data
- Too much data
- Manual work processes



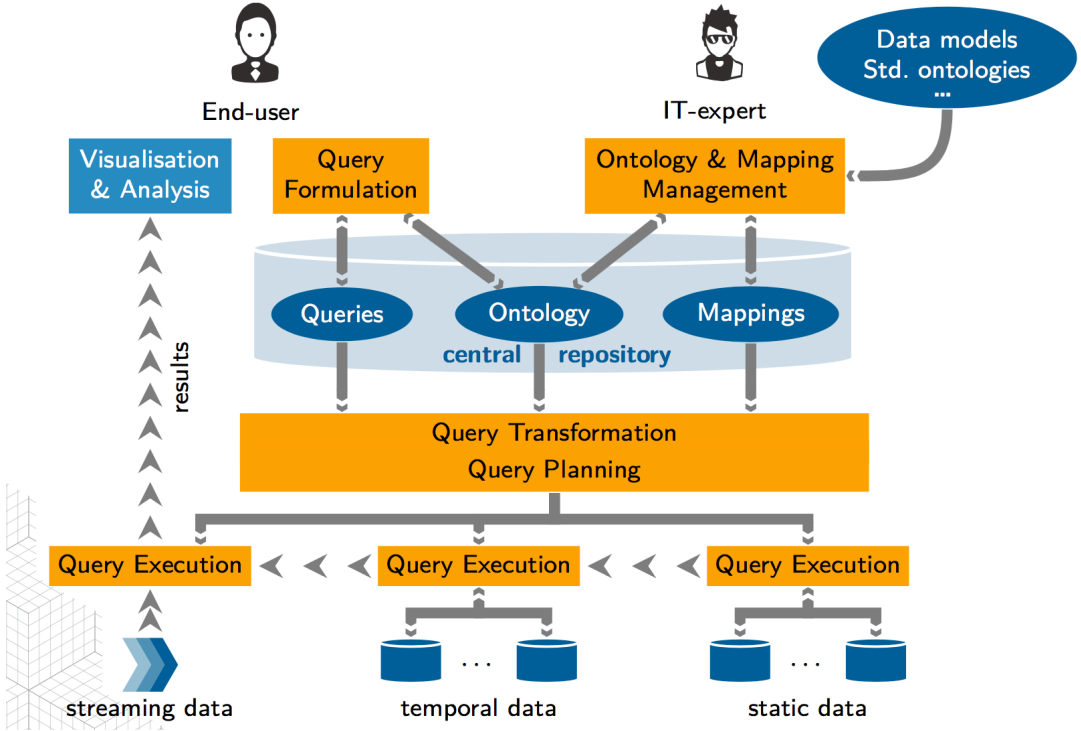
Accessing data is a technical and organizational bottleneck for using data.

We make poorer decisions and waste time on tedious work getting data.

Scalable data access is interdisciplinary



Optique can improve the cost-effectiveness of environmental compliance



Big Data in Environmental Monitoring

- Build pilots of limited cases
  - No grand unifying system
  - Re-usable components are good
- Build fit-for-purpose semantic models
  - Again, no grand unifying system
- Living systems are natural area for use of statistical models
  - I.e. “big data analytics”
  - But use physical models where they are valid and useful
- Streaming data is important research area here
- Context is important: coordination of text and data