SIRIUS
Beacons for digitalization

David Cameron, Centre Coordinator
SINTEF Petroleum Conference
Trondheim
19th March 2019

The SIRIUS Centre

- Eight years' financing from RCN
- 13 Industrial Partners (11 in 2017)
- 3 Leading Academic Institutions
- Centre for Research-Based Innovation
- Funding for 20 Ph.D. students
- Innovation through prototypes and pilots
- 45 affiliated researchers

UiO : University of Oslo

simula

sfi Centre for Research-based Innovation

Schlumberger

equinor

SAP

IBM

DNV·GL

EVRY

Dolphin

NUMASCALE BIGGER DATA ANALYTICS

KADME Knowledge and data management expertise

OSIsoft.

aibel

TechnipFMC

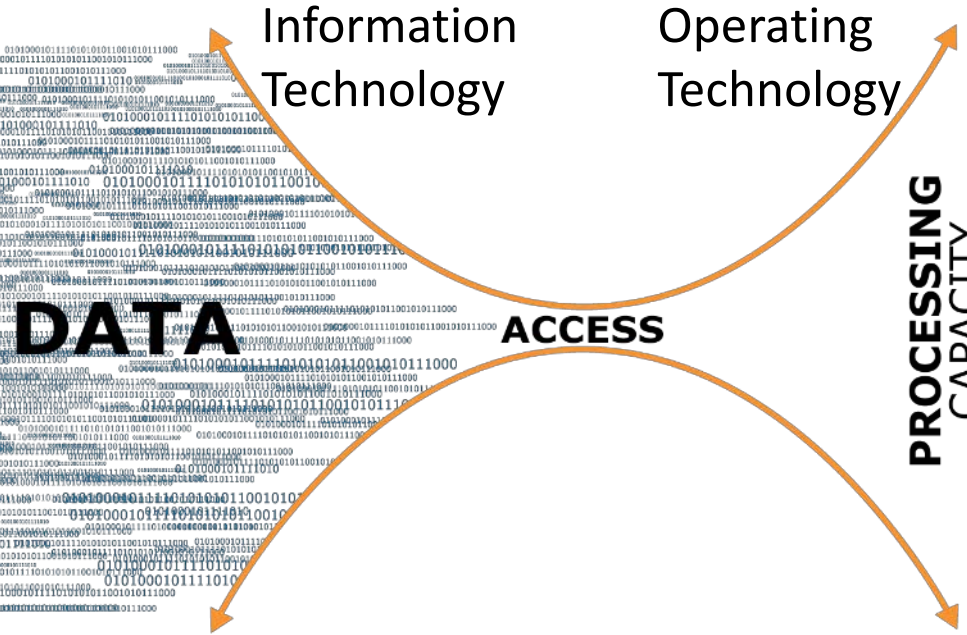
computas

NTNU Norwegian University of Science and Technology

University of Oxford Department of Computer Science

The problem of scalable data access

- 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.

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

And then came digitalization!

Machines
Platforms
Crowds

Building bridges to fill gaps

Publish!

Researchers

Technology push

The Gap

Terminology

Problem description

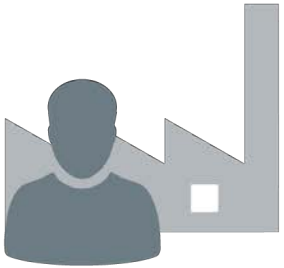
Rewards

Time-scale

Agility

Domain knowledge

Problem pull



Industrial end-users

Pump Oil!
Digitalize now!

Operating Technology

Information Technology

The other Gap

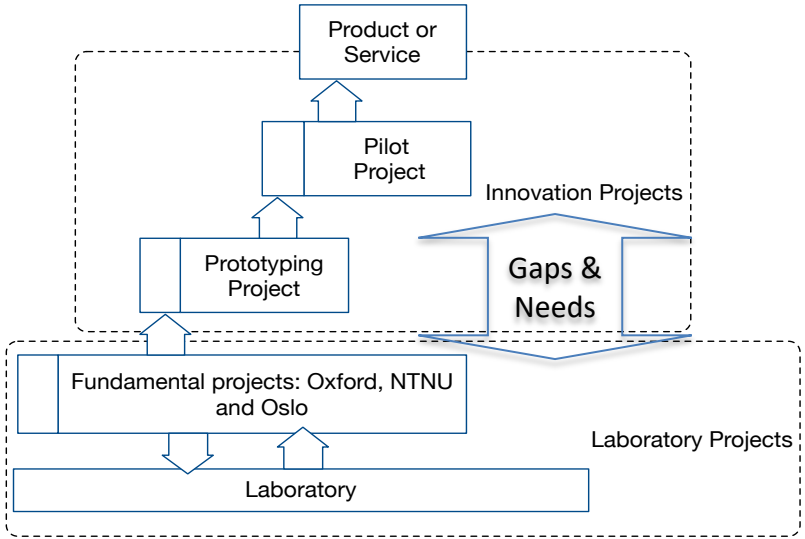
Sell!

Product and Service Vendors

Technology push

Two ways of filling the gaps

An innovation cycle aligned with digitalization



Building arenas for establishing common understanding

Research programs build a foundation for …

Analysis of Complex Systems		Ontology Engineering	
Semantic Integration		Data Science	
Scalable Computing		Industrial Digital Transformation	

… Beacons addressing industry challenges

Geological Assistant		Integrated Digital Planning	
Subsurface Data Access & Analytics		Digital Twins	
Digital Field & Reservoir Management		Digital Field Development	
Personalized Medicine		Environmental Applications	

Answering the challenges of KONKRAFT

- Digital collaboration
  - Simplification and standardisation.
  - Remove duplication and paper
  - Digitalization of NORSOK
- Upgrading of DISKOS
  - Easier to use – interoperable – a platform for the sector (the oil and gas crowd).
- Modifications and Maintenance
  - Planning
  - Equipment reuse

We cannot do this alone

- You need us:
  - Digitalization pilots need our computer science to succeed
- We need you:
  - We need to prove our worth on non-toy problems
  - Our computer science is stimulated by your needs as geologist, engineer, doctor or manager

Digital support for exploration processes

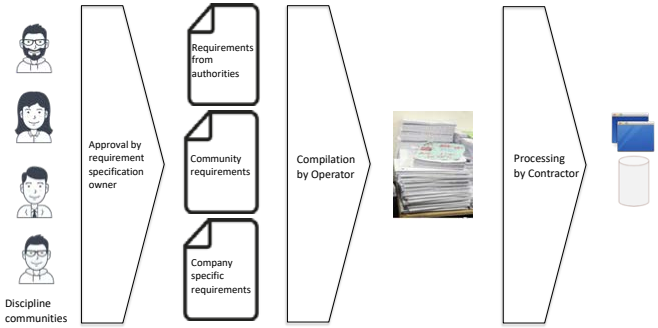
Industry Pain

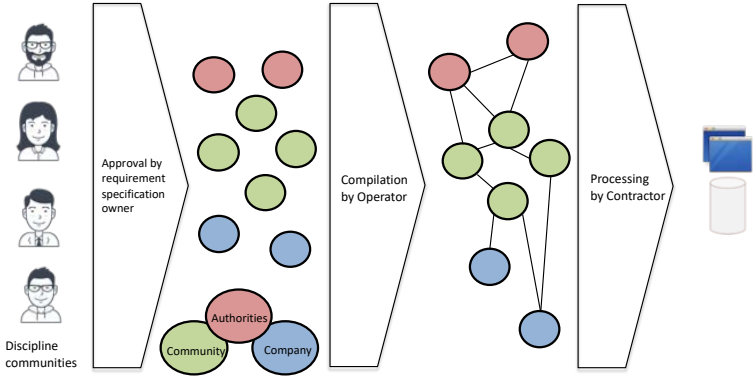
- Geologists are not well supported by digital tools.
- Subjective evaluations, judgements, stories and pictures.
- How can we provide digital support to exploration geologists?

GeoAssistant: Tool to help explain observed geological facts

- Analysis: backwards search for possible geological histories from facts
- Formalize geological rules as transition system
- Connect rules, knowledge base (axioms), observed facts

Digital Field Development





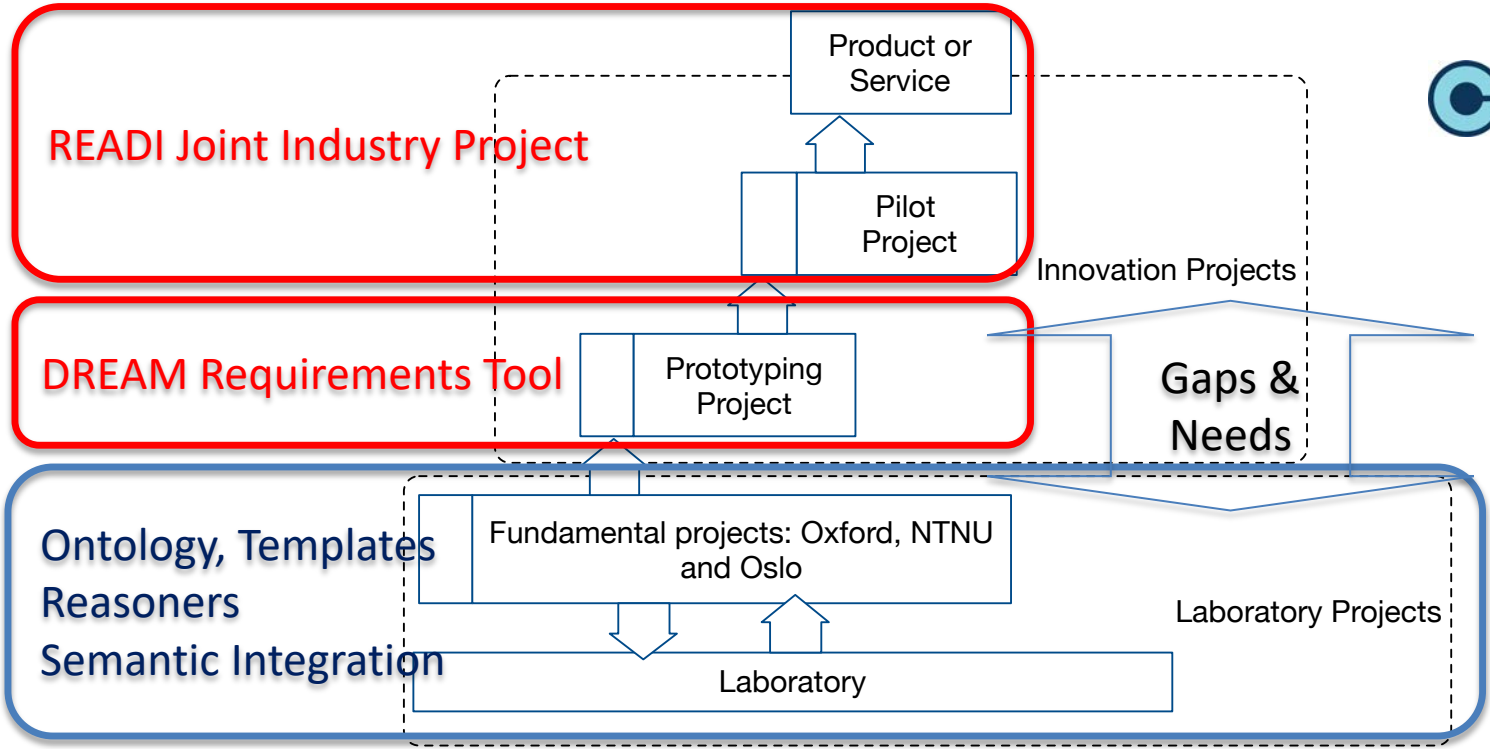
Industry pain:

- Processing of requirement specifications by manual interpretation of text
- Asset information locked in hundreds of proprietary applications
- Huge information loss in handover from one project phase to another

Requirements as Digital Artefacts

- From documents to structured data
- Objects for all life cycle phases (e.g., design, fabrication, maintenance)
- Requirements become rules over the asset model
- Compliance checking is automated
- Handover is information sharing

Digital Field Development



Digital Twins

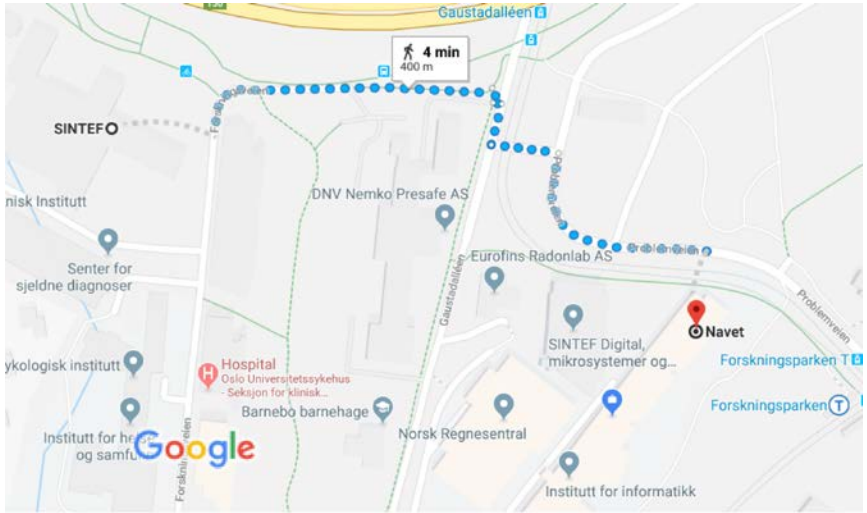
Industry Pains:

- "Everybody" is offering a digital twin.
- Fragmented systems, siloed perspectives and overload of data.
- Systems are difficult to configure, maintain and scale.
- Challenges in work practices, security and alignment to business.

- A standards-based semantic backbone for digital twins
- Faceted data access and semantic user interfaces for usable twins
- Domain-adapted interpretation of unstructured information in twins
- Formal simulation of complex twin deployments and architectures

Collaboration with SINTEF

- Not just Digital.
  - Industry, Energy, Ocean
- GEMINI Big Data Center
- European Project Proposals
- Subsurface Data Laboratory
- European PPP
  - Big Data Value Association
  - A.SPIRE – process industries
- Tekna Big Data



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