

Digitalisation of Engineering

The role of Computer Science

David Cameron
Subsea Valley Masterclass
5th April 2017



SIRIUS:

Scalable data access in the oil and gas domain



Statoil



Schlumberger



DNV·GL



Dolphin

NUMA SCALE
BIGGER DATA ANALYTICS



KADME

Knowledge and data management expertise



OSIsoft.



UiO : University of Oslo

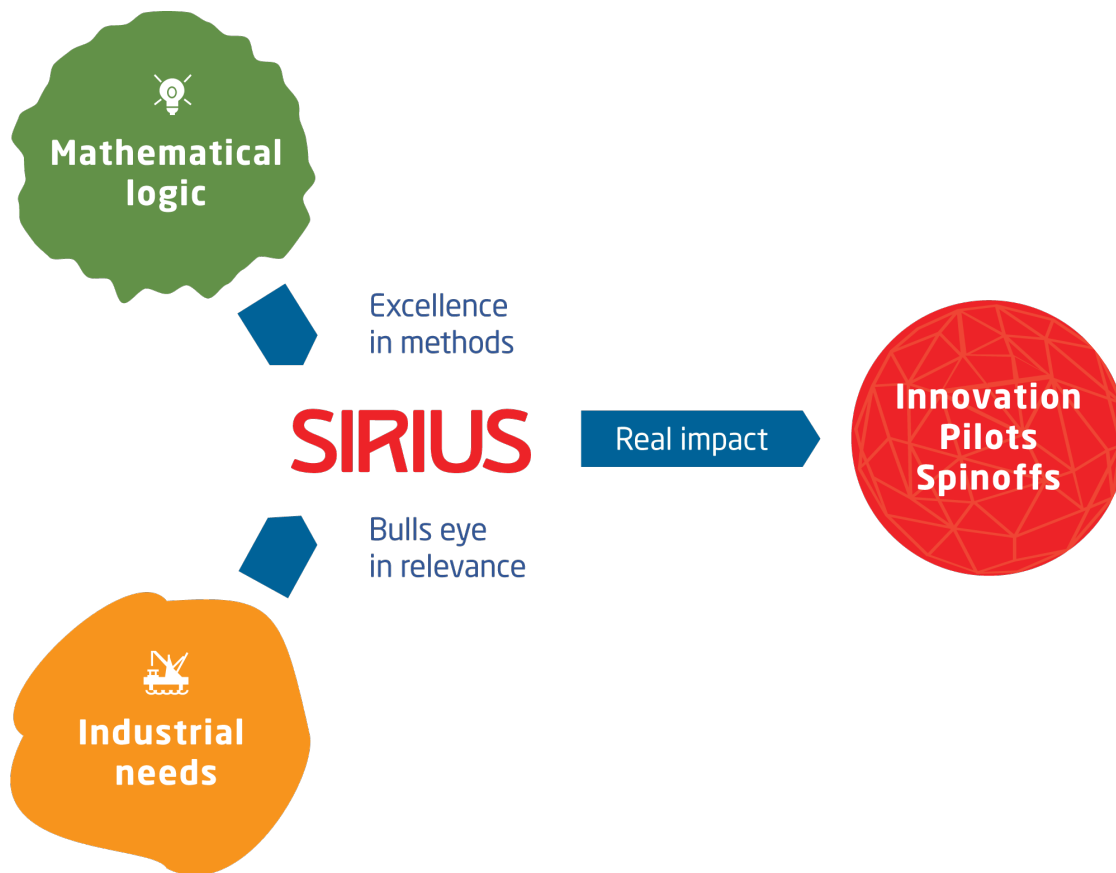
[**simula** . research laboratory]



Norwegian University of
Science and Technology



DEPARTMENT OF
**COMPUTER
SCIENCE**



Snake oil warning!



- Everybody is talking digitalisation
- ... and defining what they do as digitalisation or data science.
- This keeps the money flowing.
- Historical inevitability and inflated expectations.
- Be sceptical, take the good and discount the hype.
- Know that your professional skills and relationships remain relevant.



What will we do in 2022?



But this will be:

1. More expensive than we expect.
2. Will be more difficult than the evangelists tell us.
3. Will not meet expectations.
4. Will change the ways we work
5. Can give us a right to exist and sell our products and services.



What Norwegian Oil and Gas Needs

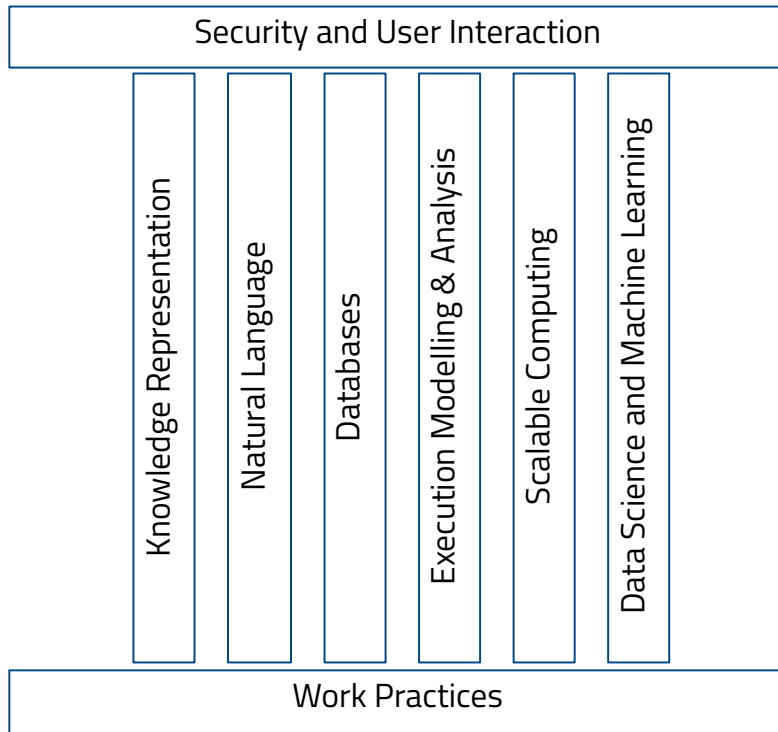
Øyvind Eriksen , Aker ASA, 4th April 2017

- Modernise, standardise and simplify standards and procedures.
- Sharing of information and re-use effect in design, construction and operations.
- Common strategy for digitalisation, automation and adoption of robots.





Computer science research can help





Knowledge representation

- Data is about *ideas* or *things*
- Computer representation of this allows:
 - Integration
 - Reasoning
 - Interchange
 - Access – find and control
 - Configuration management



Language technologies

- Interpretation and use of unstructured data - i.e. text
- Engineering text isn't like other text
- Resurrecting old design documents for decommissioning
- Tracing product design and aligning with operational data.

Databases

- No longer just Relational / SQL
- Triple-stores, non-relational, HADOOP
- Big data and reasoning needs clever and well-designed databases



CON [10]	Heating Oil	1.5003	-0.01	-0.7%
CON [10]	ICE Brent Fut.	48.80	-0.10	-0.2%
	Brent	48.87	-0.10	-0.2%
	ICE Brent Index	4,705.00	-24.00	-0.5%
1M [120]	Dubai 1M	45.58	-0.10	-0.2%
	West Texas	47.72	-0.10	-0.2%
GL95	SG Gasoline95	58.35	-0.10	-0.2%
REF	SG Refinery	7.24	-0.01	-0.1%
[60]	Baltic Dry	888.00	-10.00	-1.1%
CON [10]	Natural Gas	2.812	-0.01	-0.4%
CON [10]	Hot Rolled Coil	485.00	-1.00	-0.2%

Execution Modelling and Analysis

- Complex systems behave in complex and unexpected ways.
- Modelling and formal analysis can detect and avoid problems at design time.
- Will it work? Is it safe? Can a DDOS cause it to crash?
- Commercial and project processes are like computing processes.
- Can be applied to planning of operations and maintenance.



Scalable Computing

- How will our applications and data work in the cloud?
- How can our calculations give answers on time and in time?





Analytics, data science, machine learning ...

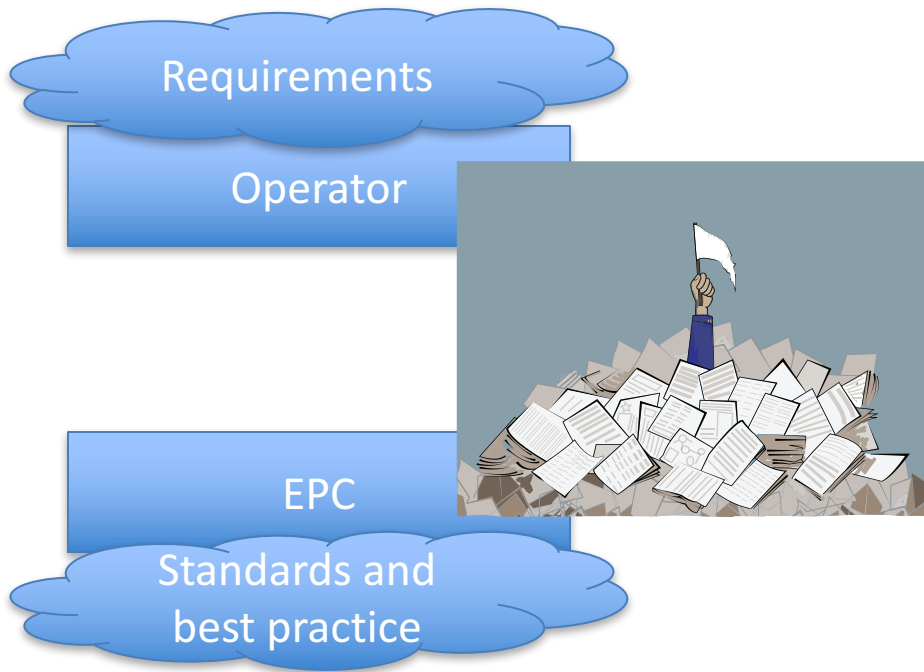
- How do we turn our data into information?
- How do we combine physics, statistics and commerce in useful analytical and predictive models?

Work practices

- Data doesn't innovate: people do.
- Why does so much industrial IT fail to meet its expectations?
- How can we ensure that the what we implement is embedded in an community of practice?



Our example today: Documentation and Requirements





SIRIUS

Center for Scalable Data
Access in the Oil and Gas Domain

sirius-labs.no



WE ARE SIRIUS

