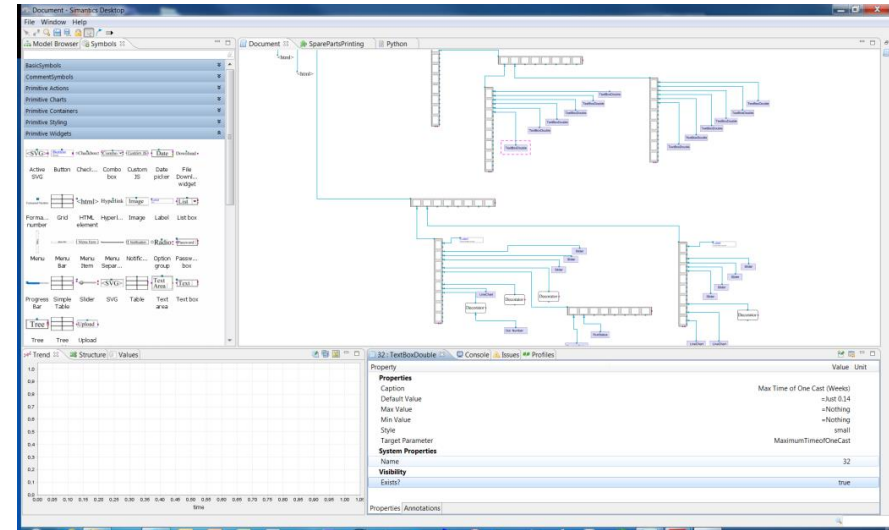


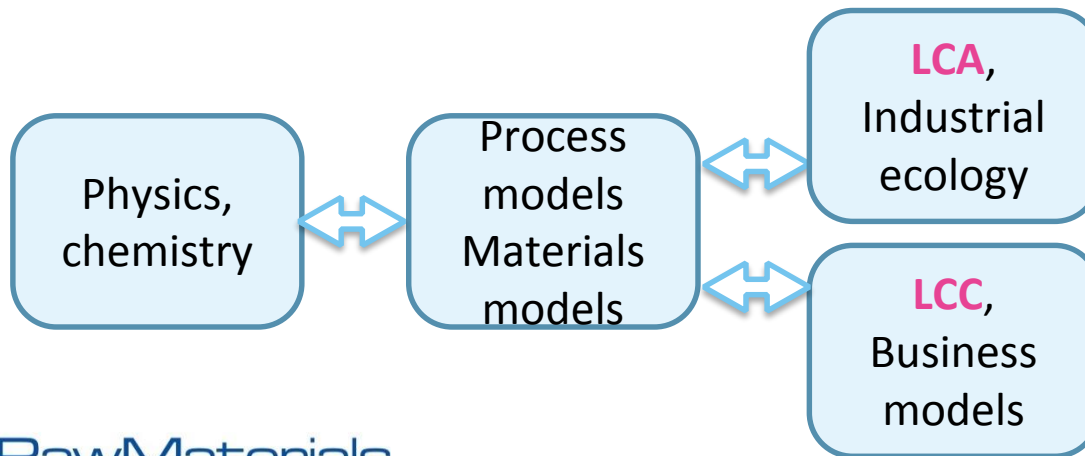
Design and Decision Support System Perspectives

EMMC BDSS meeting
Fraunhofer, Brussels
2018-03-27
sami.majaniemi(at)vtt.fi

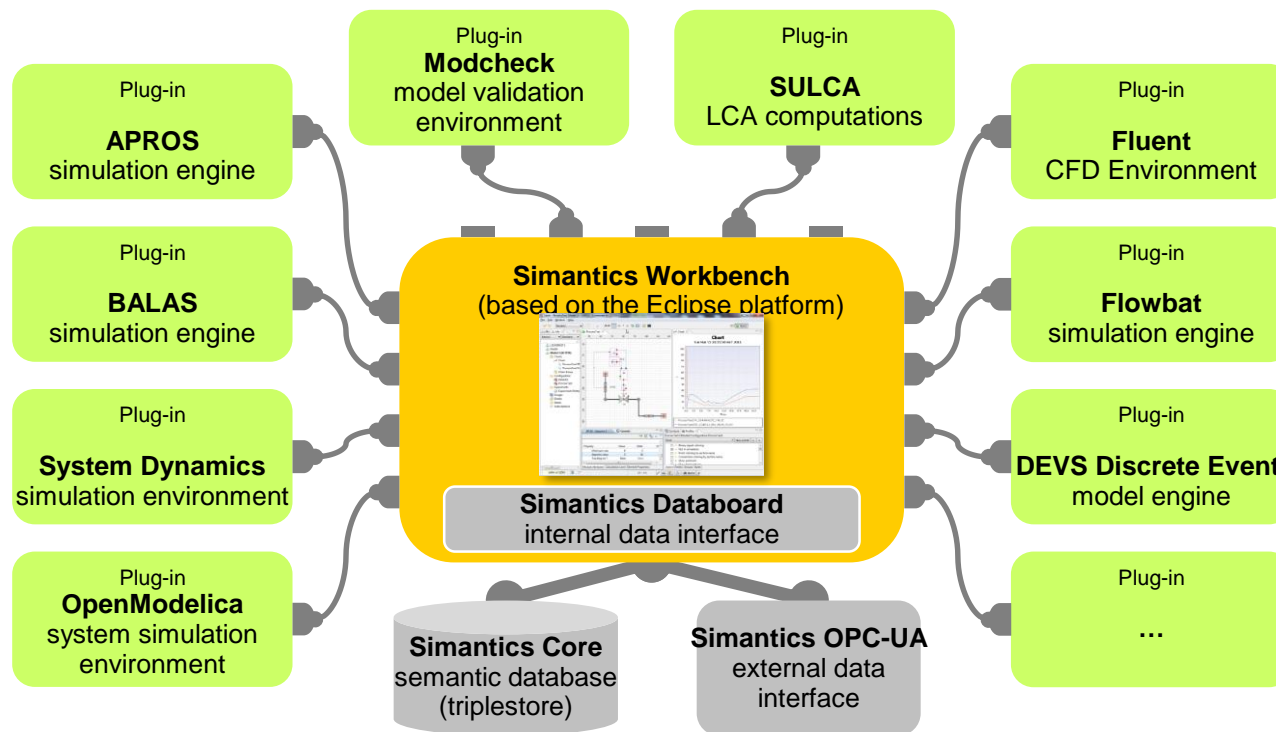


Multi-disciplinary collaboration and improved design decisions via Modelling Factory platform

- Improving **collaboration** between domain experts in **different fields**.
- **Types of users**
- Developers (Information infrastructure coding)
- Modelers (domain experts, computational models)
- End-users/ Decision-makers (product designers, strategic designers, executives, teachers)



Plug-in architecture for modelling and simulation



Base technology for Modelling Factory

- The technology is based on open source Simantics platform (Eclipse)
- has been published as an open source software and maintained through non-profit association
- has annual development project portfolio of about 1M€
- Example: MF's open source system dynamic modelling tool that has over 5000 downloads (**one of many available tools**)
- used by large automation, power and process industry companies

General points

- **Semantic integration platform**: rapid integrations possible, **deeper integration** levels than just data integration possible
- **Various modeling paradigms and languages** can be used together
- Allow users to use their favorite tools in data production and analysis
- Not everything should be integrated: concentrate on **model/paradigm ‘families’**
- Utilize large **open source solver libraries** (e.g. physics, engineering, chemistry)
- Interface with HPC, do not compete with specialized solutions (e.g. support work flow management, batch jobs etc, data formats etc.)
- Support **surrogate model construction** (fast to simulate, automatable). In other words, computationally heavy models are transformed into more easily compatible fast models, which are suitable for web apps, optimization (iterative usage)
- Enable **collaboration** in work rooms and **dissemination of results as web apps**

Demo: Modelling Factory (BDSS & design projects)

- <https://modellingfactory.org/>
- Interested in trying it out yourself? Check out instructions at <https://modellingfactory.org/instructions>
- For our base technology, visit www.simantics.org
- Hosting a 2 day workshop on integrated economic & eco-design and decision making tools related to electric vehicle circular economy (Espoo Finland, May 24-25th, 2018) <http://closeloop.fi/workshop/>(registration opening soon).

Examples of business decision support & design projects

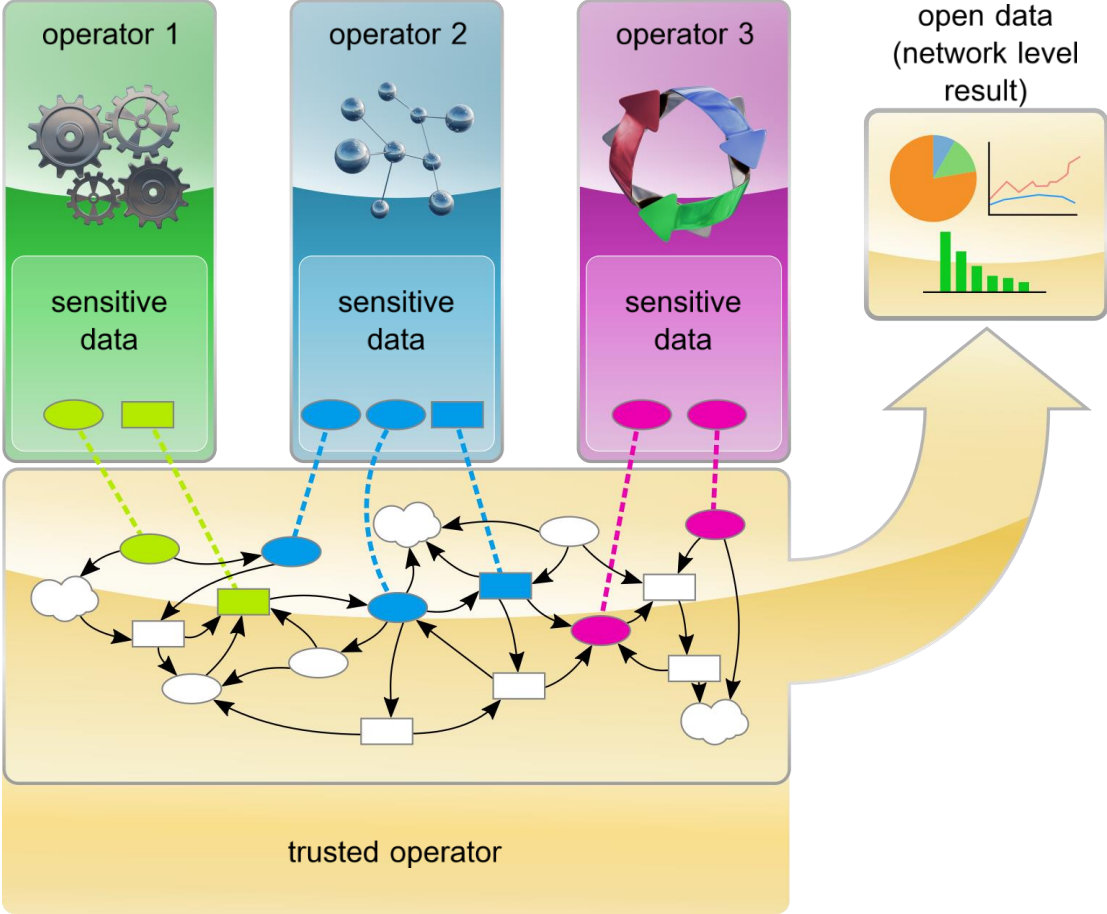
- We present 3 implemented BDSS examples
- 1. Multi-stakeholder Electric Vehicle Economy design portal
- 2. Cloud service for Life Cycle & Cost Assessment service integrated with 1 above
- 3. Ice load portal for wind farm design



Example 1: Multi-stakeholder Electric Vehicle Economy design



Example 2: Network Life Cycle Assessment & Cost cloud service



Example 3: Wind power generation

Ice Load Portal File Logout Jussi

Location Turbine Loads Analysis

Select Location

Latitude °N

Longitude °E

Overlay

Maximum ice thickness ▼

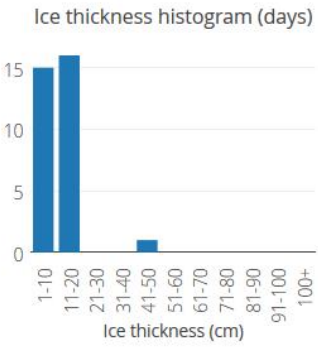
Load Parameters

Max. ice thickness 1 cm

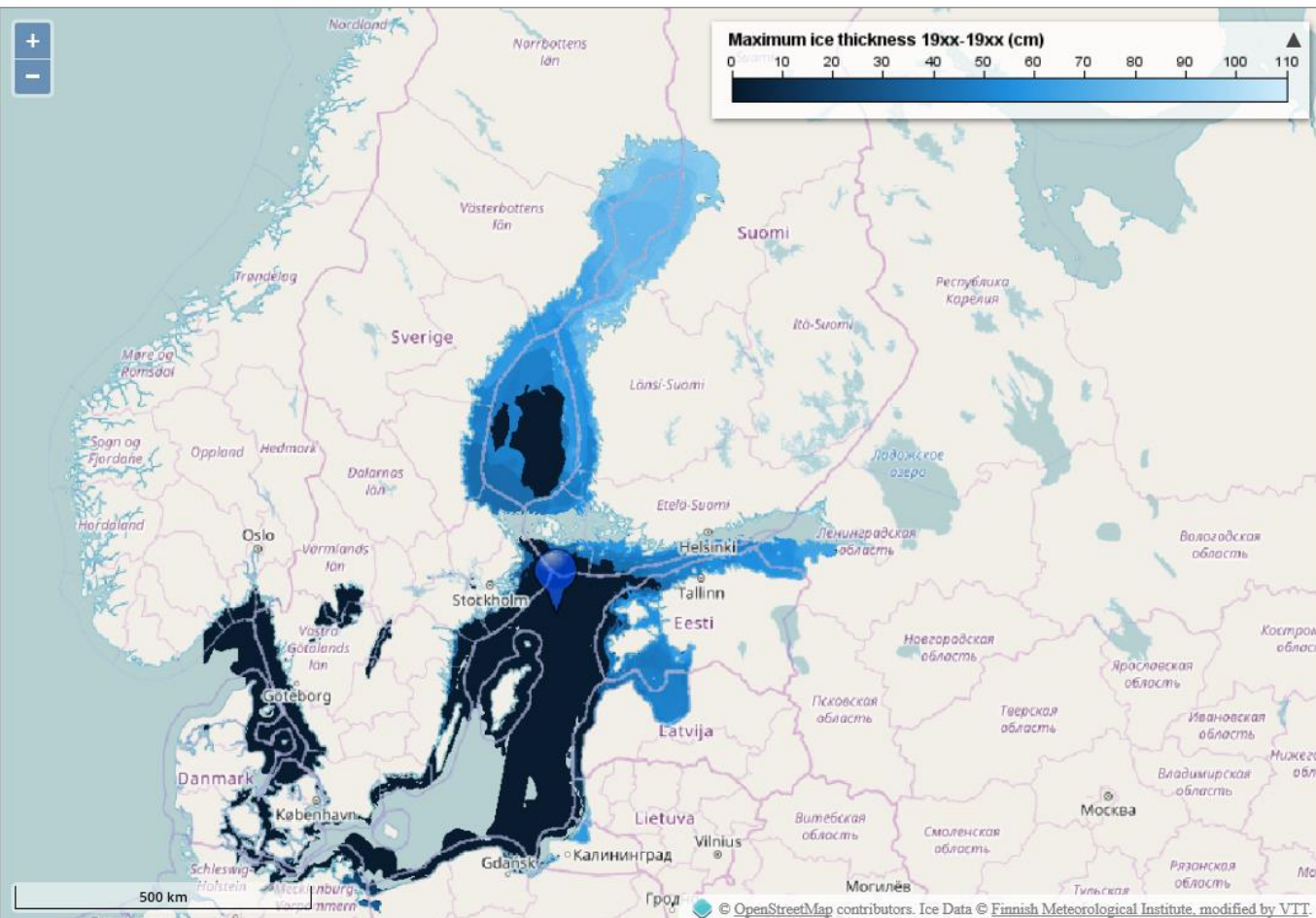
Max. significant wave height 7.59 m

Depth of the sea 151 m

Ice thickness histogram (days)



Ice thickness (cm)	Days
1-10	15
11-20	16
21-30	0
31-40	0
41-50	1
51-60	0
61-70	0
71-80	0
81-90	0
91-100	0
100+	0



Maximum ice thickness 19xx-19xx (cm)

0 10 20 30 40 50 60 70 80 90 100 110

500 km

© OpenStreetMap contributors. Ice Data © Finnish Meteorological Institute, modified by VTT.