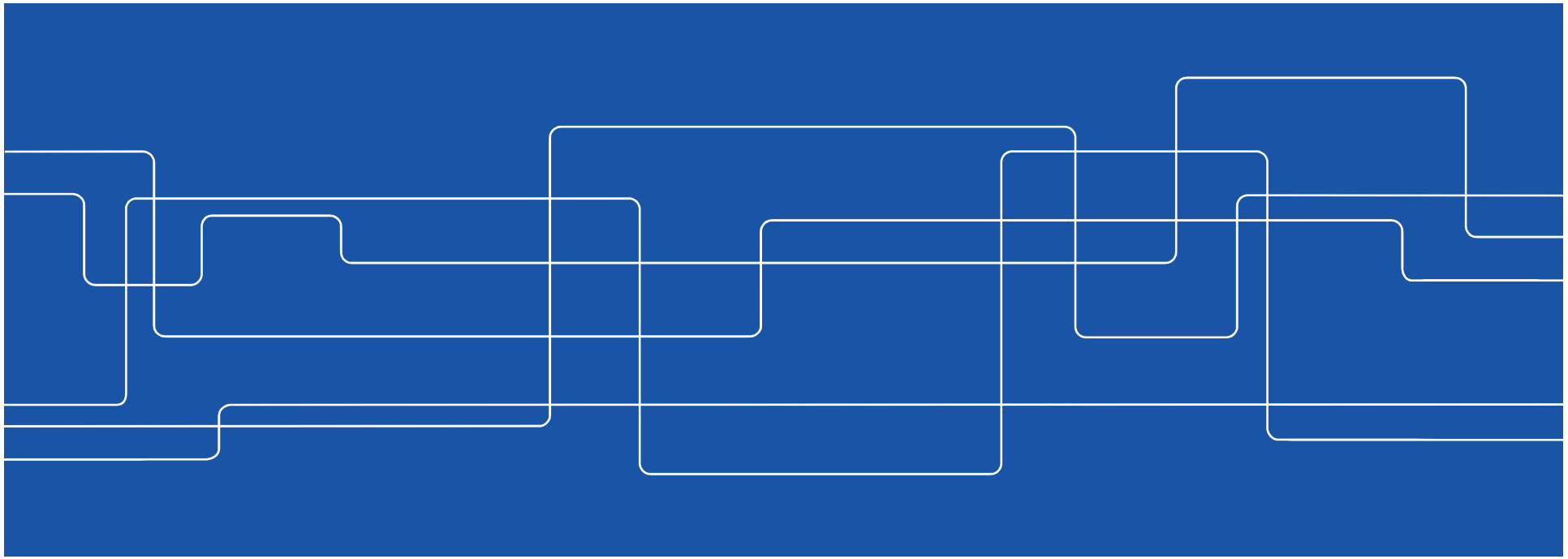
Interoperability of Modelling Tools - Using Linked Data

Jad El-khoury, jad@kth.se

KTH Royal Institute of Technology
Department of Machine Design, Mechatronics



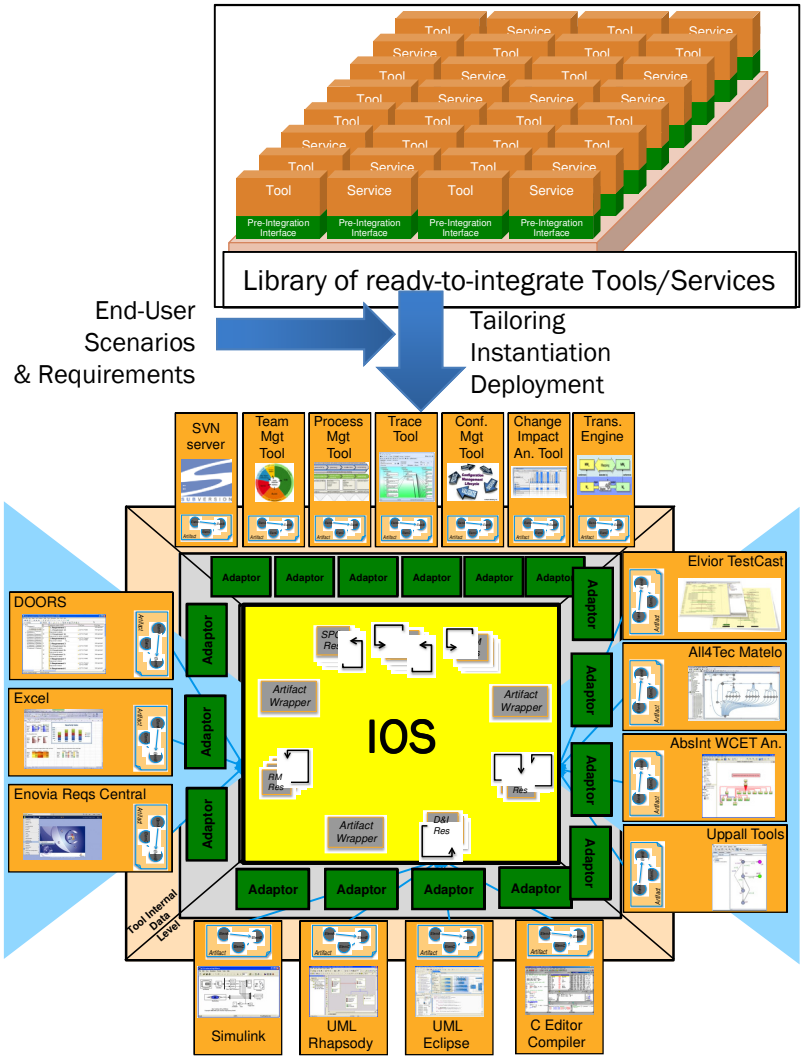
Background
- Crystal Interoperability Specifications (IOS)

From a library of Engineering Tools & Platforms

... to a configurable system Engineering Environments

The remedy:

IOS-compliant standard interfaces

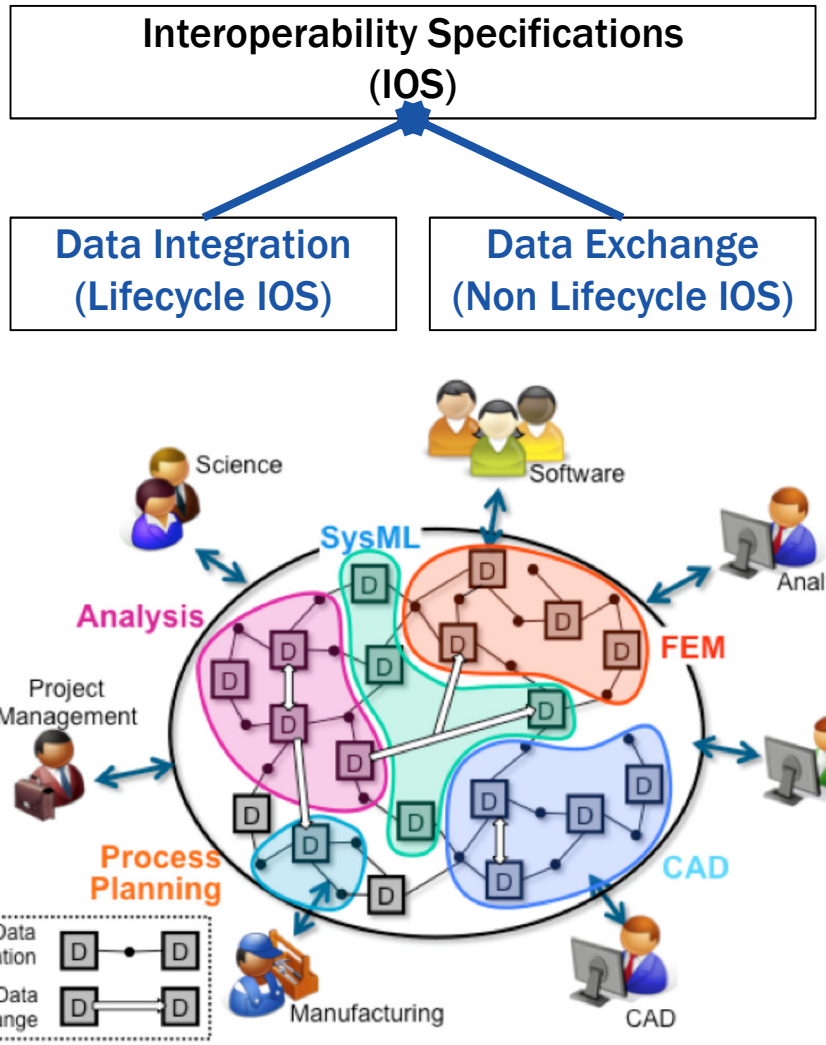


Background
- Data Integration vs. Data Exchange

Data Integration - Cross-Disciplines

Integration across loosely-coupled tools; across development phases.

e.g., Traceability across the whole product development lifecycle

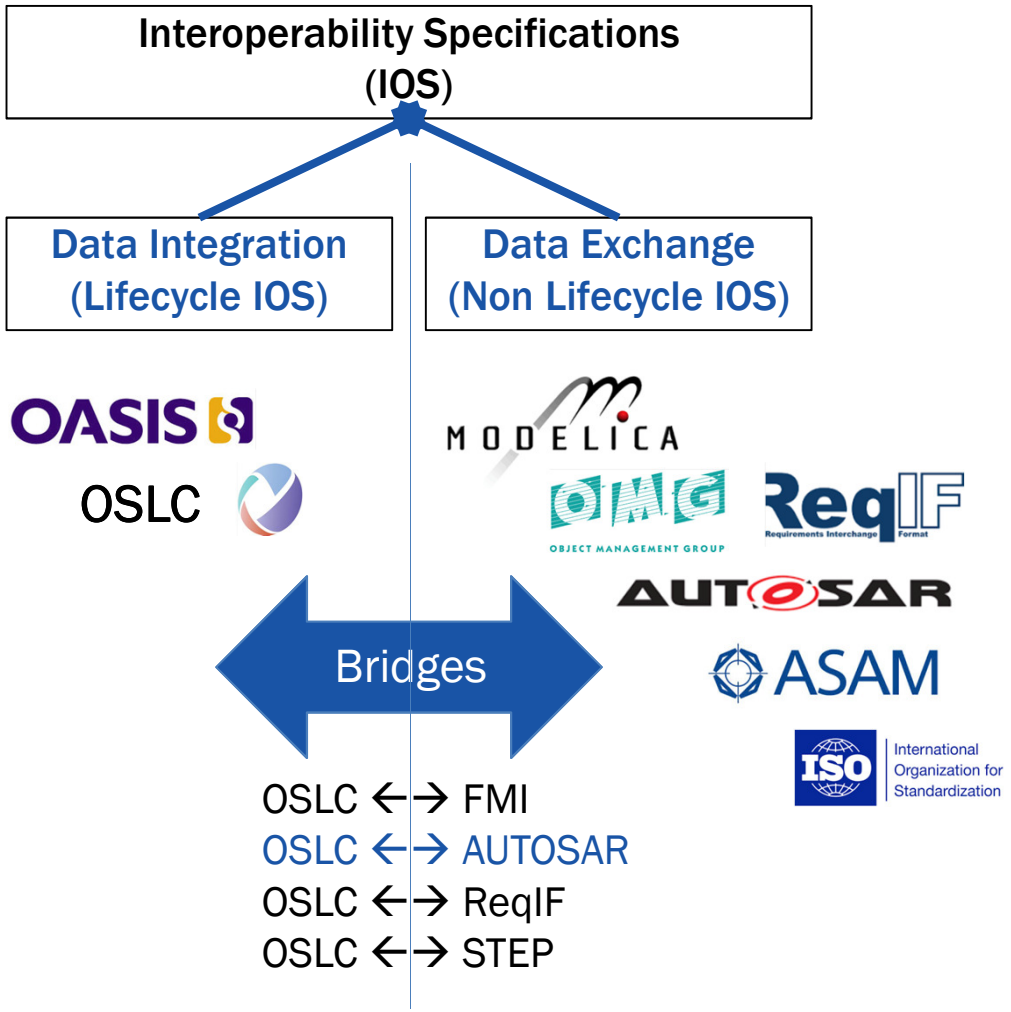


Data Exchange - Discipline-Specific

Exchange within tightly-coupled tools; within specific development phases.

e.g., Real-Time & Distributed Co-Simulation, Runtime Data Calibration & Measurement, etc.

Background
- Data Integration vs. Data Exchange



What is OASIS OSLC?

An OASIS standard that targets the integration of software tools.

Architecture of the Web

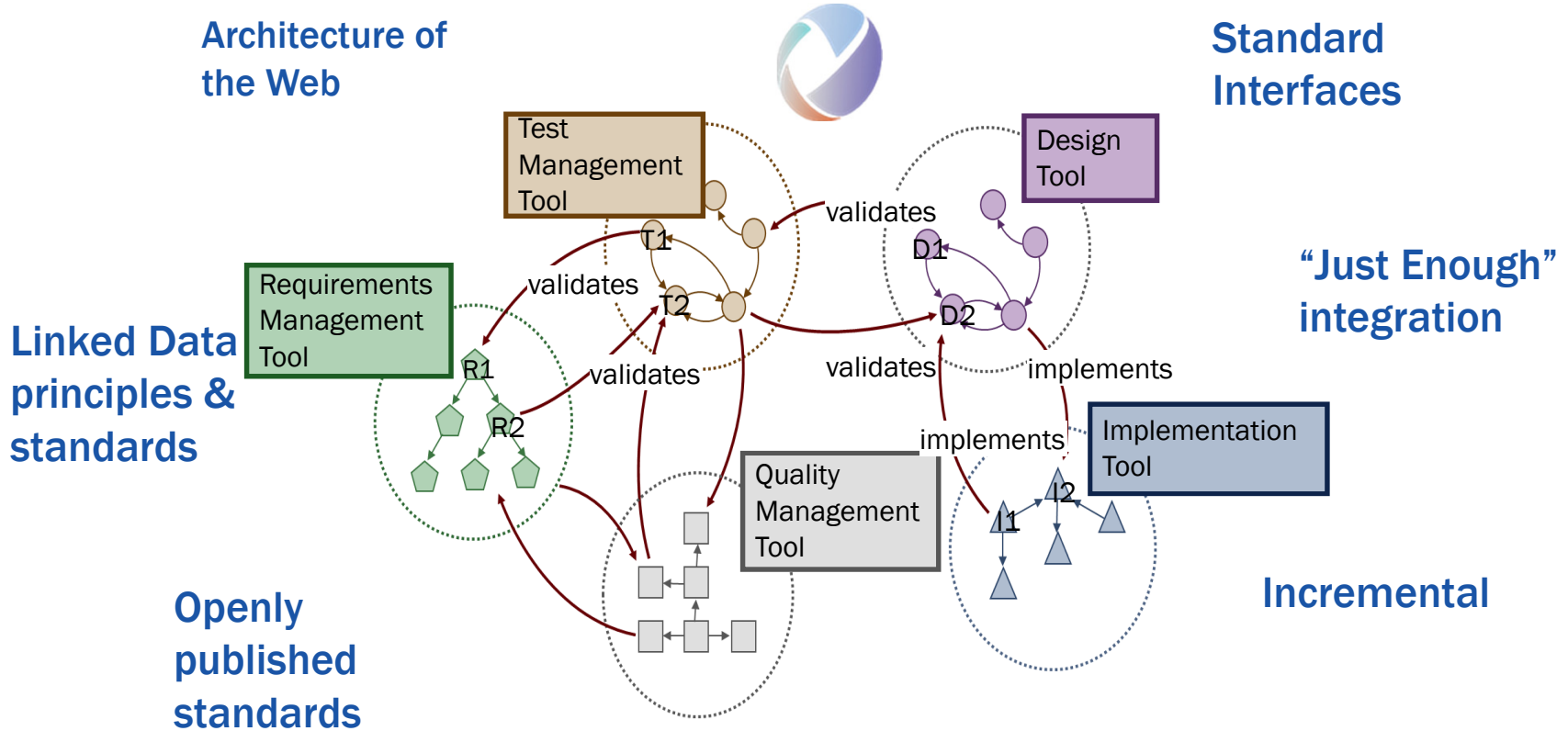
Standard Interfaces

Linked Data principles & standards

"Just Enough" integration

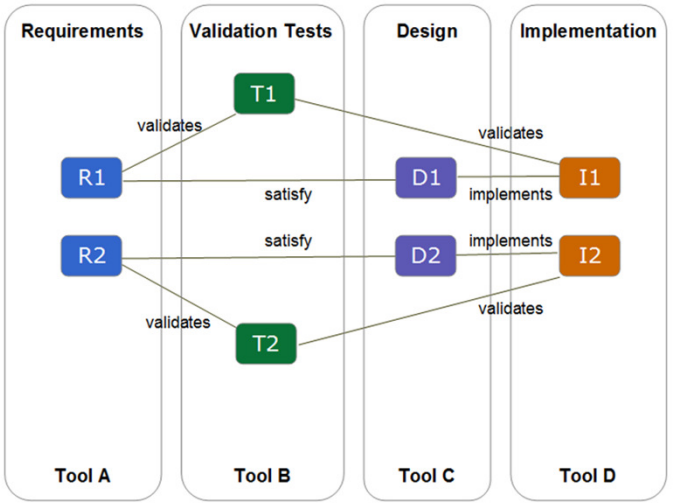
Openly published standards

Incremental



What is Linked Data?

- An approach of publishing structured data, such that
  - Data from different sources can be connected
    → Data gets more meaning
  - Data from different sources can be queried
    → Data becomes more useful



- Builds upon standard Web technologies
  - HTTP, URIs, RDF family of standards
  - To describe structured data on the web

What is Linked Data?

Linked Data Example - The Linking Open Data project

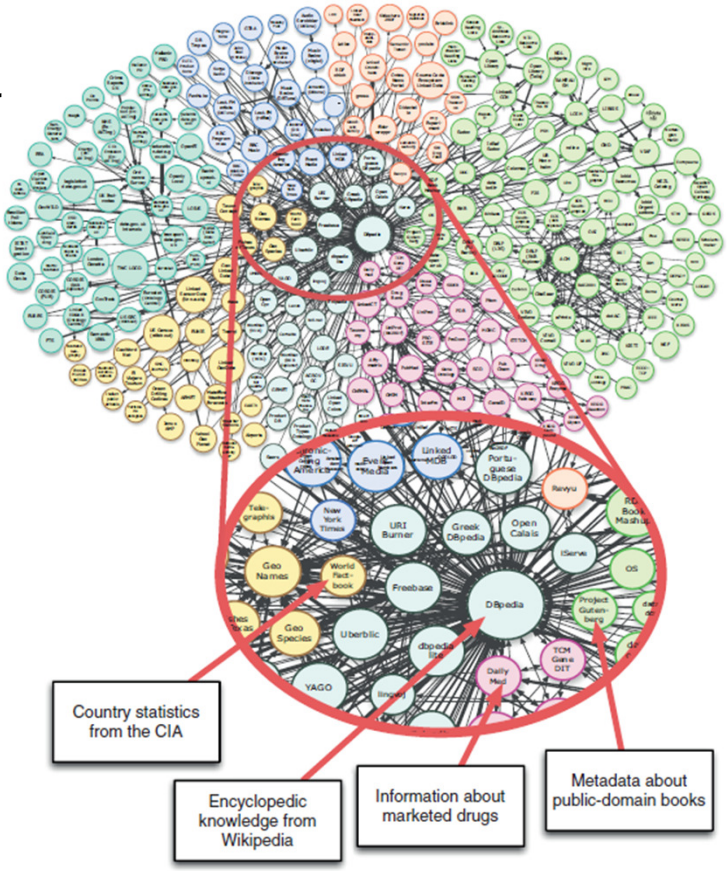
- Links data from open-content projects such as
  - encyclopaedias and dictionaries
  - government statistics
  - music
  - research papers
  - …

→ Access to data & its semantics

→ No longer Data Silos

→ Discoverability

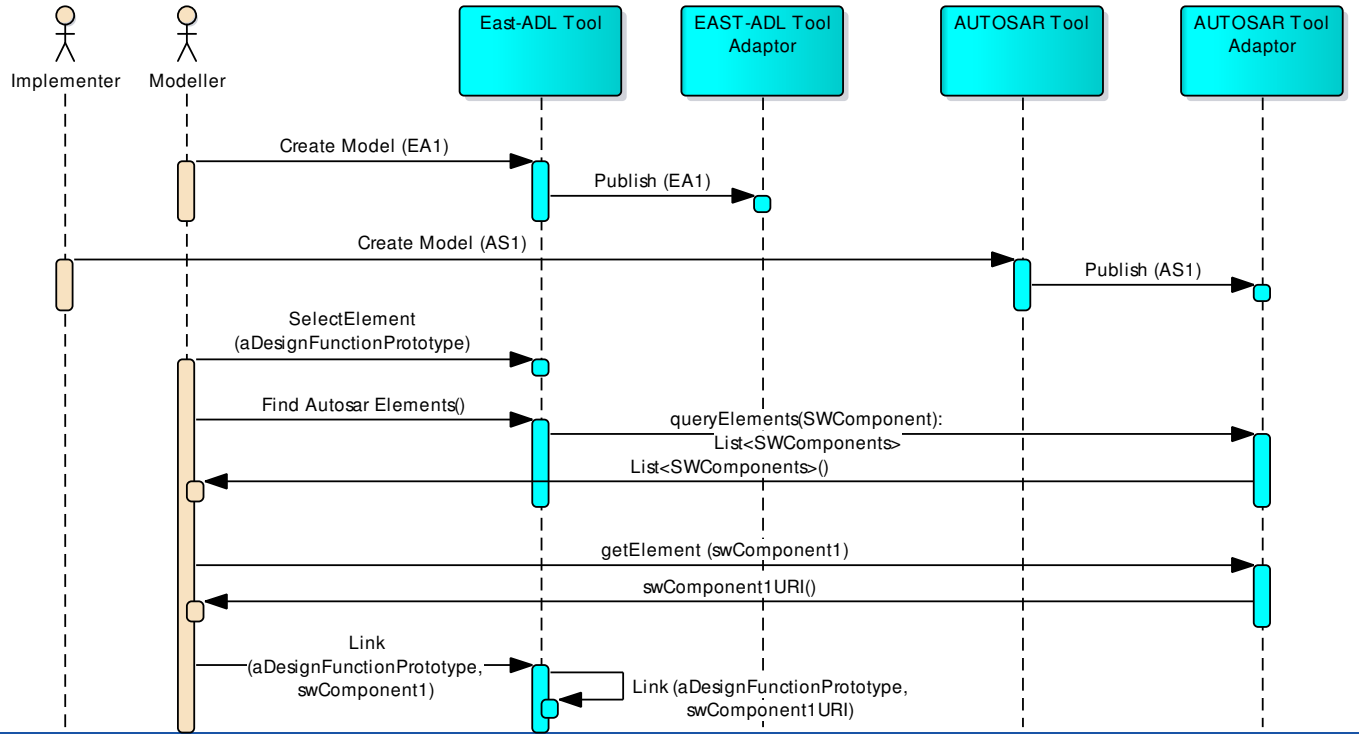
→ Data discovered and used in unpredictable ways



Linked Data - Structured Data on the Web; by David Wood, Marsha Zaidman, and Luke Ruth; Fig 1.5

The Case Study

- Linking and exchange of information between EAST-ADL and AUTOSAR models
  - Without assuming a common tool and/or framework
  - Requiring the exposure of many fine-grained resources



The Problem

Provide an OSLC interface for EMF-based modelling tools

- Expose the full vocabulary from any rich modelling language.
- Minimal development effort and/or cost

Do we have a contradiction?

OSLC – minimalistic interface

Modelling – Rich vocabulary

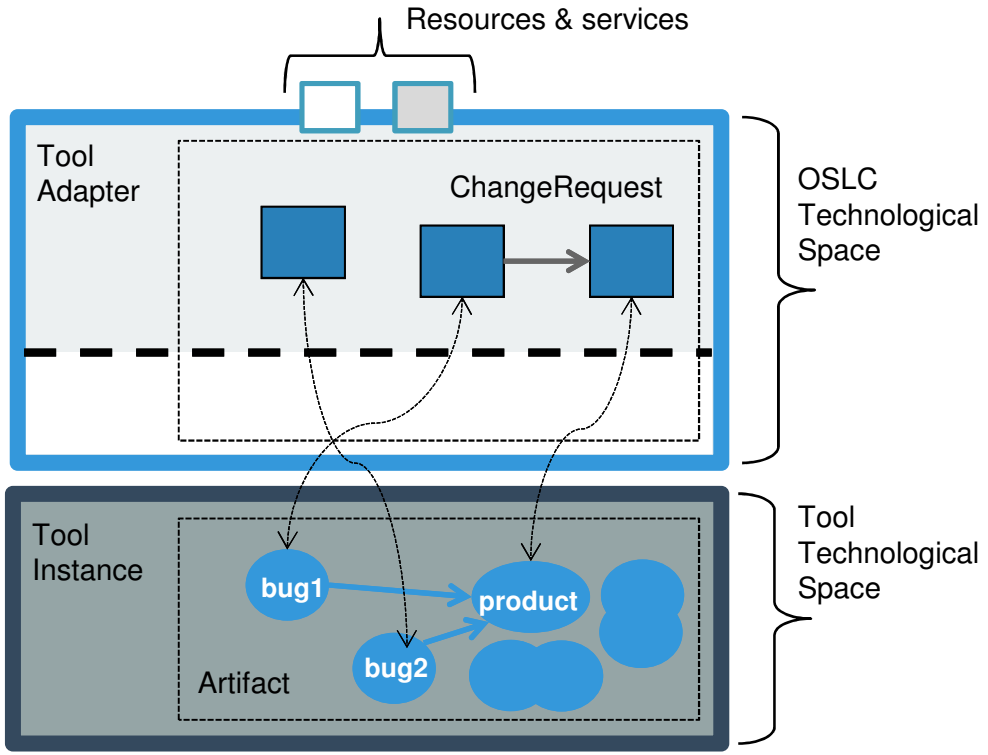
The Contribution

A code generator that provides an OSLC interface for EMF-based modelling tools

What can be generated?

1. The OSLC interface
    1. RDF representations
    2. RESTful interface
2. The interaction with the data source.

→ With all data digitally available, fully-automation is possible



What Does OSLC Bring to MDE?

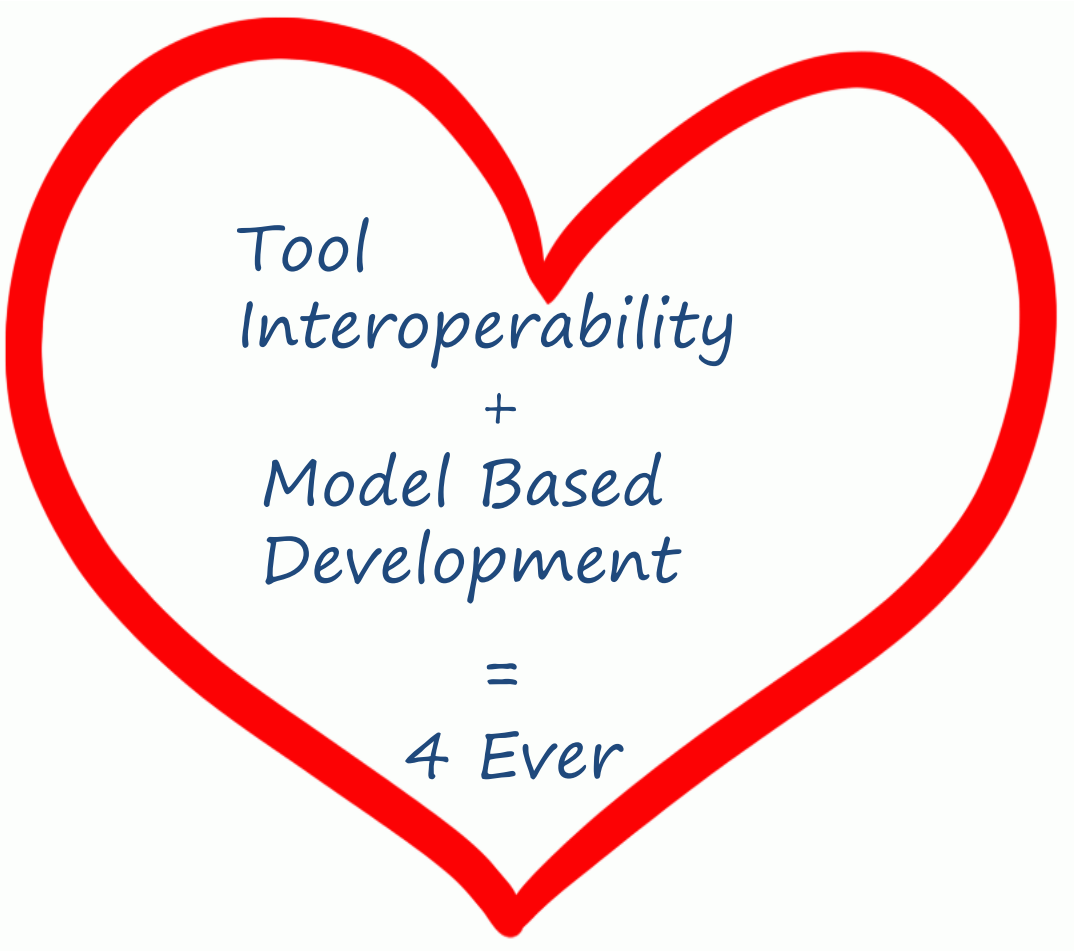
Technology-agnostic interoperability

(Differentiate between model technologies and integration technologies)

- Focus on the model data to be integrated
- Disregard the technology used to manage data within each modelling tool.

Will this facilitate the use of MDE across a wider span of the development process?

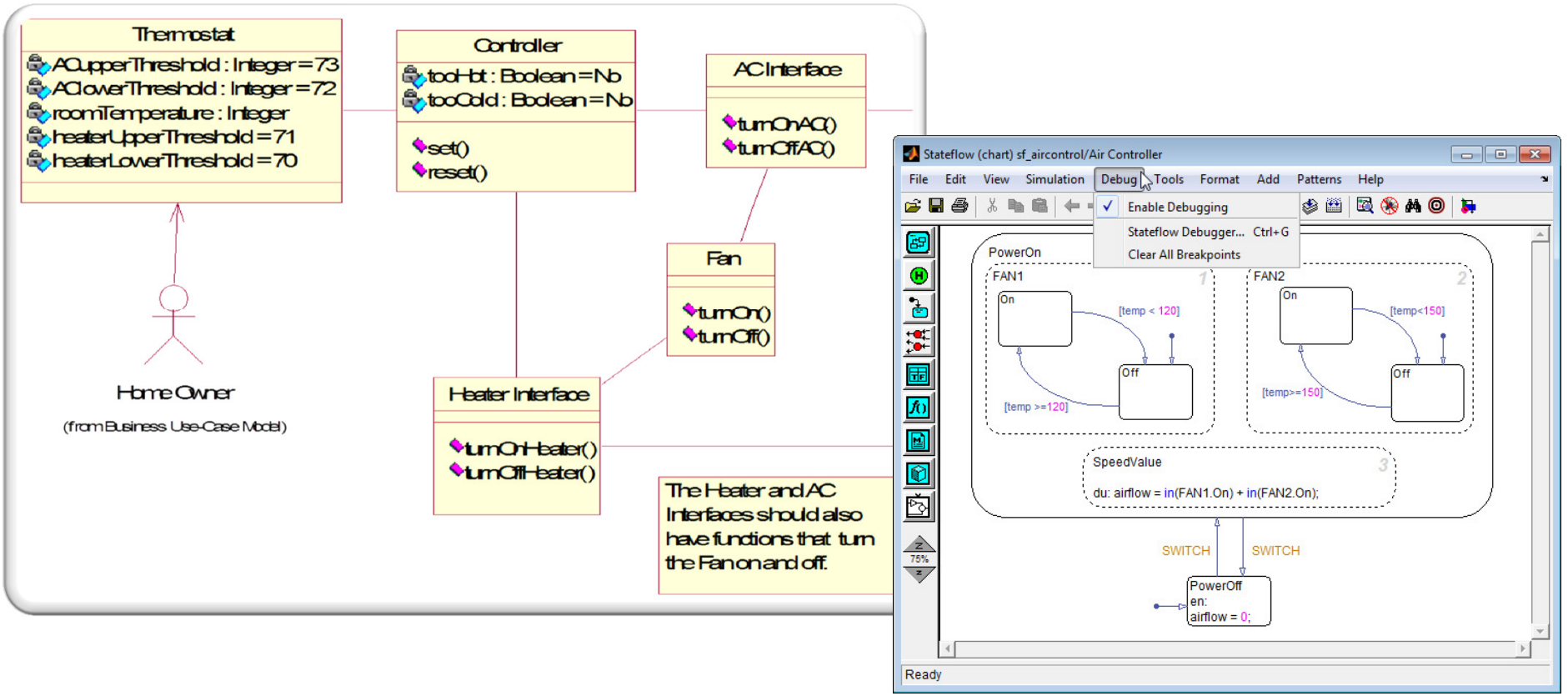
An insight …



→ Information-based Development

The Future (Work)

- A Dream Use Case
  - Tight integration of 2+ non-EMF modelling tools



Notice This page contains a Project Proposal. **Notice**

The Future (Work)

- The Challenges
  - Federated data storage
  - Integration of User interfaces
    - Delegated UI interactions
  - Change event handling
  - Version & configuration management
  - Performance & scalability of Linked Data?
  - Handling the rich semantics of a modelling language.
    - Capability to configure and limit the hierarchy of artefacts being exposed.
  - …

Thank You!

Jad El-khoury, jad@kth.se

KTH Royal Institute of Technology
Department of Machine Design, Mechatronics