

# Systems Engineering Tools Integration and Interoperability using OSLC in the SPRINT project

Andreas Keis, Parham Vasaiely (EADS Innovation Works, Newport)  
Uri Shani (IBM Israel Science and Technology Ltd., Haifa)

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# EADS at a glance



# EADS Divisions – The Four Firm Walls on which EADS is Built



- Globally leading aircraft manufacturer
- Since 2000, Airbus commercial deliveries grew by 60 %
- Backlog more than doubled in one decade (now equaling 6 years of production)



- Europe's leading space provider
- Largest space employer in France, Germany, Spain and the UK
- Having increased its revenues 2x and EBIT 4x since the year 2000



- Leading helicopter manufacturer
- Accounting for 1/3 of the global helicopter fleet
- Having delivered about 4,000 helicopters throughout the past decade



- Worldwide leader in security systems and Europe's leading UAV provider
- Over 234 Eurofighter aircraft delivered (as of Sept. 2010)
- Having more than doubled its EBIT & Return on Sales over the last 5 years

# EADS Innovation Works (EADS IW)

An international network of research centres working on EADS priorities

EADS Innovation Works is responsible at EADS Group level for identifying new technologies that:

- Create value and develop them up to TRL 3
- Guaranteeing the technical innovation potential for EADS in TRL 1-6

## IW Geographical locations



**Staff in France and Germany: 510 people**

**IW UK: 120 people**

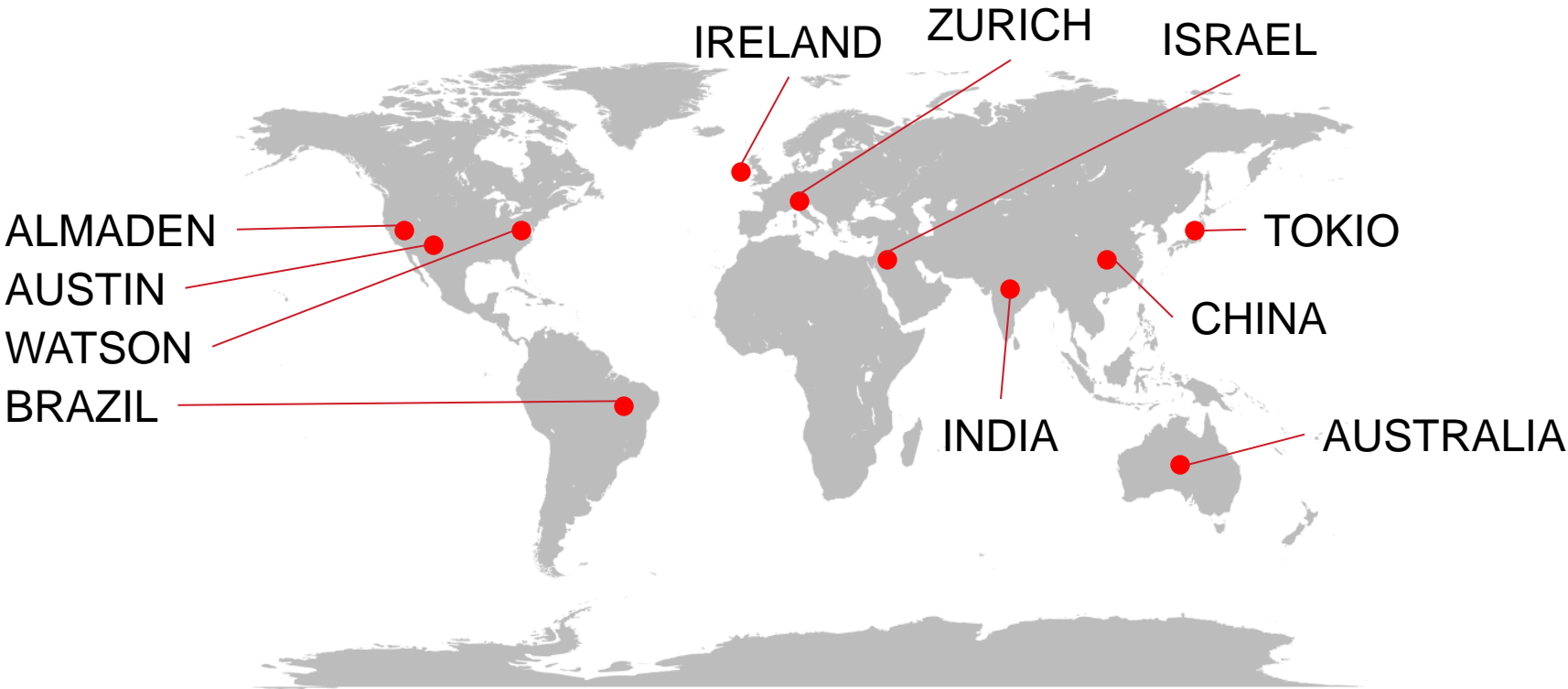
**IW Spain: Target = 75 people**

**IW Singapore: Target = 30 people**

# IBM Research Labs Worldwide

The IBM Research division is one of the world's largest IT research organization with more than 3,000 scientists and engineers working at 11 labs in 9 countries.

<http://www.research.ibm.com/>



# IBM Haifa Research Lab, Israel

The IBM Scientific Center in Haifa opened in 1972, since then the lab has conducted decades of research that have proved vital to IBM's success. The lab is the largest of the five research laboratories located outside of the United States.

The Software and Services department which participates in the SPRINT project, develops software technologies to exploit advances in computing infrastructure that benefit both traditional IT businesses as well as the system engineering and the embedded software development space.



# SPRINT – Software Platform for Integration of Engineering and Things

- FP7 Project (ICT-2009.1.3: Internet of Things and Enterprise environments)
- Project Website: [www.sprint-iot.eu](http://www.sprint-iot.eu)
- Launched October 2010
- Duration 36 months
- Budget: 3.46 Mio EUR

## Our Roles:

- Andreas Keis: Project Coordinator
- Parham Vasaiely: Project Manager
- Uri Shani: Technical Manager

Partner	Country
EADS UK (Coordinator)	United Kingdom
Israel Aerospace Industries	Israel
IBM Haifa Research	Israel
FRAUNHOFER FOKUS	Germany
Mathcore	Sweden
ALES	Italy
Elvior	Estonia

# SPRINT Objectives and Challenges

## SPRINT Objective

Development of next generation design methods and tool integration technologies for the design and deployment of complex systems developed in a geographically distributed environment by introducing new concepts related to the Internet-of-Things paradigm.

## SPRINT Challenges

- Geographically distributed collaborative projects
- Multi tool-vendor environment
- Design data isolation to support a multi-corporate development ecosystem
- Multiple design methodologies
- Legacy and green-field components
- Geographically distributed simulation and HIL testing



# The next generation of Systems Engineering: Development over the Internet

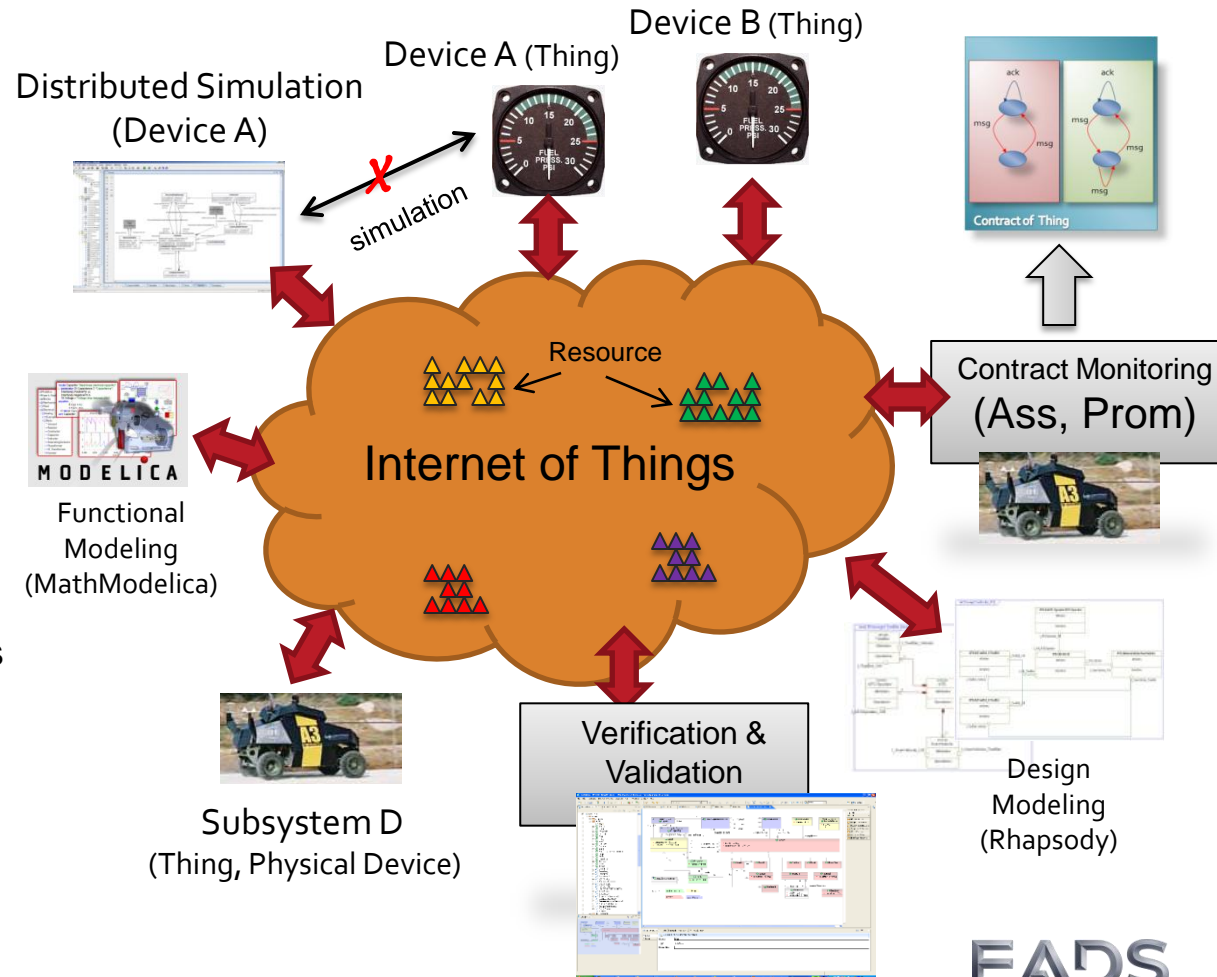
In the IoT everything is a Resource

SPRINT uses the IoT approach to:

- Identify Resources
- Configure Devices
- Setup Simulations
- Coordinate Activities

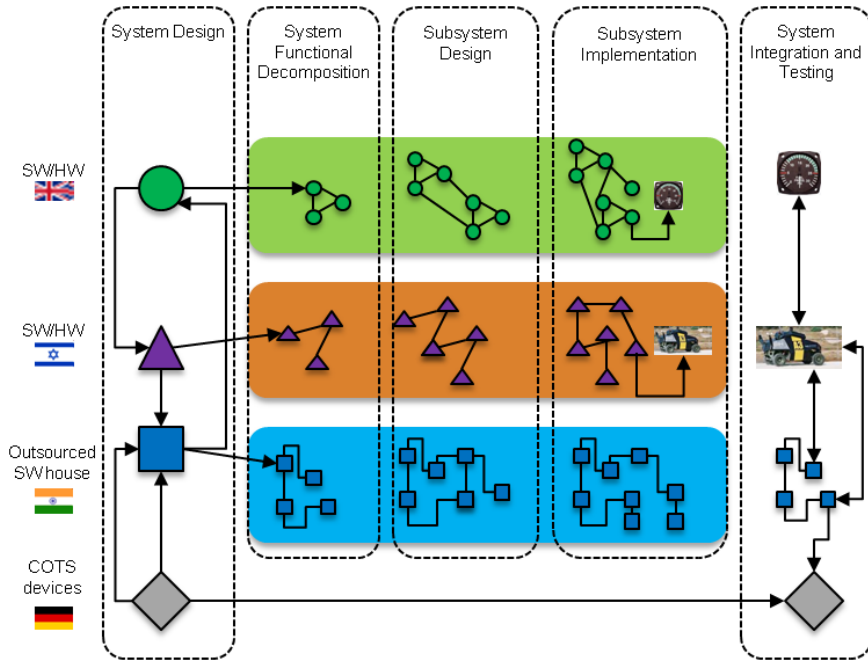
SPRINT does not address:

- ✗ Real-time simulation problems
- ✗ Common modeling language problems

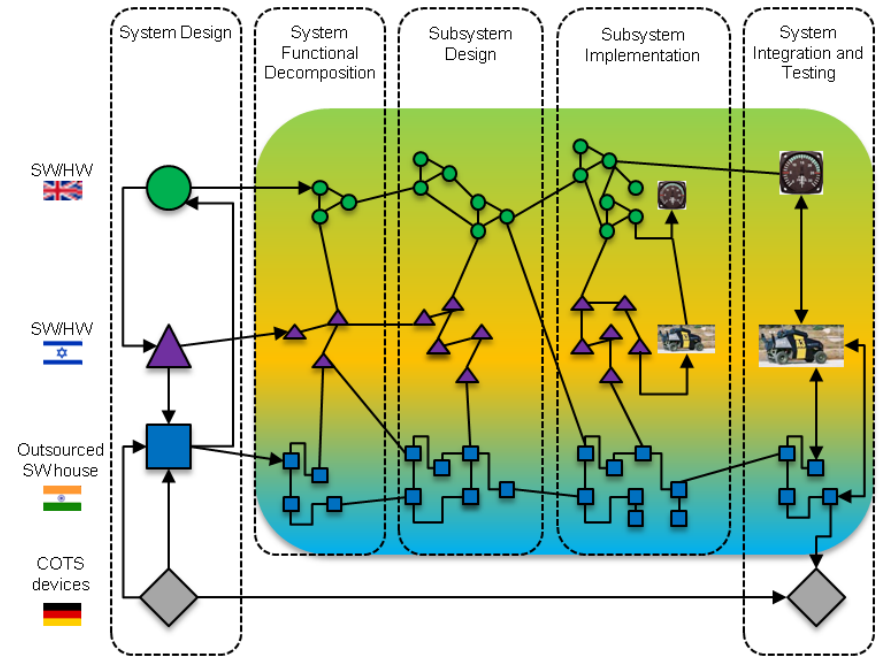


# SPRINT Desired Goal: Break existing design silos

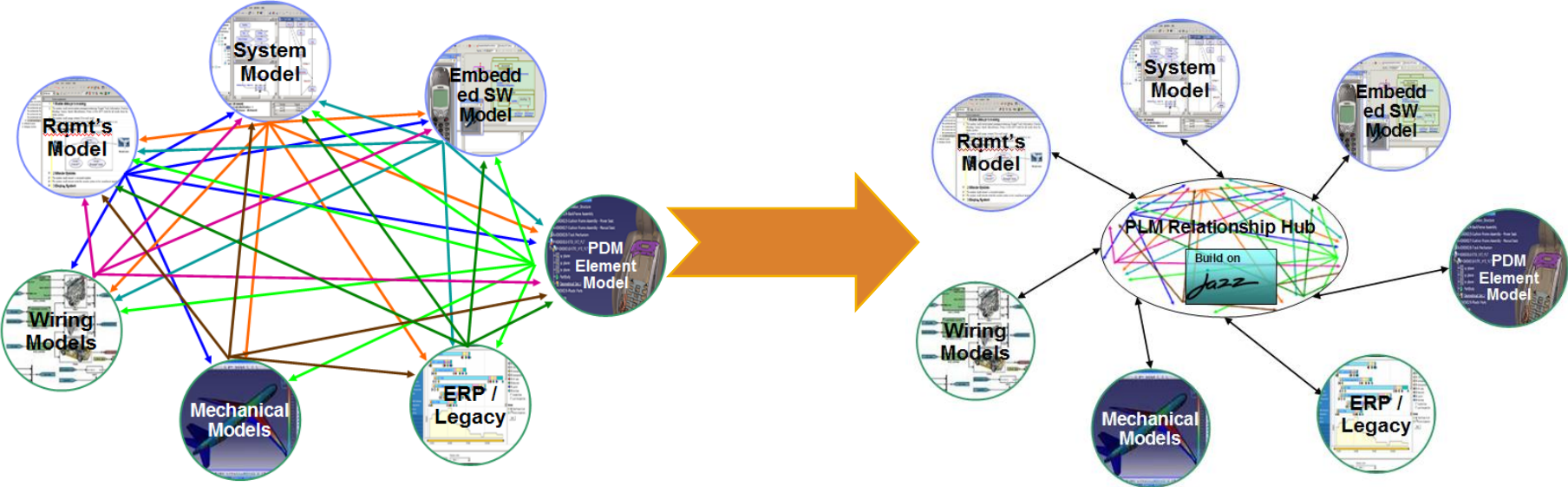
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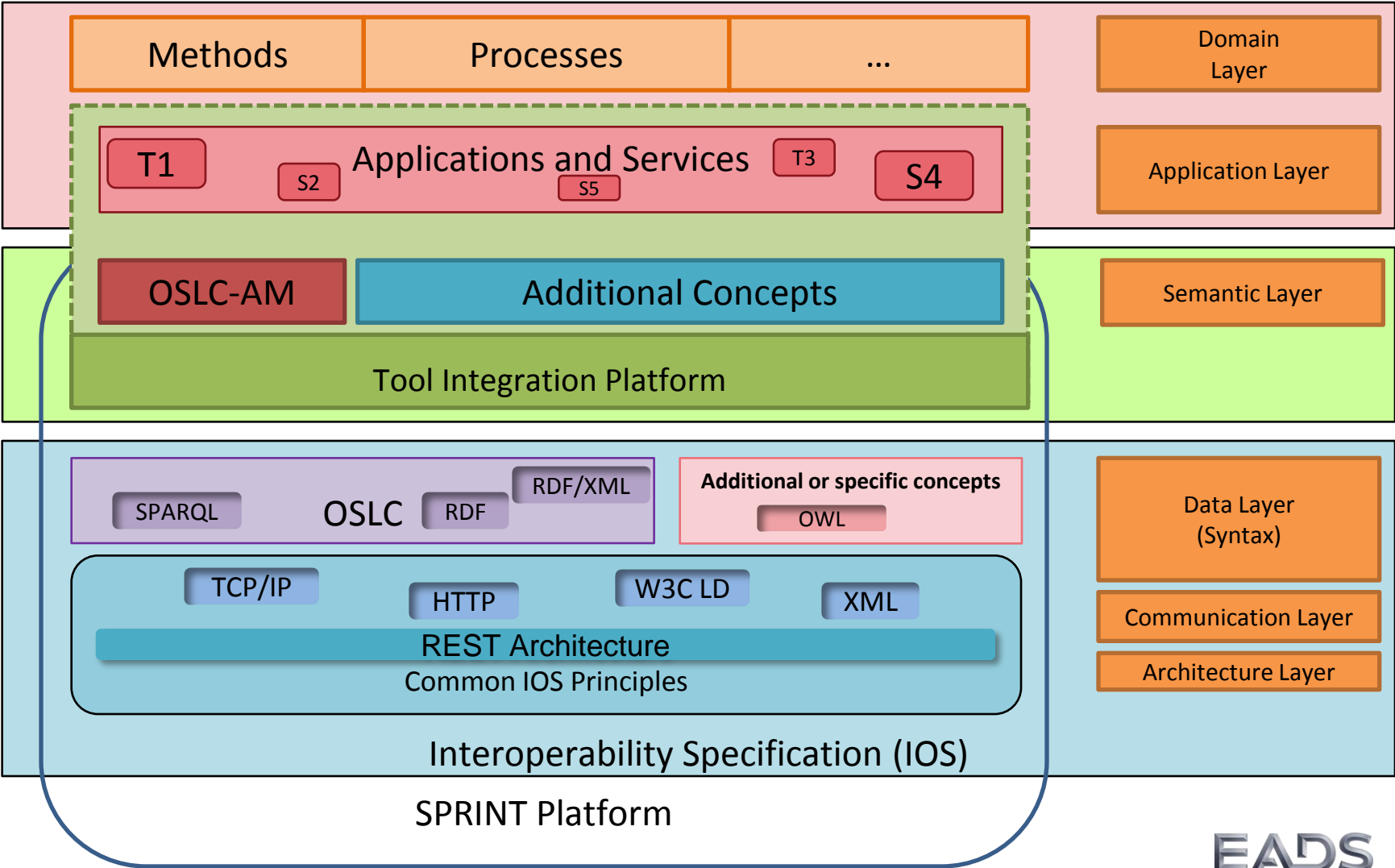
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# From Point-2-Point to “Hub and Spoke”



# The SPRINT Collaboration Platform Architecture



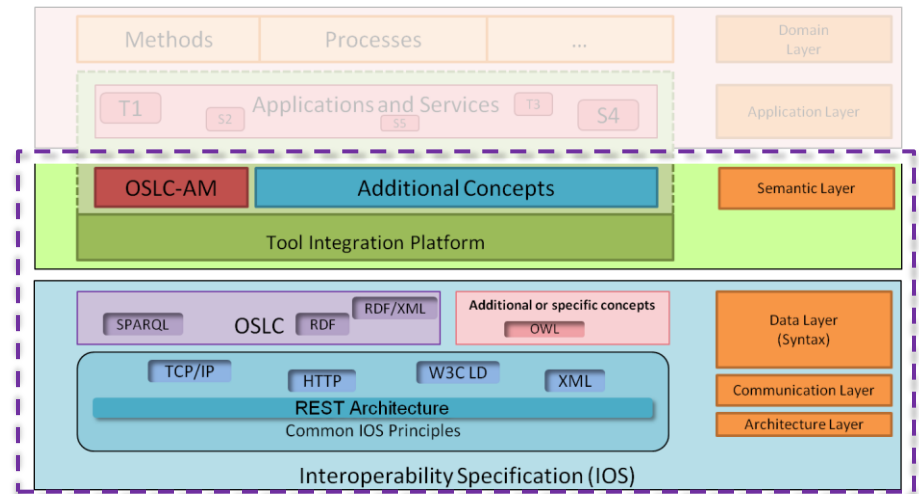
# Focus of this presentation

This presentation will focus on the tools interoperability problem which may be solved with:

**Part 1:** OSLC as common interoperability

**Part 2:** Semantic Mediation (SM) as additional concept for interoperability

**Part 3:** Collaboration Environments as possible compositions of integration platforms.



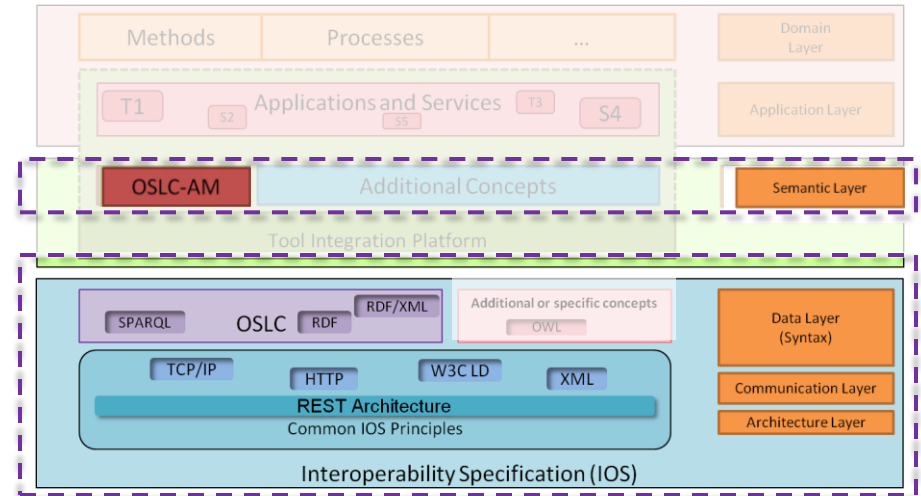
# Part 1: OSLC as common interoperability

## ► Role of OSLC in the Platform Architecture

Tool integration approach based on **interoperability technologies** proposed by the Open Services for Lifecycle Collaboration (OSLC).

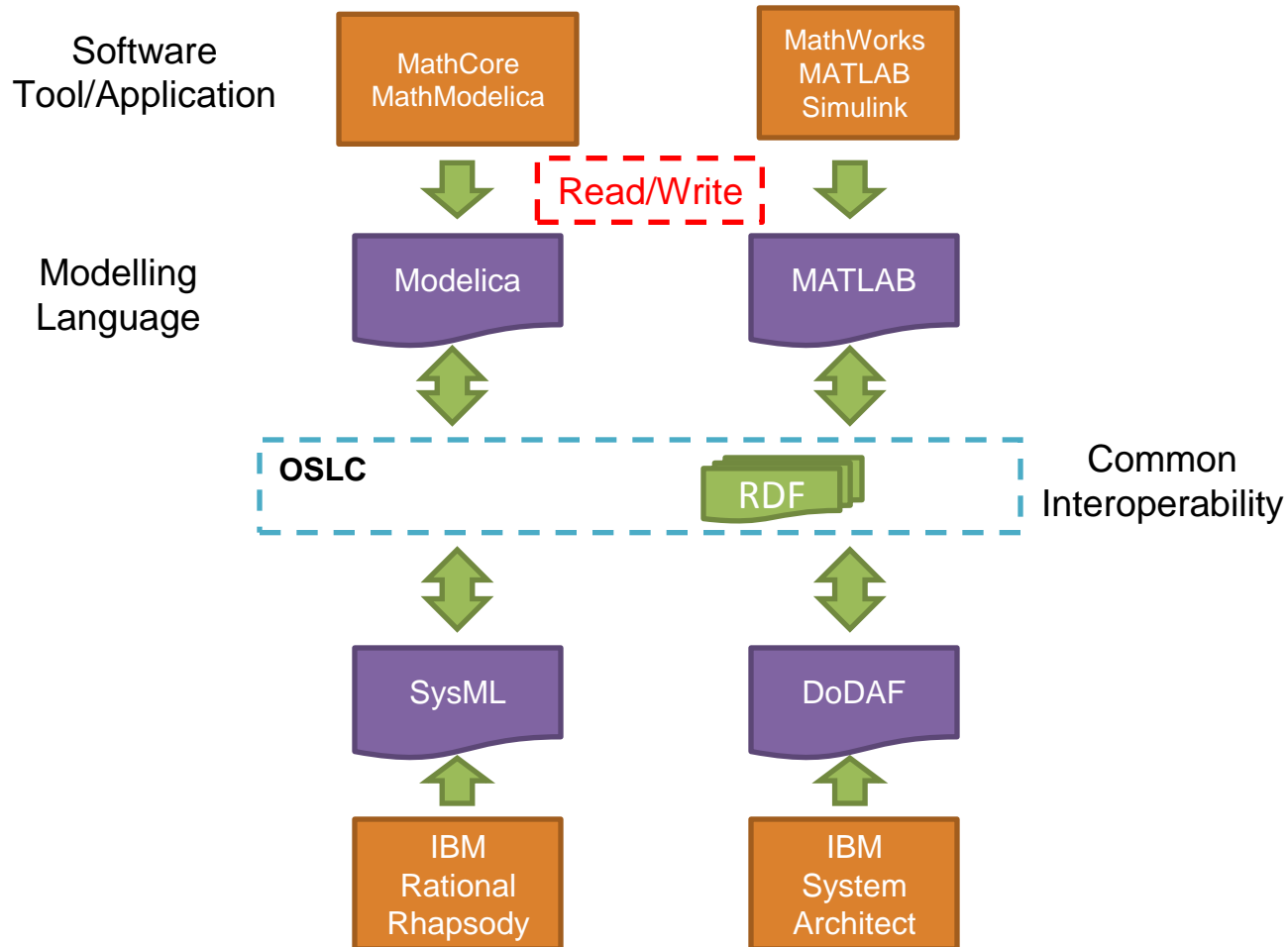
These **standard internet technologies** allows the sustainability and acceptance of the solution in the future.

The **OSLC-AM** is used to specify semantics for resources.



# Part 1: OSLC as common interoperability

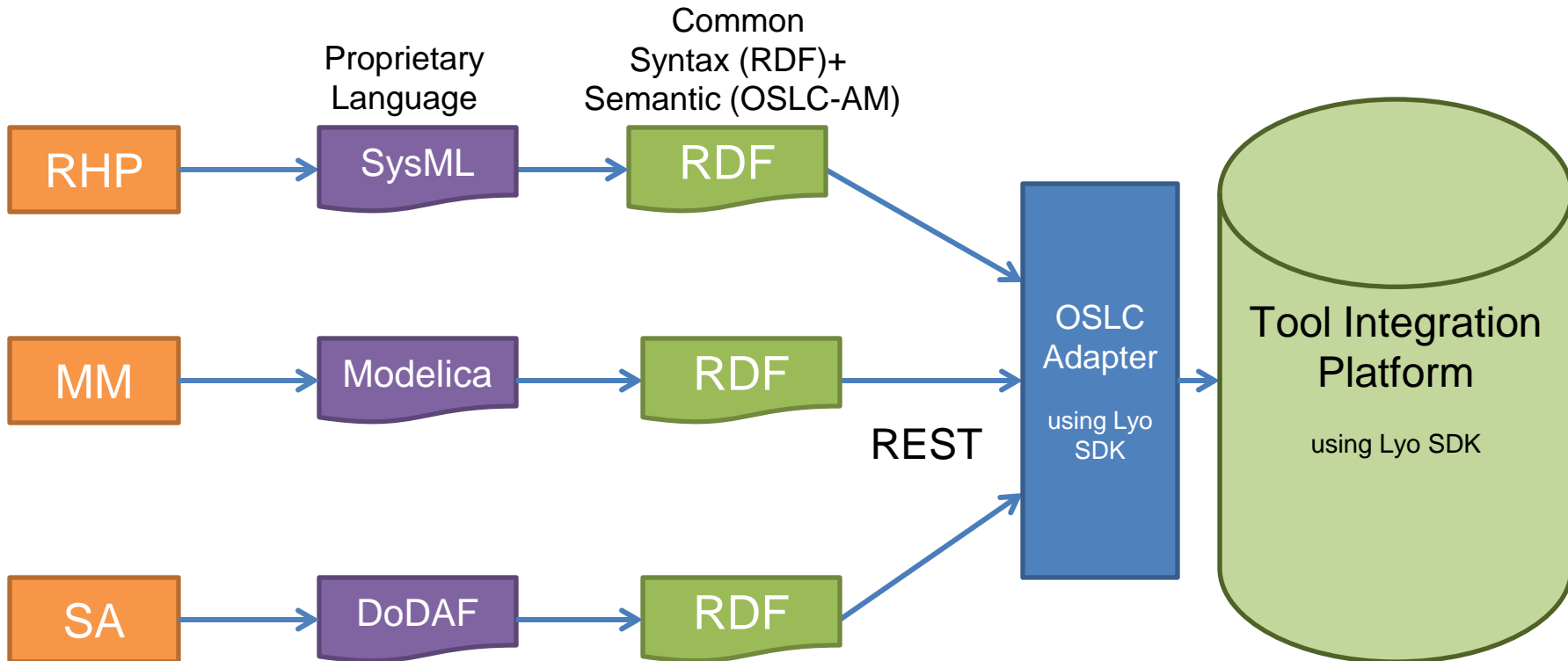
## ► Tools Interoperability in a nutshell



# Part 1: OSLC as common interoperability

## ► OSLC Architecture Management Domain

The OSLC-AM domains give the minimum common vocabulary to allow architecture modeling and design tools not only the exchange of information but their understanding





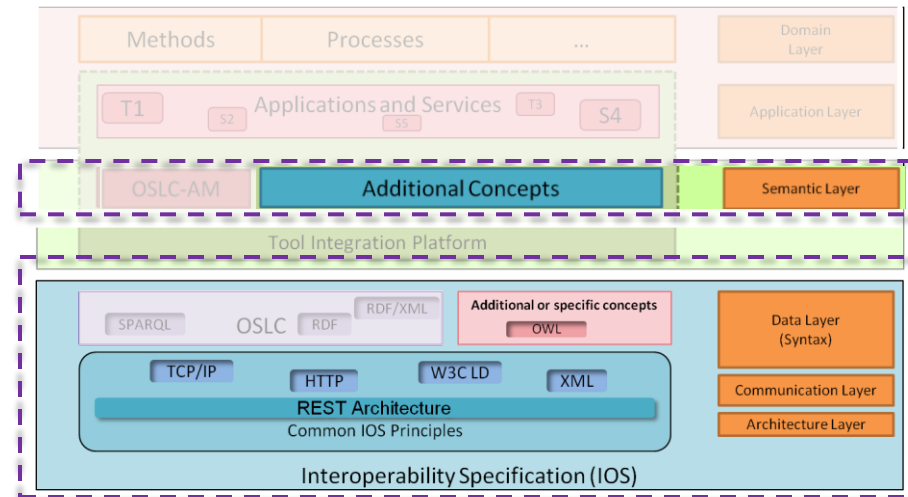
# Part 2: SM as additional concept for interoperability

## ► Role of SM in the Platform Architecture

In many cases different architecture tools or languages has additional concepts (types) which are not covered by the OSLC-AM.

**Semantic Mediation** allows the composition of semantic rules in OWL.

The **standard internet technologies** are still responsible for the communication and data exchange format.



## Part 2: SM as additional concept for interoperability

### ► What is Semantic Mediation?

To reach a model in a destination language based on a source language one can use the following methods:

**Translation:** Mapping of elements from the source to the destination language.

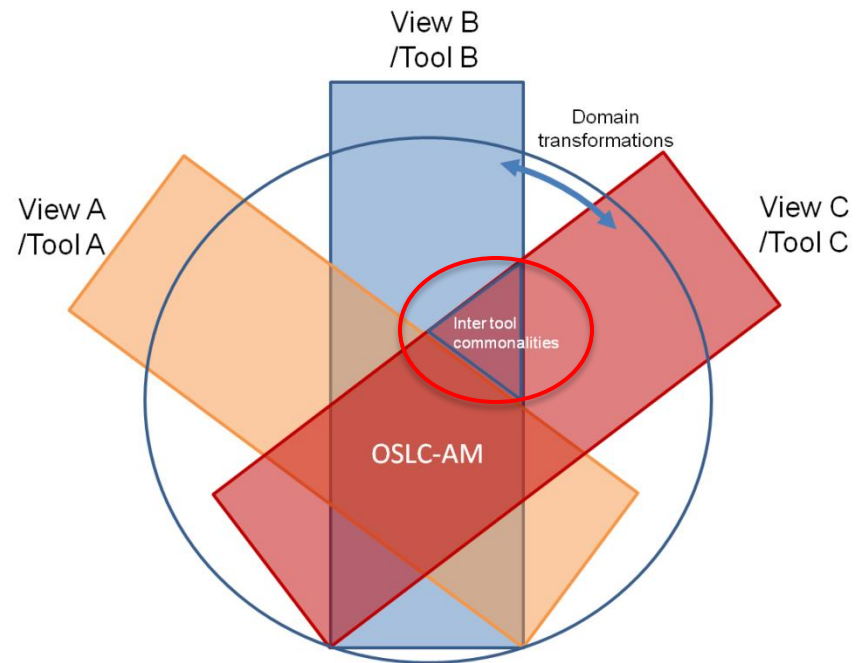
- A new model will be created.

**Transformation:** Changing of element types from the source to the destination language.

- The existing model will be transformed.

**Semantic Mediation:** Identifying similar types of both languages based on an ontology/semantic rule set.

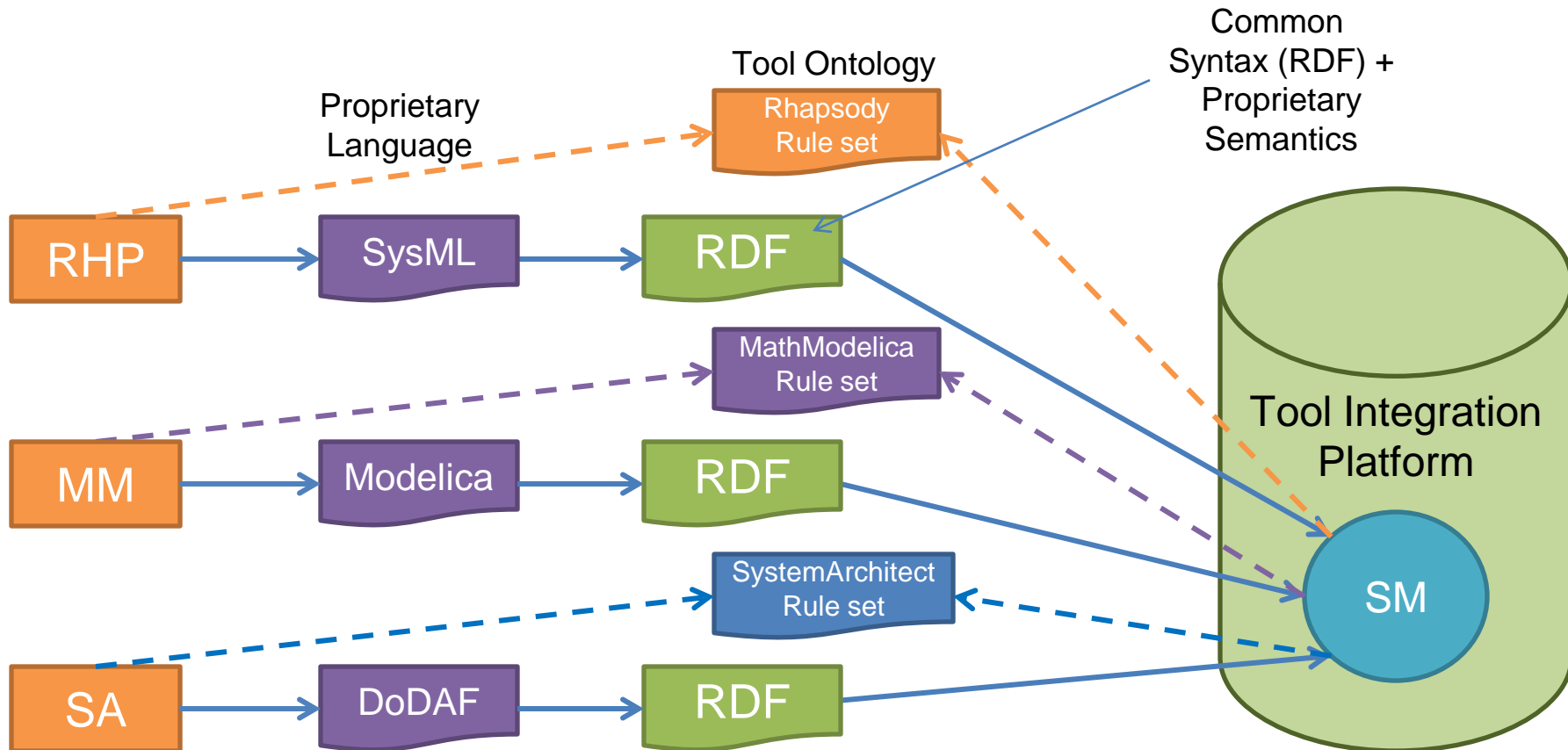
- A new model will be composed.



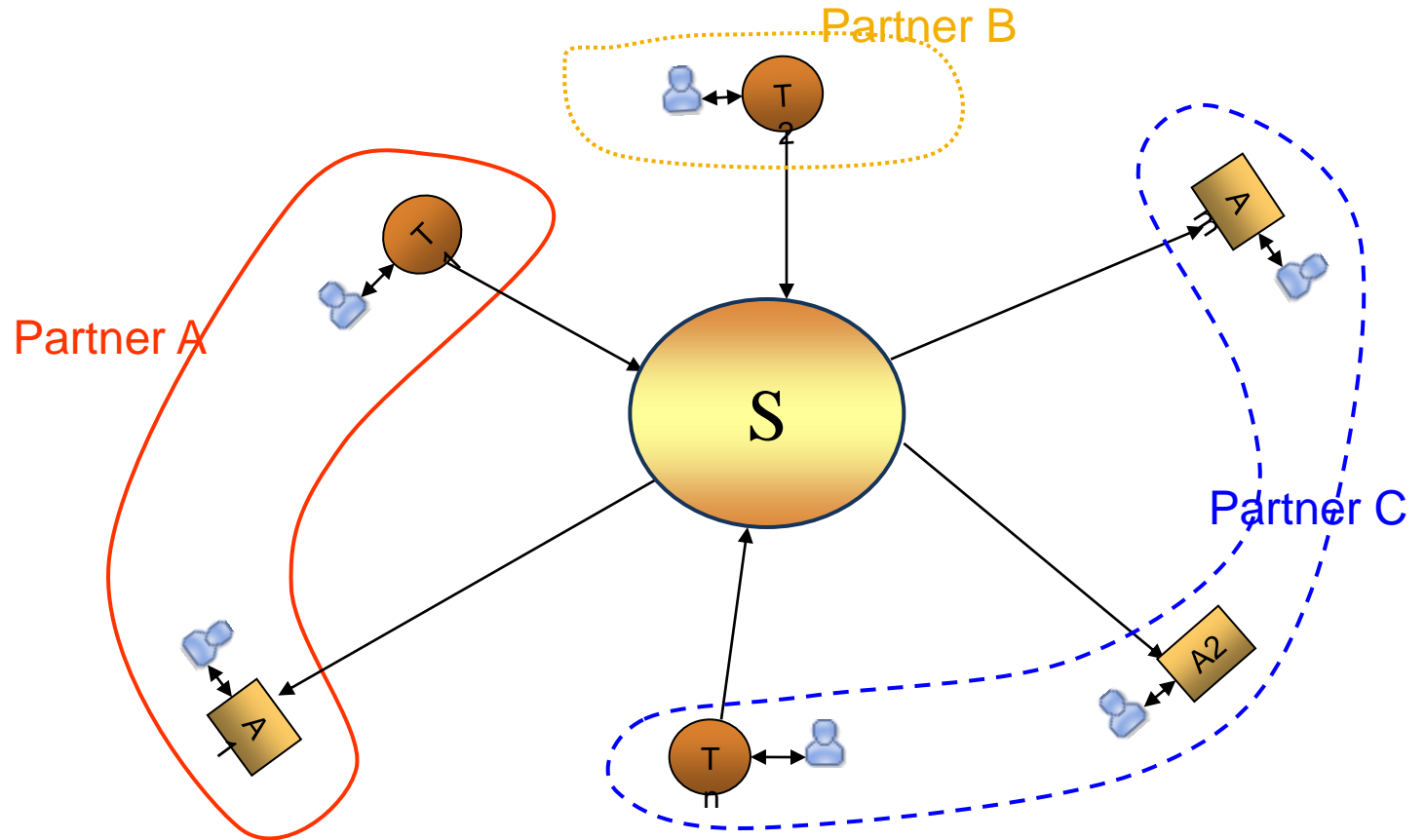
# Part 2: SM as additional concept for interoperability

## ► The SM approach and its elements

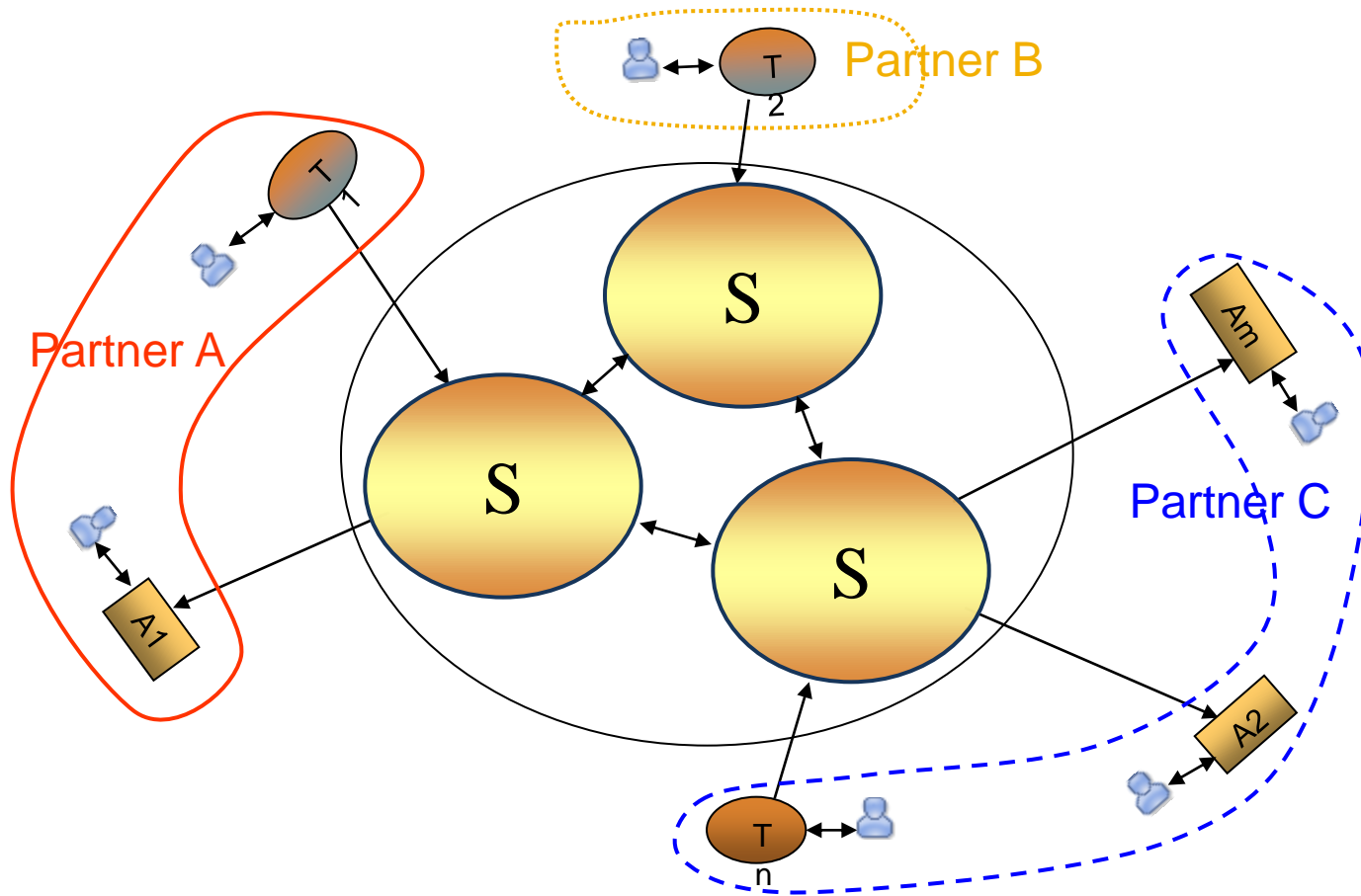
By defining semantic rules, the system can identify resources from one language A to be semantically same as an element from language B.



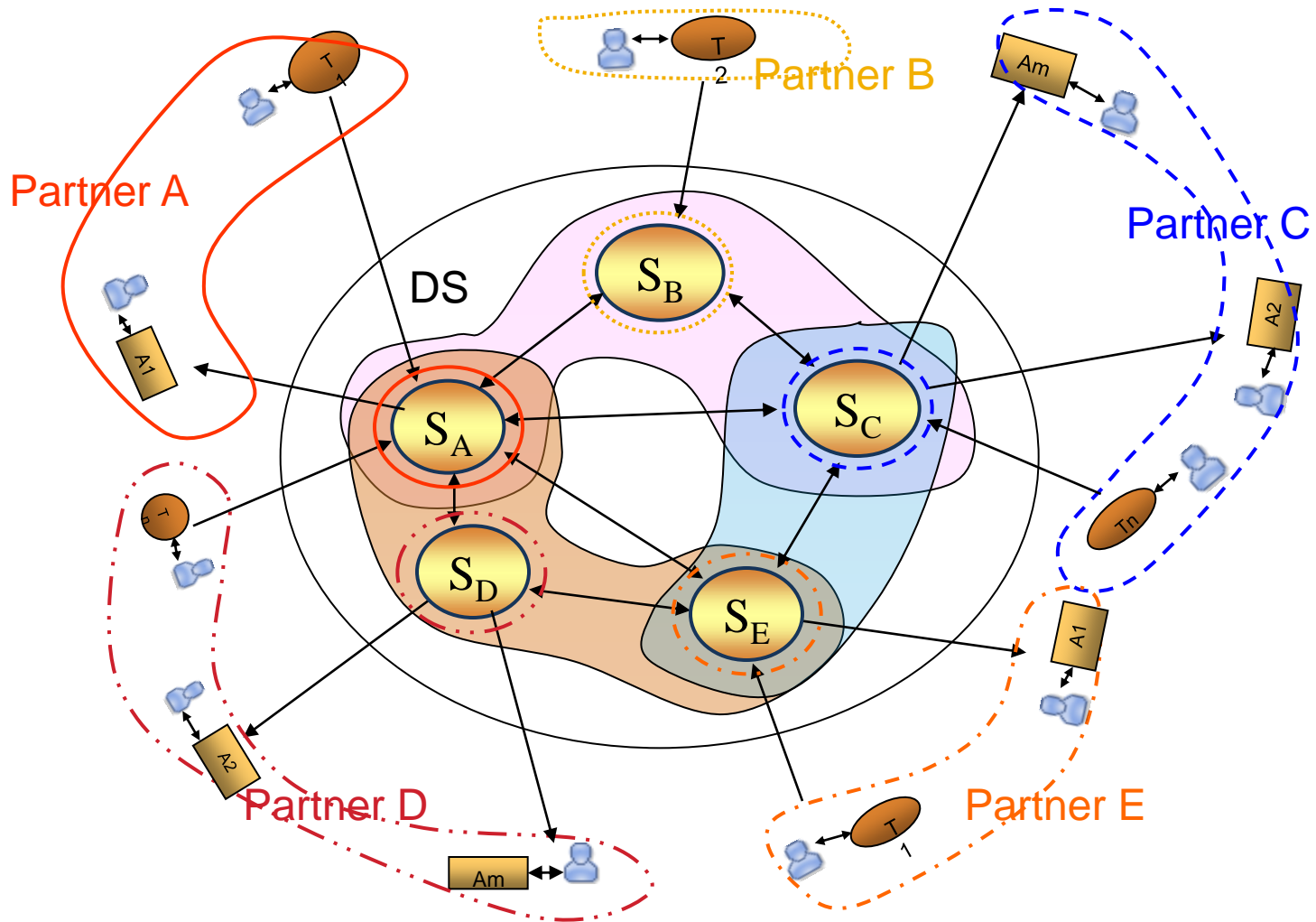
## Part 3: Collaborative Environment (SPRINT Year 1)



# Part 3: Distributed Collaboration (SPRINT Year 2)



# Part 3: Multi-project Distributed Collaboration (SPRINT Year 3)



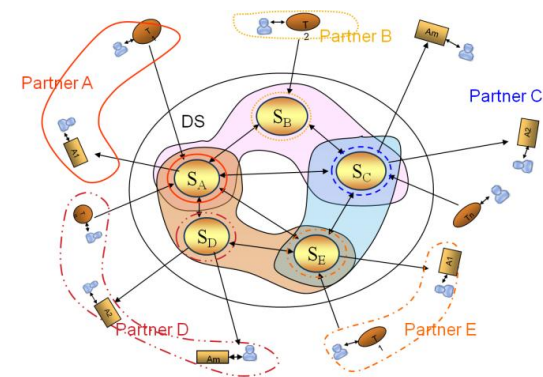
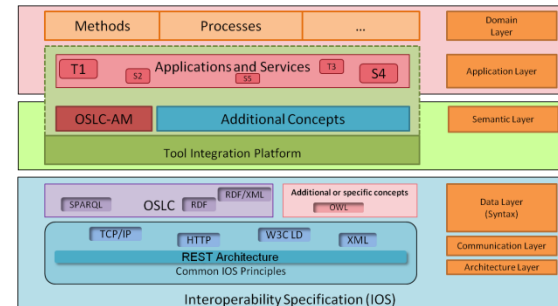
# Conclusion

The “**Common IOS Principles**” based on OSLC technologies allows a step by step implementation approach.

Based on this **agreement of communication and data exchange formats** one can build stable and future proof fundament.

The **OSLC Domains** are used as the common interoperability part

**Semantic Mediation** is used in addition to the OSLC domains, to allow the interoperability based on non OSLC concepts.



# Thank you for your attention!

Time for your Questions



Visit us at: [www.sprint-iot.eu](http://www.sprint-iot.eu)

Andreas Keis (EADS Innovation Works, Newport, United Kingdom)

[Andreas.Keis@eads.com](mailto:Andreas.Keis@eads.com)

Parham Vasaiely (EADS Innovation Works, Newport, United Kingdom)

[Parham.Vasaiely@eads.com](mailto:Parham.Vasaiely@eads.com)

Uri Shani (IBM Israel Science and Technology Ltd., Haifa)

[SHANI@il.ibm.com](mailto:SHANI@il.ibm.com)