Software Center

Theme 2
Continuous Architecture

Reporting Workshop, Sprint 11
2016-12-08

Current theme 2 projects

- #26 API Strategy, *Imed Hammouda*
- #2 Managing Architectural Technical Debt, *Terese Besker*
- #24 Ensuring Quality of Service through Modeling of Service-level Agreements in Industrial IoT, *Saad Mubeen*
- #16 Managing Interoperability Concerns in Large Systems, *Romina Spalazzese*
- #22 Evolution support for architectural artefacts, *Federico Ciccozzi*
- #25 Closing the Safety-Security gap in software intensive systems, *Kaj Hänninen*
- (#4 Model Driven Engineering, *Truong Ho-Quang*)

Theme 2 – Continuous Architecture

Project #26: API Strategy, *Imed Hammouda*

Software Center

CHALMERS
UNIVERSITY OF TECHNOLOGY

UNIVERSITY OF GOTHENBURG

API Strategy – APIS

Project #26

Sprint 11 Reporting Workshop

December 8th 2016

CHALMERS UNIVERSITY OF TECHNOLOGY | UNIVERSITY OF GOTHENBURG

Researchers

Imed Hammouda

Eric Knauss

Juho Lindman

Industrial Partners

AXIS COMMUNICATIONS — Fredrik Hugosson

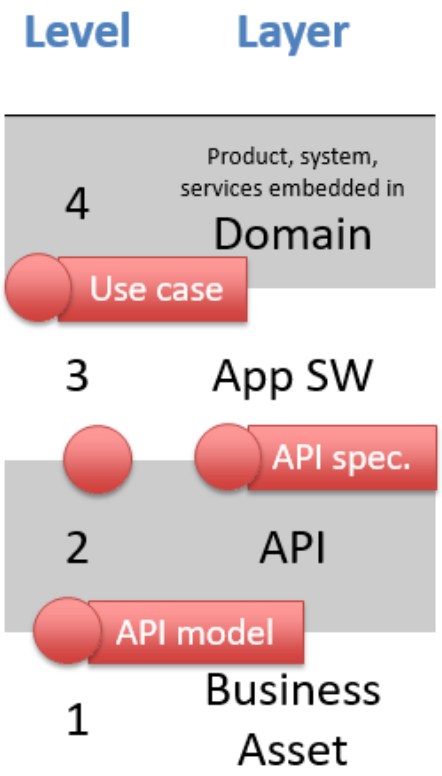
GRUNDFOS — Yuriy Dovgalyuk

verisure — Lars Gråmark, Peter Bengtsson

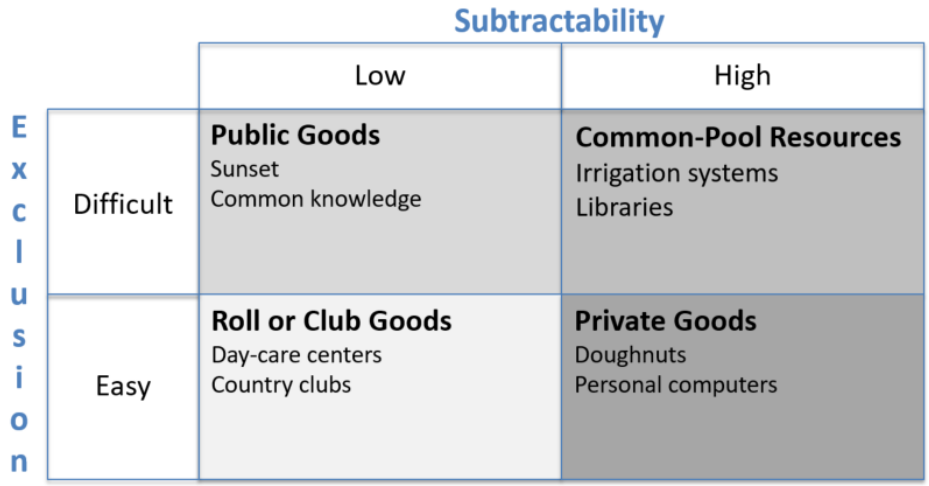
ERICSSON — Magnus Standar, Peter Eriksson, Mårten Rånge

Tetra Pak — Anna Andersson, Jonas Holmer, Börje Johansson

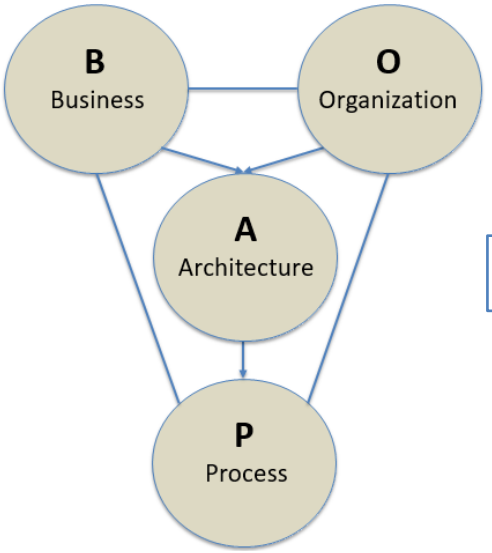
Multi-disciplinary Approach to APIs



APIs as Digital Innovation Objects

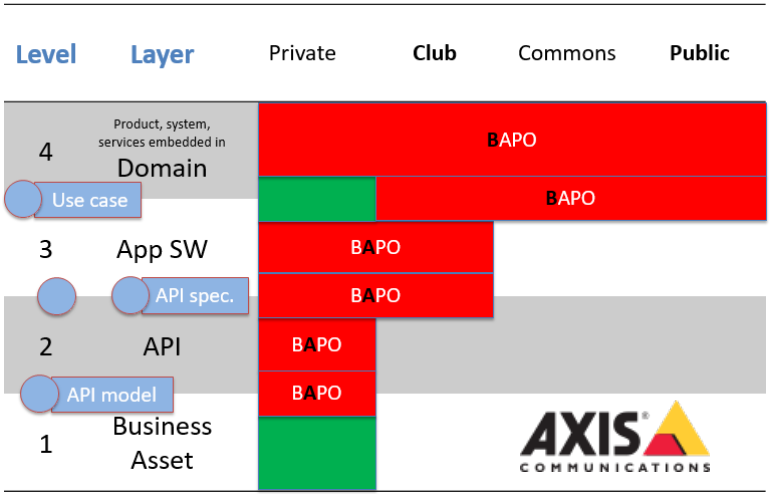


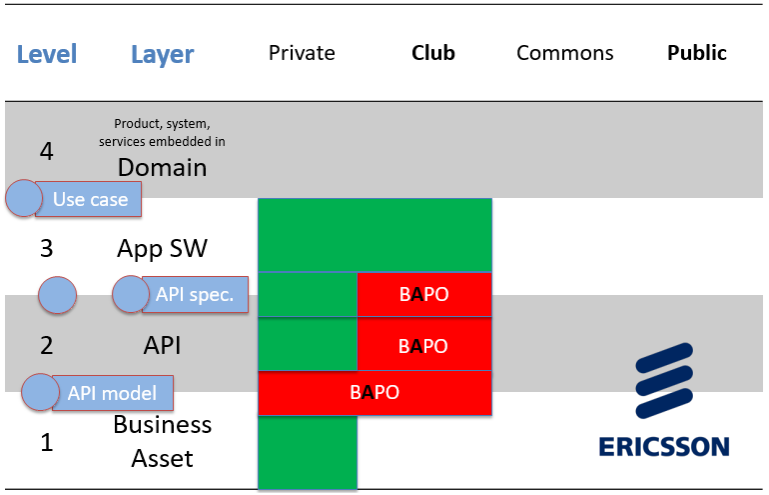
APIs and Governance

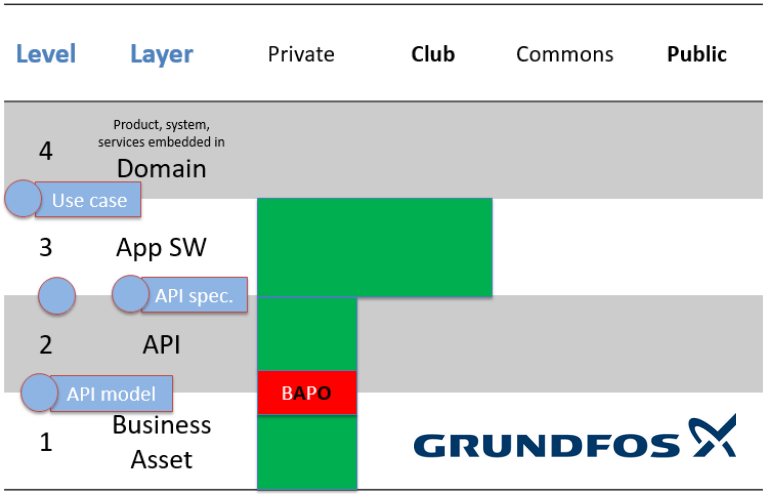


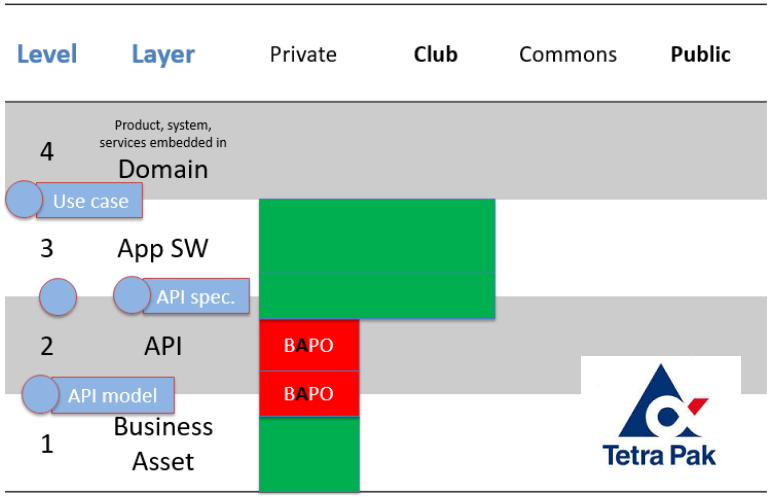
Method for API Engineering

Case Studies



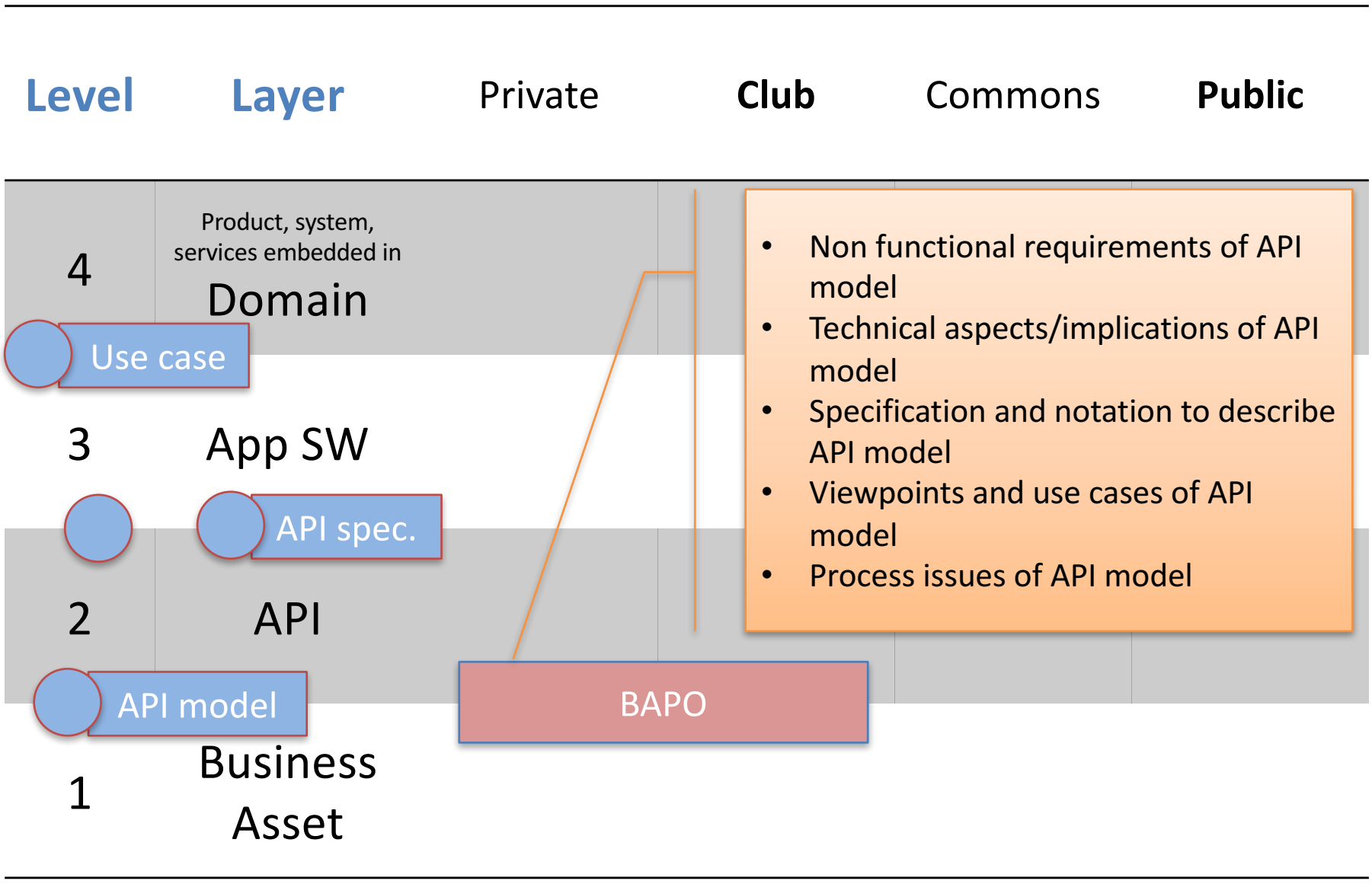






I. Hammouda, J. Lindman, E. Knauss. **Emerging Perspectives to API Strategy**. Submitted to ICSE 2017

Sprint 12


Level
Layer
Private
Club
Commons
Public
4
Product, system, services embedded in
Domain
Use case
3
App SW
API spec.
2
API
API model
BAPO
1
Business Asset
Non functional requirements of API model
Technical aspects/implications of API model
Specification and notation to describe API model
Viewpoints and use cases of API model
Process issues of API model

Theme 2 – Continuous Architecture

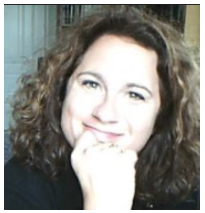
Project #2: Managing Architectural Technical Debt, *Terese Besker*

Software Center

Presentation of Results from Sprint 11

Software Center

Terese Besker
Antonio martini
Jan Bosch



Managing Architectural Technical Debt

How much and what is **wasted** because of TD?

How does **TD affect** software developers' **morale**?

What are the **benefits** and **challenges** of **tracking** TD?

Which system **qualities** are **affected** by TD?

What **tools** can we use to **track** TD?

How can we **decide** if it's **convenient** to **refactor**?

Morale

Our research shows that having Technical Debt in the systems is *stressful* for the practitioners and have a negative effect on the *team spirit.*

Stay tuned, more results coming soon.

Next sprint:

- We have just scratched the surface of the data… more is coming!
- On-going evaluation of software tool *AnaConDebt* to track the interest of TD
- We will organize a multi-company workshop in the spring

Theme 2 – Continuous Architecture

Project #24: Ensuring Quality of Service through Modeling of Service-level Agreements in Industrial IoT, *Saad Mubeen*

Software Center

Project # 24

SLA-IoT: Ensuring Quality of Service through Modeling of Service-level Agreements (SLAs) in Industrial IoT

Saad Mubeen, Hongyu Pei-Breivold,

Moris Behnam, Alessandro Papadopoulos

Date: 2016-12-08

SWC Reporting Workshop, Gothenburg

Project Goals

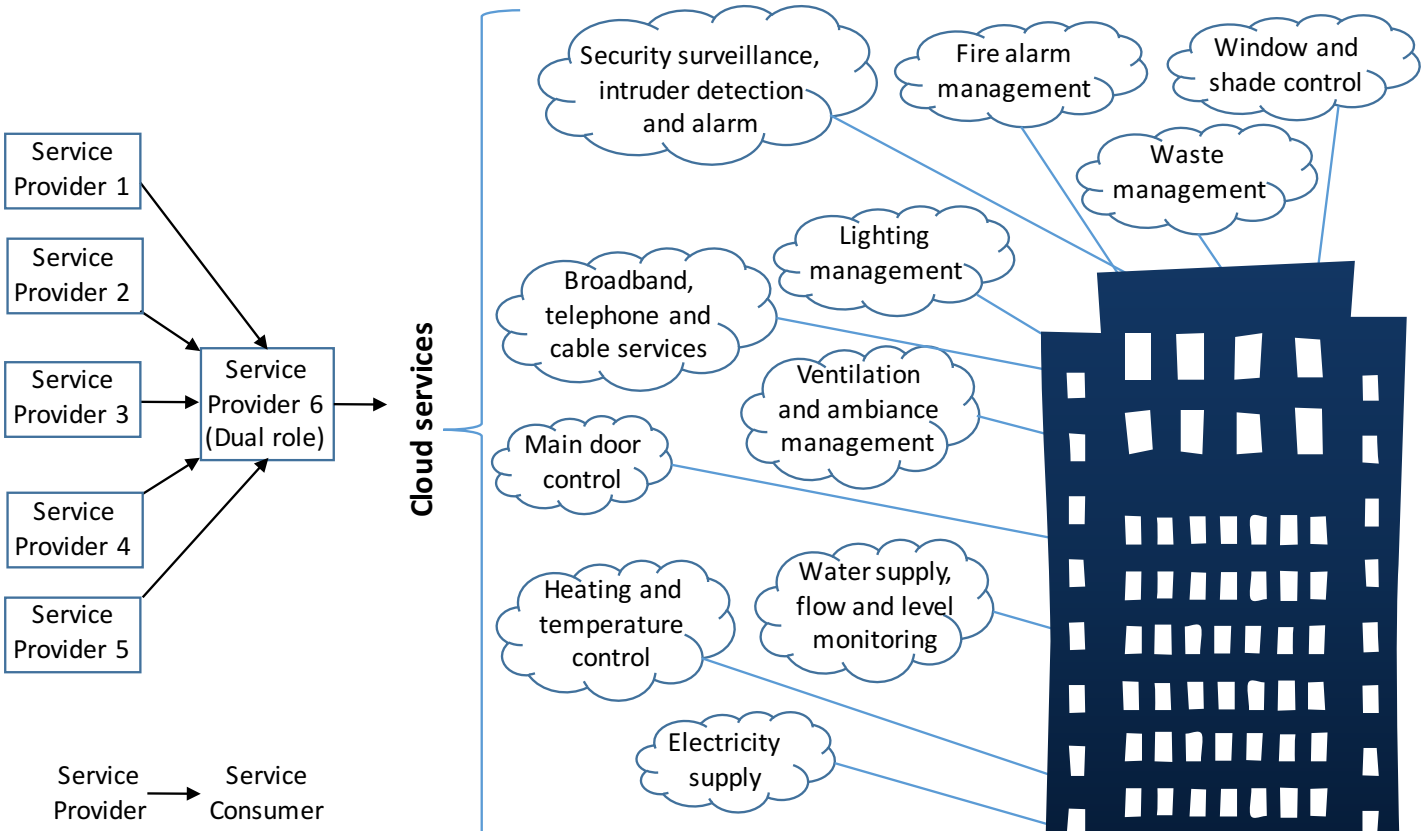
- SLA definition/negotiation in the context of Industrial IoT applications
  - End device and cloud
  - Provider and consumer cloud services

- Perspectives in SLAs
  - Technical (main focus)
  - Business (partial focus)
  - Legislation

- QoS Parameters in SLAs
  - Reliability, availability, dependability, robustness, security, safety, latency and jitter

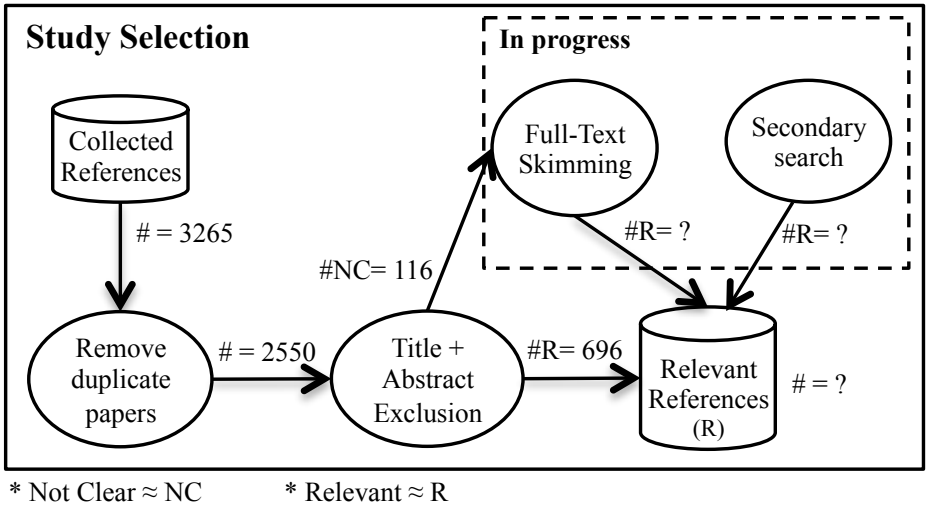
SLAs for Double Roles

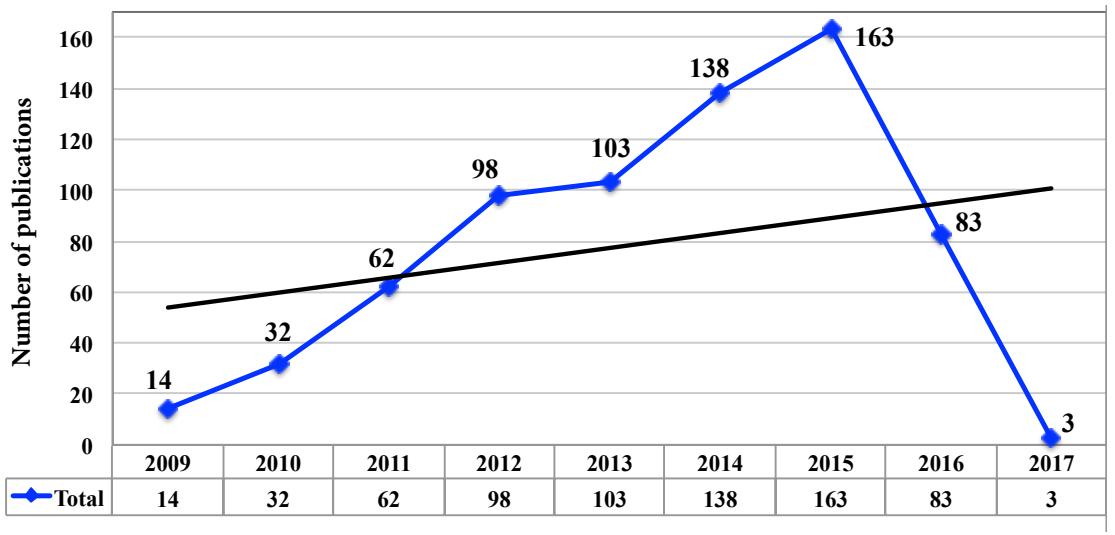
- Different vendors involved in the **supply chain of services**



Project Activities

- **Questionnaires** and **Interviews**
- Identification of **QoS parameters**
- Identification of **use cases**
- Systematic Mapping Study





Thanks!

GRUNDFOS

Theme 2 – Continuous Architecture

Project #16: Managing Interoperability Concerns in Large Systems, *Romina Spalazzese*

Software Center

MALMÖ UNIVERSITY
FACULTY OF TECHNOLOGY AND SOCIETY

Managing Interoperability Concerns in Large Systems

Dr. Romina Spalazzese
Senior Lecturer in Computer Science - Malmö University

romina.spalazzese@mah.se
http://www.rominaspalazzese.com

Who is interested

AXIS COMMUNICATIONS

ERICSSON

JEPPESEN A BOEING COMPANY

SAAB TECHNOLOGIES

SAAB

SIEMENS

Tetra Pak

verisure

VOLVO

VOLVO

CHALMERS | UNIVERSITY OF GOTHENBURG

MALMÖ HÖGSKOLA

Romina Spalazzese, Malmö University (PI)
Ulrik Eklund, Malmö University
Patrizio Pelliccione, Chalmers|GU

Vision: To identify how to improve interoperability related issues among evolving software systems

Interoperability

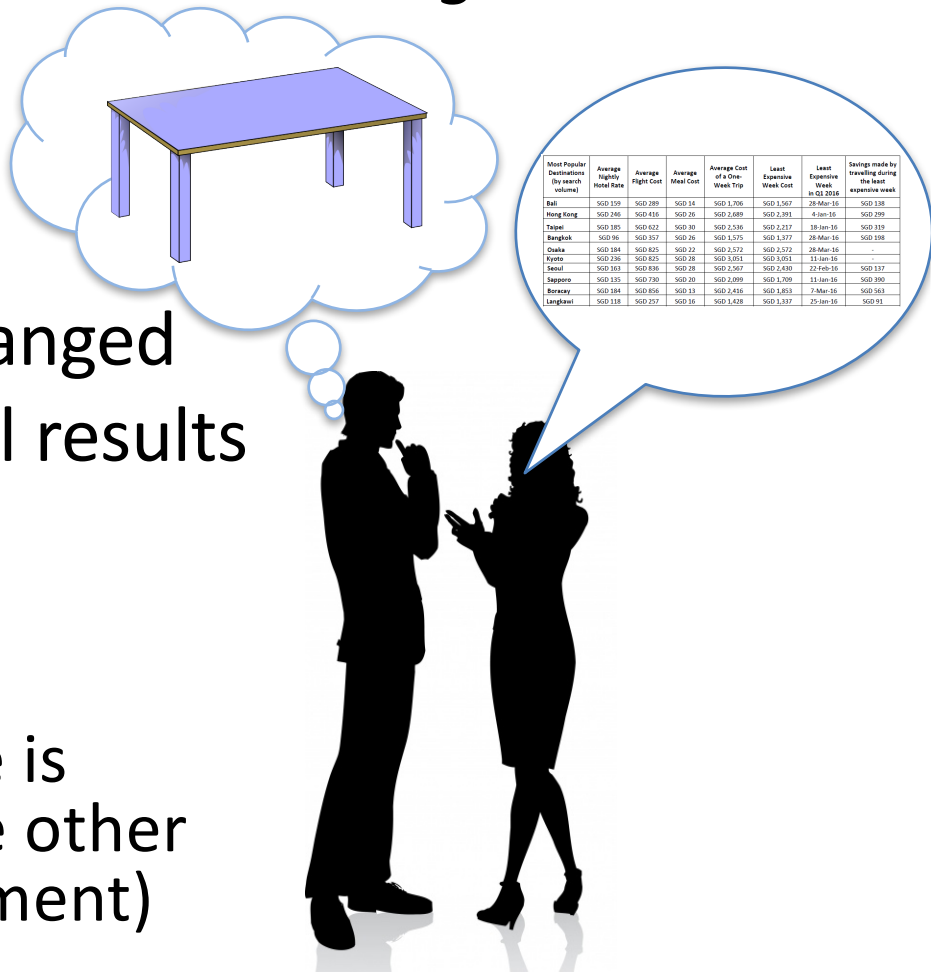
- Is the ability of two or more (software) systems or components to
  1. *exchange information*
  2. *use the information that has been exchanged*

- ISO/IEC/IEEE 24765:2010 Systems and software engineering - Vocabulary. Available at: https://www.iso.org/obp/ui/#iso:std:iso-iec-ieee:24765:ed-1:v1:en

Interoperability

Syntactic interoperability

communication and data *exchange*



Most Popular Destinations (by search volume)	Average Nightly Hotel Rate	Average Flight Cost	Average Meal Cost	Average Cost of a One-Week Trip	Least Expensive Week Cost	Least Expensive Week in Q1 2016	Savings made by travelling during the least expensive week
Bali	SGD 159	SGD 289	SGD 14	SGD 1,706	SGD 1,567	28-Mar-16	SGD 138
Hong Kong	SGD 246	SGD 416	SGD 26	SGD 2,689	SGD 2,391	4-Jan-16	SGD 299
Taipei	SGD 185	SGD 622	SGD 30	SGD 2,536	SGD 2,217	18-Jan-16	SGD 319
Bangkok	SGD 96	SGD 357	SGD 26	SGD 1,575	SGD 1,377	28-Mar-16	SGD 198
Osaka	SGD 184	SGD 825	SGD 22	SGD 2,572	SGD 2,572	28-Mar-16	-
Kyoto	SGD 236	SGD 825	SGD 28	SGD 3,051	SGD 3,051	11-Jan-16	-
Seoul	SGD 163	SGD 836	SGD 28	SGD 2,567	SGD 2,430	22-Feb-16	SGD 137
Sapporo	SGD 135	SGD 730	SGD 20	SGD 2,099	SGD 1,709	11-Jan-16	SGD 390
Boracay	SGD 184	SGD 856	SGD 13	SGD 2,416	SGD 1,853	7-Mar-16	SGD 563
Langkawi	SGD 118	SGD 257	SGD 16	SGD 1,428	SGD 1,337	25-Jan-16	SGD 91

Semantic interoperability

proper interpretation of exchanged information to produce useful results

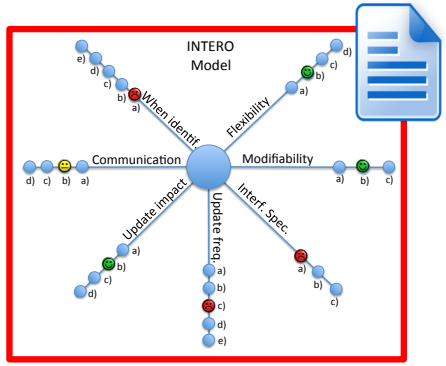
Pragmatic interoperability:

the intended *effect* of a message is achieved, i.e., understood by the other system (*context* as first class element)

What we have done/Results

1. Identified and prioritized *concrete interoperability issues* among *evolving software* systems focusing on software development

1. Defined the INTERO model including:
   - Dimensions
   - Measures
   - Satisfaction values



INTERO model

2. Put into practice the INTERO model:
   - Two experiences within two companies (theses)
   - One experience with a company (workshop)

What we have done/Results

4. Submitted a journal paper (IEEE Software)
5. Submitted a conference paper to (ICSE 2017)
6. Finalizing a journal paper to be submitted by the end of the sprint
7. Defined initial guidelines on how to use INTERO
8. Run a workshop at Axis

…more to come!!

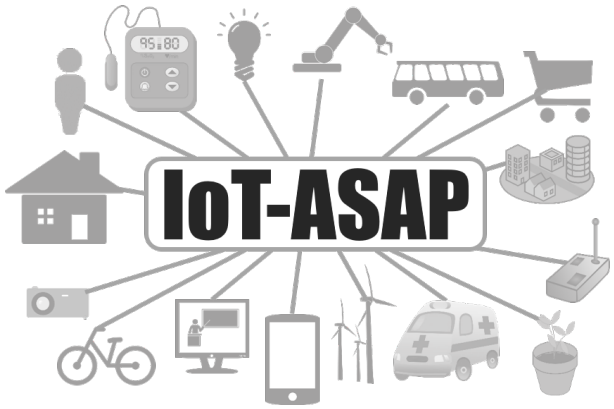
Plans for Sprint 12

- Obj 1: continue the validation of INTERO model with the companies
- Obj 2: refine the guidelines on how to use the model
- Obj 3: validate the guidelines with the companies
- Obj 4: refine guidelines and INTERO model – if needed as follow up of Obj 1,2,3

…do not miss the breakout session!

Project #16 - Interoperability

Continuous Architecture Theme



International Workshop on Engineering IoT Systems: Architectures, Services, Applications, and Platforms

http://IoT-ASAP.cs.upb.de

(tentative date) April 4, 2017, Gothenburg, Sweden

Paper submission deadline: February 23, 2017

In conjunction with ICSA 2017

IEEE International Conference on Software Architectures

(http://icsa-conferences.org/2017/)

Theme 2 – Continuous Architecture

Project #22: Evolution support for architectural artefacts, *Federico Ciccozzi*

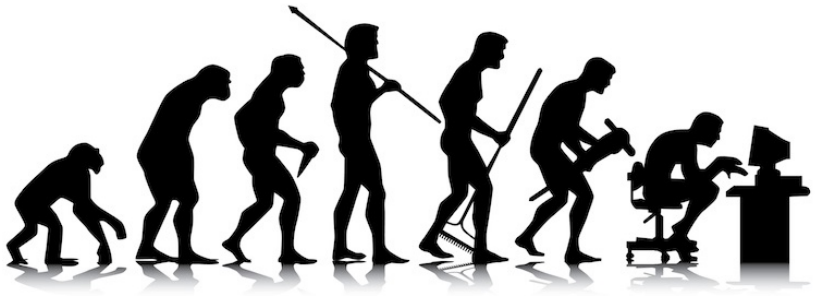
Software Center

Evolution Support for Architectural Artefacts

Software Center Reporting Workshop, 2016-12-08

Jan Carlson, Antonio Cicchetti and Federico Ciccozzi

Mälardalen University



Background

- Growing software complexity
  - Highlights the need for development at higher abstraction levels
  - Use of models for documenting, communicating, analysing and implementing software
- Need for shorter development cycles and faster feedback
  - Agile development strive to avoid heavy upfront design
  - Focus on working software over comprehensive documentation
- Continuous Architecture
  - Reconcile continuous development with good architectural practices
  - One aspect is that architectural artefacts must be allowed to evolve more continuously, following the evolution at code level

Sprint 11 summary

MÄLARDALENS HÖGSKOLA
ESKILSTUNA VÄSTERÅS

- Industrial involvement: 3 → 4 companies involved
  - Volvo Cars
  - Volvo Group
  - Saab AB
  - **Tetra Pak**
- Analysis and synthesis of interviews from Sprint 10
  - Publication at the 10th International Workshop on Models and Evolution at the MODELS conference
  - Identified key challenges in evolution of architectural artefacts
- Cross-company workshop
  - Discussion of interviews results and identified challenges
  - Planning for next steps

Plans for sprint 12

- Focus on common practices and issues
- Investigate company-specific artefacts, relations among them, and common evolution scenarios
- Identify commonalities and differences and a way to describe them
- Results are expected to be published as a conference paper

Thank you!

Questions, comments or suggestions?

Talk to us during the day, or come to the afternoon presentation!

Jan Carlson
<jan.carlson@mdh.se>

Antonio Cicchetti
<antonio.cicchetti@mdh.se>

Federico Ciccozzi
<federico.ciccozzi@mdh.se>

Theme 2 – Continuous Architecture

Project #25: Closing the Safety-Security gap in software intensive systems, *Kaj Hänninen*

Software Center

CloSS
Closing the Safety-Security gap in software intensive systems

Kaj Hänninen

Project team

Mälardalen University
- Dr. Kaj Hänninen
- Adj.Prof. Henrik Thane
- Dr. Aida Causevic
- Prof. Hans Hansson

Industrial partners
- Saab avionics
- Volvo construction equipment
- Tetra Pak




Software Center

Challenges

- Safety critical systems are becoming “open” and “connected”
  - Vulnerable to security threats
- Security risks affecting safety, not covered by current safety assurance
  - Risk for accidents and liability lawsuits

Project goals

- To understand how security risks that affects safety should be identified and managed
- To propose an extended risk analysis process for a “combined” safety/security approach

What we have done this sprint

- Investigated how system definitions have to be extended to cover both safety and security
  - Risk reasoning
- Started to investigate how safety assurance is affected by security risks
  - Process harmonisation

- Workshops with partners
- WiP paper on-going

Plans for the next sprint

- Develop a structured approach to identify interfaces that poses security risks
  - People, technology, environments, …
- Investigate how the fundamental failure modes, considered in safety assurance, are affected by security threats
  - Risk reduction purposes, countermeasures and mitigations

CloSS

www.software-center.se

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