

# Quality Prediction (QP) Working Group

**"Prediction is very difficult, especially if  
it's about the future."**

**Nils Bohr**

*Andreas Metzger & QP WG Members  
Budapest, June 2011*

# Quality Prediction WG: Motivation

- **Observation: many people within and outside S-Cube work on QP**
- **Agreement on general problem exists, but different solutions are pursued**
  - (see next slides)
- **Need to better understand where and when the approaches work best**
  - compare and contrast approaches
    - Conceptually
    - Experimentally
      - Exploiting benchmarks or (at least) joint application scenarios

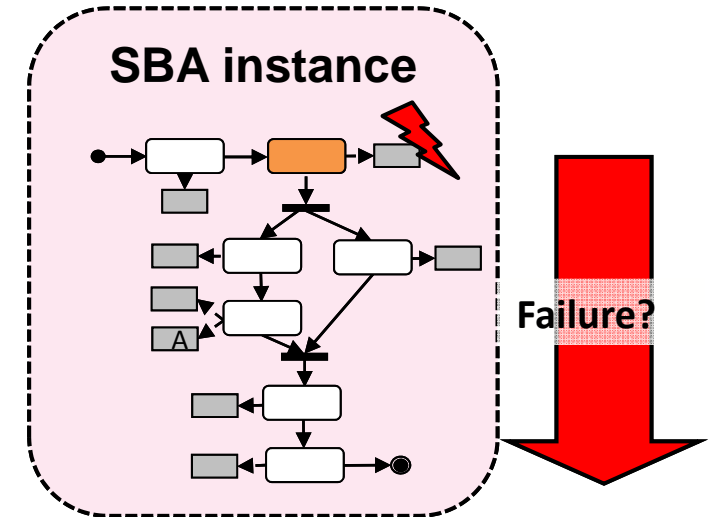
# Quality Prediction: Different Aims

- **Aim: Preventive Adaptation**

- Determine adaptation need before “normal” execution of SBA instance leads to a failure

- **Failure Prediction**

- Considering current & past monitoring data
- Possibly triggered by “local” problem



- **Aim: Proactive Adaptation**

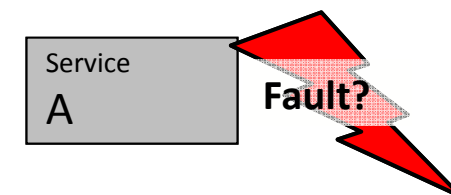
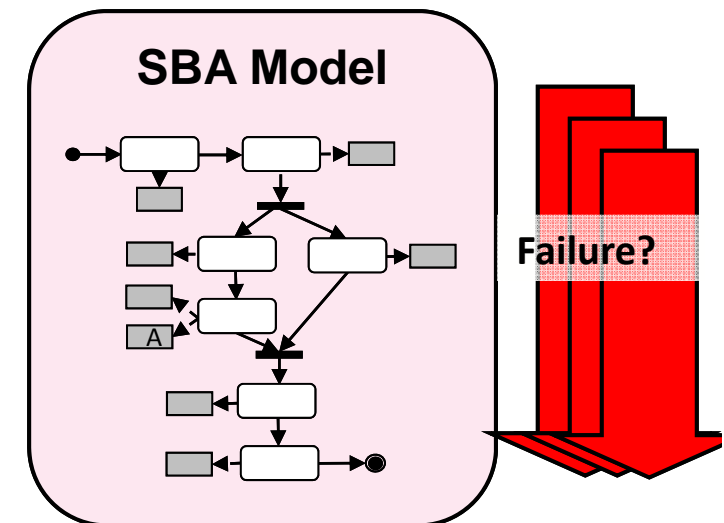
- Determine adaptation need before a “problem” occurs in SBA

- **Failure Prediction**

- Take into account different “scenarios” and monitoring data
- Change model / running SBAs if “scenarios” lead to a violation

- **Fault Prediction**

- Predict quality of constituent services
- Replace service before it is invoked (and would fail) within in SBA



# Quality Prediction: Different Approaches

## S-Cube Progress in Y3 (cf. CD-JRA-1.3.5)

- **Preventive Adaptation: Failure Prediction**

- **Data Mining:** Extract knowledge from “historical” data

- TUW & USTUTT: “Prediction and Prevention of SLA Violations in Composite Services”
- SZTAKI: “Historical Data Based Predictions for Resource Allocation”

- **Run-time Verification:** Formally ascertain that properties hold

- UniDue, FBK, Polimi: “Assumption-based Run-time Verification”

- **Proactive Adaptation: Failure Prediction**

- **Simulation:** Execute dynamic models to simulate behaviour

- UPM & TUW: “Simulation of Provision Resources”
- INRIA: “QoS Assurance Using Discrete-Event Simulation”

- **Static Analysis:** Formally infer properties (without execution)

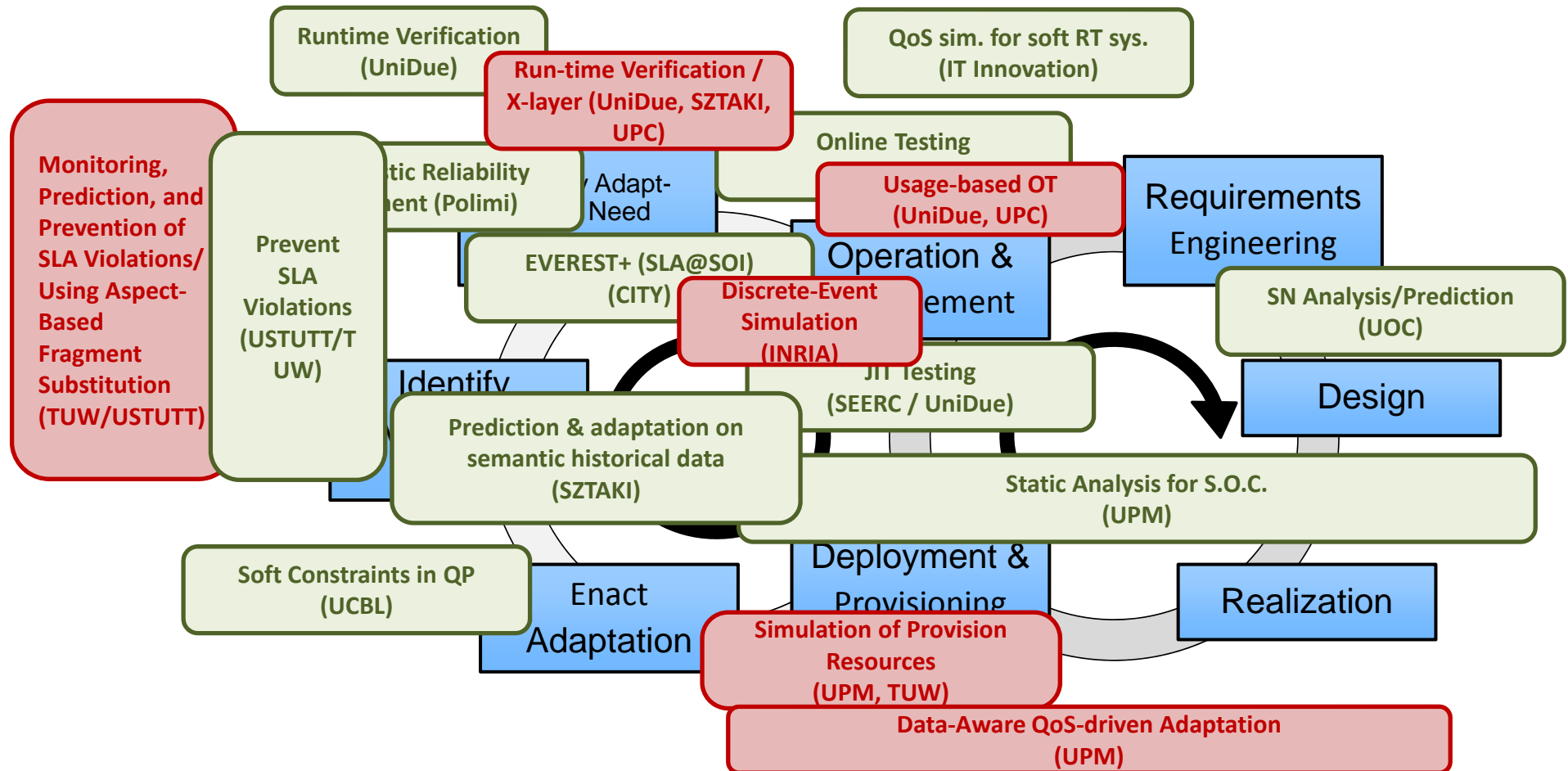
- UCBL & UPM: “Soft Constraints for QoS-Aware Service Selection”
- UPM: “Data-aware Resource Analysis for Service Orchestrations”

- **Proactive Adaptation: Fault Prediction**

- **Online Testing:** Actively execute services in parallel to normal use

- UniDue & UPC: “Augmenting Monitoring with Online Testing”
- SEERC & UniDue: “Just-in-time Testing of Conversational Services”

# Quality Prediction WG: Progress



Nov/10

Jun/11

# Quality Prediction & JRA-1.3: Planning for Y4

- **Publications**

- Plans for papers
- Plans for joint articles

- **Events**

- Next QP WG meeting collocated with forthcoming Global Meeting

- **Deliverable (final one ;-)**

- Same structure as the two previous ones

# Presentations / Roundtable

- (1) US (Universidad de Sevilla) and UPC (Universitat Politècnica de Catalunya): SALMonADA -- Carlos Müller and Marc Oriol.
- (2) FBK: Context-Aware Business Process Evolution – Antonio Bucchiarone
- ...

# Quality Prediction & JRA-1.3: Planned Partner Contributions Y4

	Y4	Contribution
UniDue	4,1	- Contrast and compare QP approaches - Usage-based Online Testing - Run-time verif. for x-layer & preventive adaptation / cost models
Tilburg	3	TBD
CITY	1	- Development and experimental evaluation of proactive SLA negotiation strategies
CNR	3,6	TBD
FBK	2,4	- Prediction of future adaptations (i.e., evolution need) of SBA based on "monitored" adaptations and context
INRIA	1,2	TBD
Lero-UL	0,2	- SLA negotiation and life-cycle
POLIMI	5,5	- penalties based on fuzzy rules - Semantic negotiation (...)
SZTAKI	1,8	- X-layer adaptation (w/ UniDue) - Semantic negotiation (mediation of negotiation protocols / negotiation by delegation; ontology on negot. concepts)
TUW	1	- Contrast and compare QP approaches - Generalize DM to predict SLO evolution (time series)
UCBL	0,5	- Penalties based on fuzzy rules
UOC	0	-
UPM	0,8	- Contrast and compare QP approaches - QP based on analysis of the SBA instance (exploiting "continuation") - Deriving constraints under which SLAs will be met / violated
USTUTT	1	- Contrast and compare QP approaches
UniHH	0	-
VUA	0	-

	Contribution
1.1 SINTEF - Norway	
1.2 IT Innovation	
1.3 U Innsbruck	
1.4 U Manchester	
1.5 Uni Dortmund	
1.6 UPC	- SALmonADA (QoS monitoring w/ SALMON, Qos check against WS-Agreement using ADA)
1.7 USI	
1.8 U Pisa	
1.9 Tsingua	- Capacity estimation tool for resource subscription / quality (based on EC2)
1.10 SEERC	- Online testing for stateful services to support QP and service mediation - Prediction of business level agreements / KPIs
1.11 U Münster	
2.1 U Groningen	
2.2 CETIC	- identity management / security
2.3 U Betragne	- Application of verification techniques for quality predictions
2.4 U Sevilla	- SALmonADA
2.5 KIT	
3.1 U L'Aquila	