Quality Prediction (QP) Working Group

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

Nils Bohr

Andreas Metzger & QP WG Members

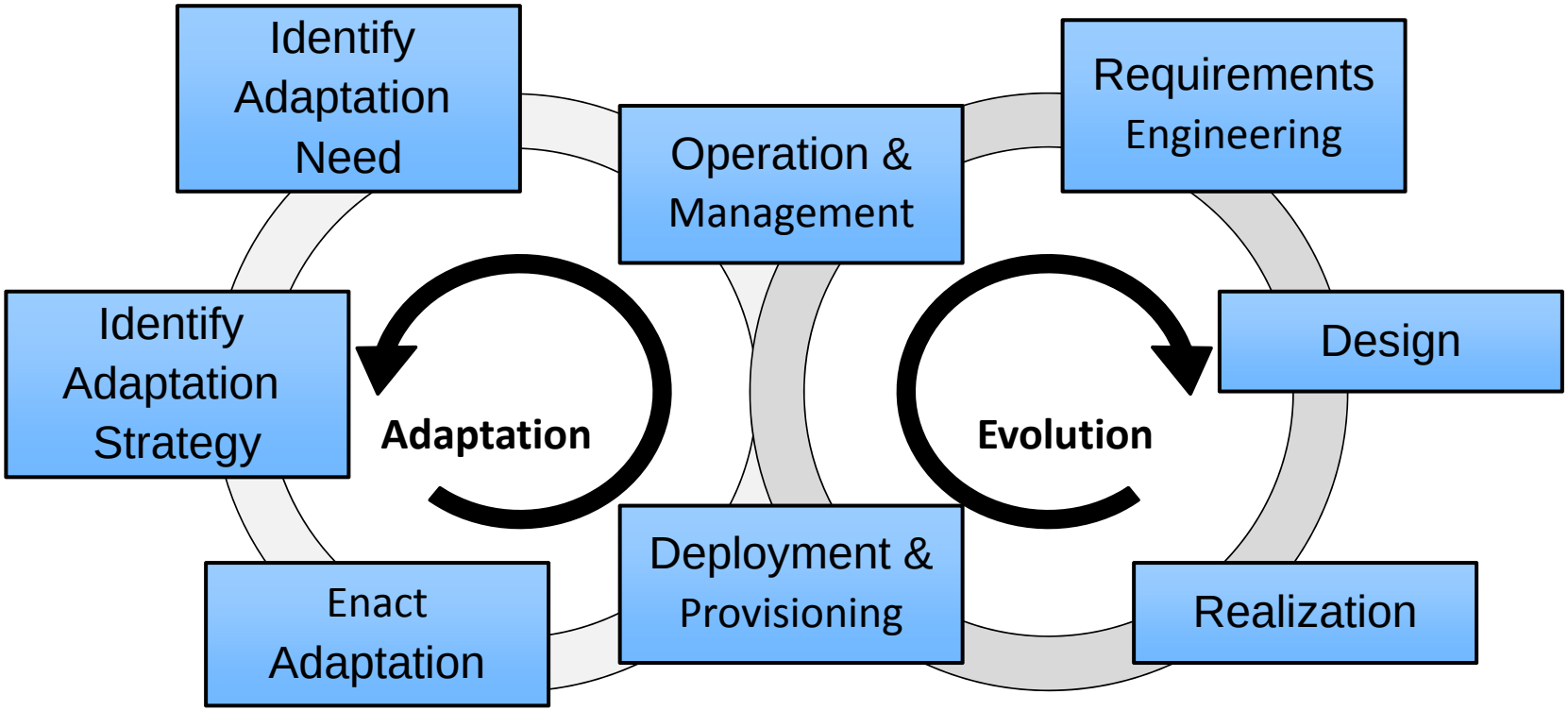
London, November 2010

Quality Prediction WG: Why?

- **Initiated by observation that many people work on QP**
  - S-Cube members: TUW, UPM, UniDue, …
  - Associate members: IT Innovation, …
  - External collaborators: SLA@SOI, …
- **Agreement on general problem, but different solutions:**
  - Analytical
  - Estimates
  - Machine Learning
  - Design-time vs. run-time
- **Understand in where and when the approaches work best**
  - compare and contras
  - validate / experiment
- **Foster joint research and publications**
  - Also with JRA-1.2 (M&A) activities

Quality Prediction WG: How?

- **Step 1: Classify the approaches**



Quality Prediction WG: How?

- **Step 2: Identify Synergies / Joint Research Challenges**

Approach	Service Con-sumer	Service Provider	Passive	Active	Q.-Attri.	SBA Layer	Artifact checked	Checked against	Level of Automation	Application Domain

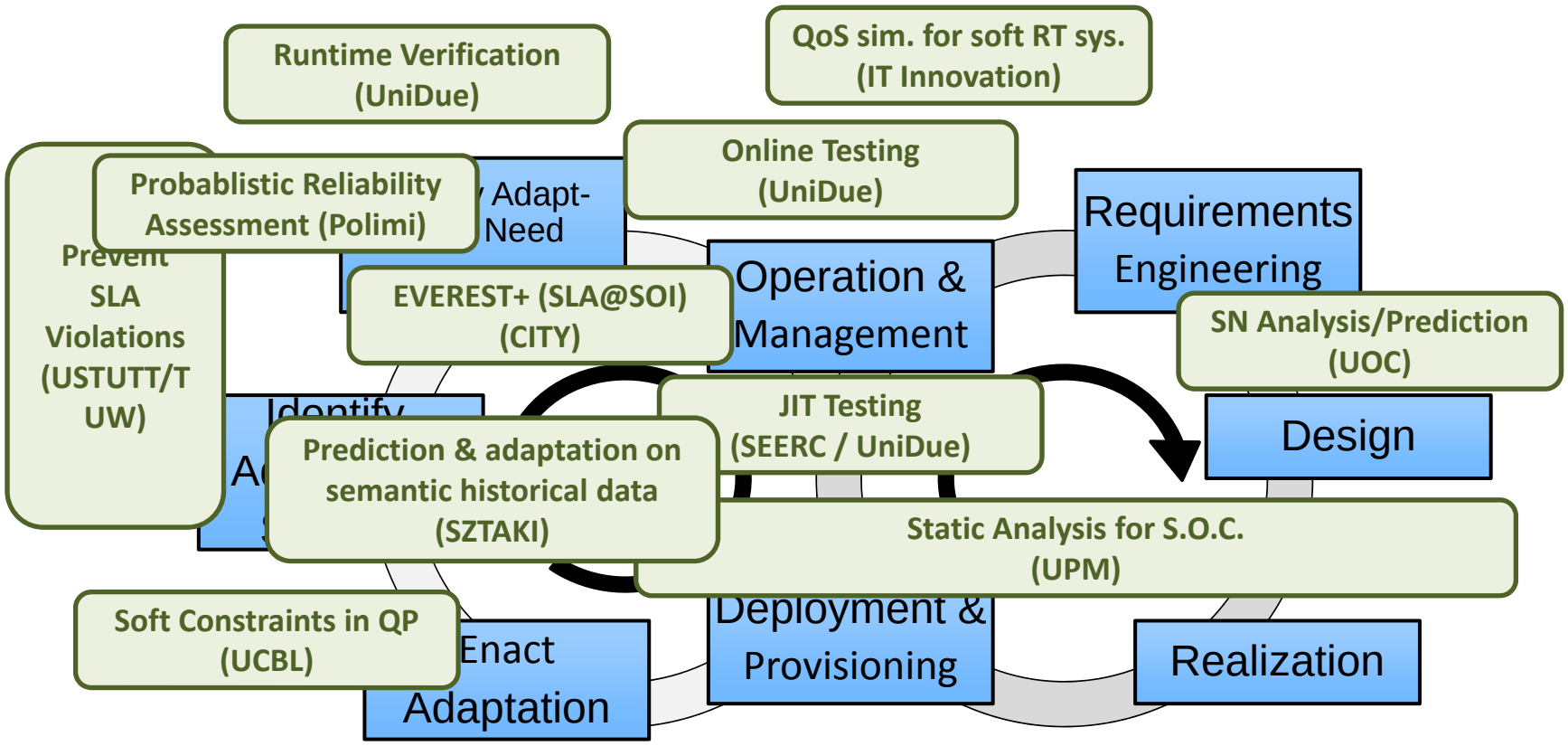
Inspired by framework introduced in
A. Metzger, S. Benbernou, M. Carro, M. Driss, G. Kecskemeti, R. Kazhamiakin, K. Krytikos, A. Mocci, E. D. Nitto, F. Silvestri, and B. Wetzstein, "Analytical quality assurance," in Service Research Challenges and Solutions for the Future: Towards Mechanisms and Methods for Engineering, Managing, and Adapting Service-Based Systems, M. Papazoglou, K. Pohl, M. Parkin, and A. Metzger, Eds. Heidelberg, Germany: Springer, 2010

Quality Prediction WG: How?

- **Further Steps**
  - **Publications**
    - Joint Journal Articles
  - **Experimentation**
    - 200 kEUR per Experiment on the BONfire facilities
  - **Workshop organisation**
    - Expand MONA+ 2011 to more strongly consider QP
  - **Interrelating with M&A activities (JRA-1.2)**
    - Prediction “method suite” as a building block
  - **More?**
    - …

Quality Prediction WG: How?

- **Step 1: Classify the approaches**



• Step 2: Identify Synergies / Joint Research Challenges

Approach	Service Consumer	Service Provider	Passive	Active	Q.-Attri.	SBA Layer	Artifact checked	Checked against	Level of Autom.	Application Domain
Runtime Verif. (UniDue)	-	X	X	-	Performance	SCC	Workflow	Req, SLO	Full	eGov
Online Testing (UniDue)	X	-	-	X	Performance	SCC	Service	SLO	Full (modulo Testing techn.)	eGov
JIT Testing (SEERC / UniDue)	X	(X)	-	X	Protocol (fct.)	SCC	Service	Protocol Spec.	Full	eShop
Static Analysis for S.O.C. (UPM)										
Prevent SLA Viol. (USTUTT/TUW)	-	X	X	-	KPIs (e.g., delivery time)	BPM, SCC	Post mortem data; live data	KPIs / SLAs	full	?

• Step 2: Identify Synergies / Joint Research Challenges

Approach	Service Consumer	Service Provider	Passive	Active	Q.-Attri.	SBA Layer	Artifact checked	Checked against	Level of Autom.	Application Domain
SN Prediction (UOC)	?	?	X	-	?	BPM	?	?	?	?
QoS sim. for soft RT sys. (IRMOS) (IT Innov.)		X	X		Performance	SCC/SI	Statechart model	SLO?	Full?	Media / Content
EVEREST+ (SLA@SOI) (CITY)	X	(X)	X	-	SLA (all SLOs)	BPM/SCC/SI	Moni. data	SLO	Full	?
Q Prediction (UCBL)	?	?	?	?	?	?	?	?	?	?
Historical Data (SZTAKI)		X		X	QoS (delays, downtimes, etc.)	SI	Grid/Cloud resources, jobs	Original schedule	Full	Grid/Cloud computing
Soft Constraints in QP (UCBL)	X	-	X	-	generic	SCC	Workflow, CSP	SLA, Reqs	Full	?
Probablistic Reliability Assessment (Polimi)	X	-	X	-	Reliability	SCC	Markov chain model	Probailistic Reqsd	Full	?

Quality Prediction WG: Open issues

- Confidence / reliability / precision of quality of prediction
  - Can we rely on the predictions for triggering „pro-active“ adaptations?
    - E.g., replacing a service provider with another one (rebinding) might incur higher operational costs (e.g., because of a switch from a free to a commercial provider), or exhibit faults which were not observed in the original service.
  - What are the „quality“ indicators for a „reliable“ prediction?
    - Post-mortem assessment of prediction error doesn‘t help in determining whether to adapt at the point in time when the actual prediction is made (we need to estimate the prediction error at the time of predicting)

- Testing mode for online testing
  - How can we perform online tests of services without interfering with their state / real world
  - Especially tricky for conversational services and services that are asynchronous / long-running (in which state changes are not triggered by the service users)