HPI Hasso Plattner Institut

IT Systems Engineering | Universität Potsdam

Service-Oriented Systems & Self-Adaptive Software

S-Cube Research Roadmap Workshop on Service-oriented Systems. 22.11.2011. Barcelona, Spain

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Challenge

Self-Adaptive Service-oriented Software equals **open**, evolving **systems of systems**.

> **How can we enable trustworthy self-adaptation and evolution for Service-oriented Systems?**

Some open issues:

- How to meaningful control at runtime the self-adaptation of choreographies and orchestrations?

- How to exclude unwanted co-adaptation races or other anomalies in open service-oriented systems?
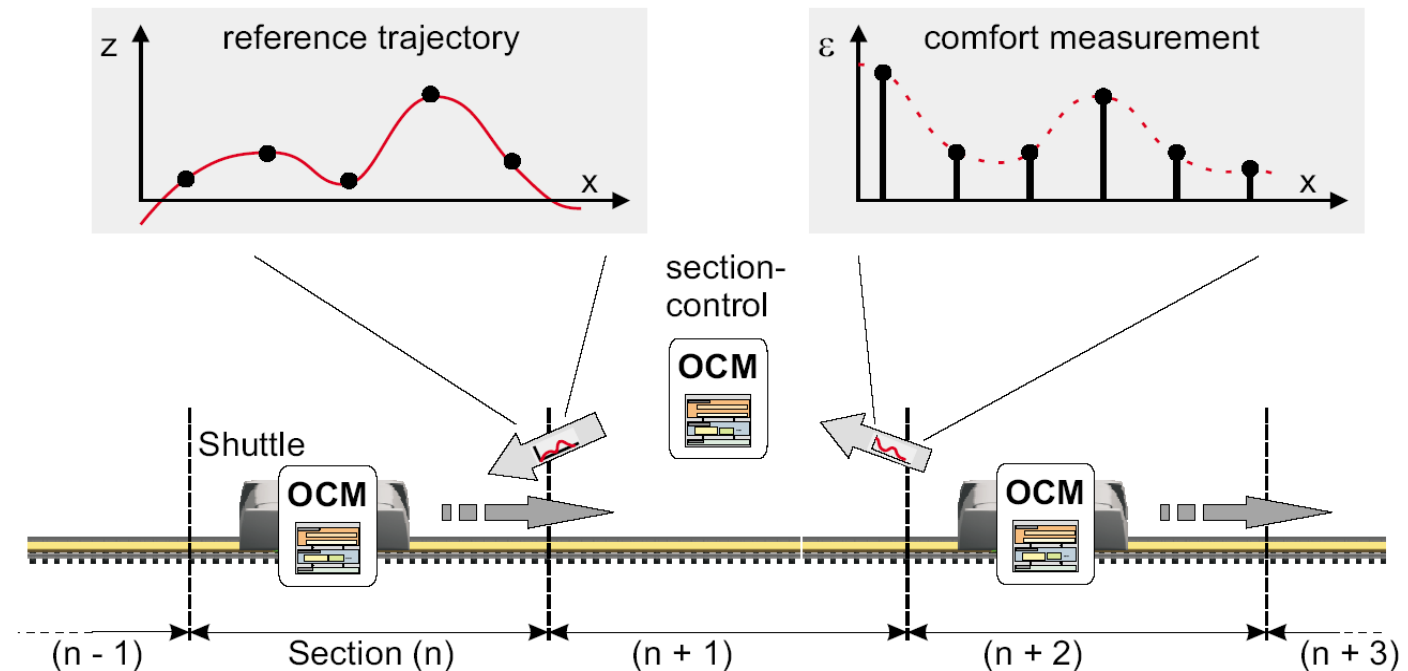
Self-Adaptation & Choreographies

http://www.railcab.de/

Test track

Test shuttle
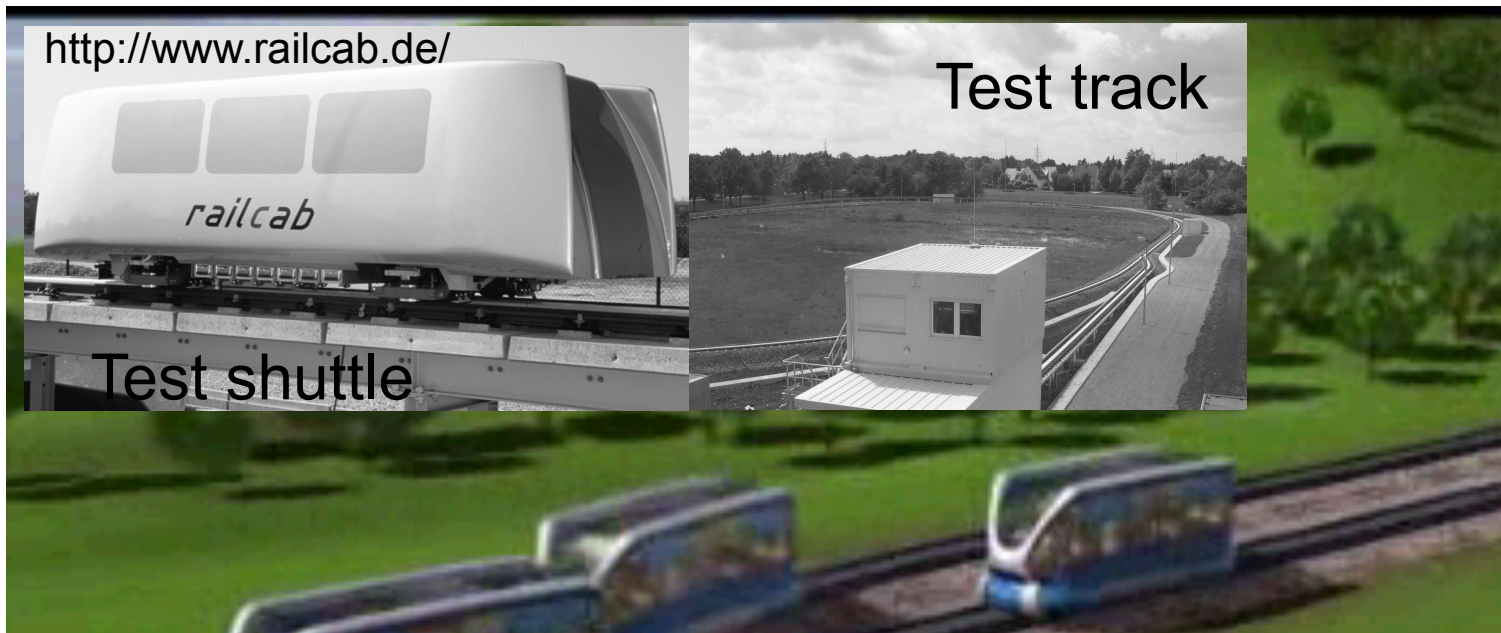
A trustworthy choreography for a convoy of shuttles:
- Adaptation capabilities are captured by role contracts
- Convoy choreography requires good knowledge about subsystems
- Choreography protocol is designed/verified completely upfront

Missing: full heterogeneity, openness, evolution of the protocol, …

Other cases: competing at switches, compete for passengers, …

Self-Adaptation & Choreographies

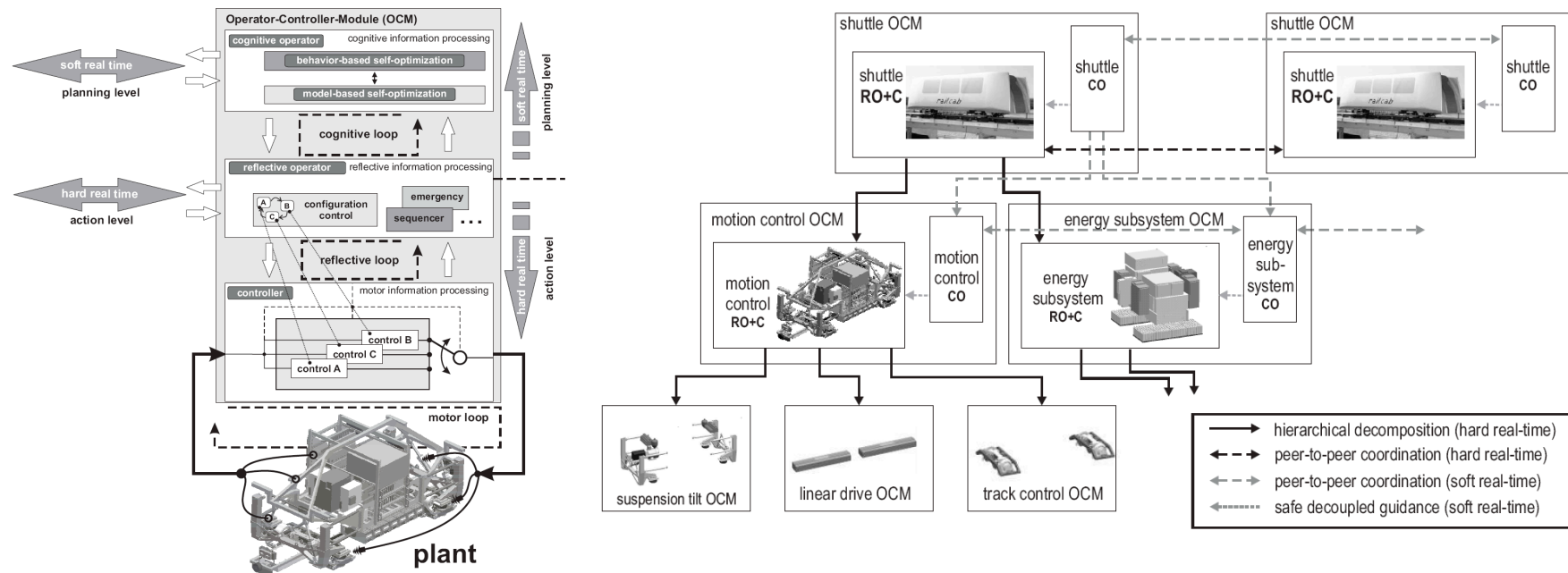**A trustworthy choreography for self-optimization:**
- Distributed learning of a model of the track (context)
- Local learning of a model of the shuttle (self!)
- Planning an adaptation in form of an optimal trajectory
- **Trajectory synthesis & backup establishes assurance**

Missing: full heterogeneity, competing scheme, …

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FINE

Self-Adaptation & Orchestration

Operator-Controller-Module (OCM) diagram and shuttle OCM orchestration hierarchy

A trustworthy orchestration of subordinated OCMs:

- Supervising OCM coordinate offered adaptation contracts of subordinated OCMs
- Supervising OCM sets goals for subordinated OCMs that locally adapt accordingly
- Orchestration behavior is designed/verified completely upfront

Missing: openness?, upward goal propagation, …