Software Engineering
new challenges, some solutions

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Software for E-Mobility

- ASCENS European project about programming self-aware, self-adaptive and self-expressive autonomic systems.
- Collaboration with Volkswagen about intelligent interaction between electric vehicles and services.

Local: optimal parking slot  
Global: optimal parking allocation
New Challenges for Sw Engineering

Classical waterfall model of SE
- top-down development methodology
- clear distinction between design time and run time
- purely procedural semantics

Innovative application domains
- service oriented architectures: inherently distributed, asynchronous, session-based systems
- adaptive workflows
- autonomic systems: adapting to unpredictable changes while hiding intrinsic complexity

Key features
- open endness
- forever yours: eternal systems
- procedural vs. declarative knowledge: new procedural behavior derived from general knowledge when needed

New theories and new methodologies for innovative applications
Service Oriented Architectures

Some challenges
- Session management
- QoS contract negotiation
- Long-running transactions
- Inherently distributed, asynchronous

Enabling methods and techniques
- Negotiate, commit, execute:
  - amalgamate static and dynamic verification
- Effective infinite state verification
- Local and global optimization
Adaptive Workflows

Some challenges
- Coordination policies enforcement
- Replaceability of activities
- Human involvement
- Process mining

Enabling methods and techniques
- Event-condition-action policy specification
- Java event-based middleware
  - formally designed and verifiable workflows
- On-the-fly consistency verification
- Event logs conformance and performance checking
Autonomic Systems

ASCENS Ensemble Development Life Cycle

Some challenges
- Self-* behaviours
- Design at Runtime
- Adaptivity
- Non-functional requirements.

Enabling methods and techniques
- Statistical model checking
- Continuous software life cycle
- Knowledge management for awareness
- Local and global optimization