White paper progress

Software Engineering Challenges and Trends for supporting Innovative Services and Applications

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ubiquitous solutions

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White Paper Structure

1. Introduction
2. Taxonomy of challenges
3. Business cases
4. Novel software engineering approaches
5. Conclusions
6. References

Taxonomy of challenges

- Challenges categorized in four axes
  - **Design challenges** (service composition, micro-services etc.)
    - Main design challenges: ***service composition*** *through microservices,* ***reusable design*** *patterns,* ***interpretation of annotations*** *at execution time,* ***self-adaptive systems****, horizontally* ***scalable*** *systems,* ***variability*** *of distributed applications.*
  - **Middleware challenges** (programmability of infrastructure, parallelism, etc)
    - Main middleware challenges: ***exploit programmability*** *of IT infrastructure,* ***cloud-based tools*** *for software prototyping,* ***reduce complexity*** *on management and deployment of data-intensive distributed applications,* ***management of ready-to-run workloads****, efficient tools for* ***integration*** *of cyber-physical systems.*
  - **Software Quality challenges** (quality evolution, user feedbacks, etc.)
    - Main software quality challenges: improve **collaboration-driven software validation and verification** methods, improve **trust, transparency and interoperability** of the provided services, guide software **quality evolution**, gather, analyse and exploit **end-users feedback**.
  - **Services lifecycle challenges** (DevOps + collaboration tools, novel software engineering tools)
    - Main services lifecycle challenges: *adoption of* ***DevOps practices****, adoption of* ***model-based development techniques****, introduction of "****security-by-design****" approaches.*

Business cases

- Big data related challenges
  - Parallelism, concurrency and scalability aspects.
- Cyber Physical Systems related challenges
  - Open and dynamic environments. Need for real-time context-adaptive solutions. Use of high-level programming languages and speech acts for dynamic integration in an open world.
- Cloud Computing Services: CDCP - a framework for building data management applications
  - Case: Provide data management facilities for IoT solutions
  - Challenges : Support **software reuse** through the development of micro-services and service compositions; Support **variability** of highly distributed applications in heterogeneous environments; Exploit the ability to use cloud-based services and tools for **rapid software prototyping**; Manage the **complexity** of large software and data-intensive systems; **Automate** the software development process in order to ensure quality software.

Novel software engineering approaches

- Approaches followed by EU projects and mapping to challenges
  - Tools and methods for software development
    - Software tools and methods for large, complex and data-intensive systems
    - Software architectures and tools for highly distributed applications
    - Software architectures for time-critical applications
    - Graphical user interfaces allowing seamless integration of software and services, goal-oriented workflow composition
  - Advanced Cloud Infrastructure and Services
- The way forward - Envisaged outcome of clustering activities

Roadmap

- Collect contributions and finalize by the end of next week.
  - Distribute before and receive feedback from all partners in the cluster.
- Presentation @ ICT 2015 (20-22 October)