WORK PROGRAMME 2014 – 2015
Topic ICT 9: Tools and Methods for Software Development

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Session Outline

  • Dr. Odysseas I. Pyrovolakis, DG CONNECT – Unit E2 Software and Services, Cloud

• “Challenges for Software and Software Services Research”
  • Prof. Klaus Pohl, University of Duisburg Essen, member of NESSI board and Steering Committee

• Q & A session
European Software Industry*

Software Revenues (B €)

* Source: Truffle100 [http://www.truffle100.com](http://www.truffle100.com)
R&D and Software Industry*

Total R&D investments

Total R&D headcount

* Source: Truffle100  [http://www.truffle100.com](http://www.truffle100.com)
FP7 and research in software/software engineering

Call 1 – Objective 1.2: Service and Software Architectures, Infrastructures and Engineering
- Service/software engineering approaches, Virtualisation tools, system software, middleware and network-centric operating systems,

Call 5 – Objective 1.2 Internet of Services, Software and Virtualisation
- Software engineering methods and tools, Verification and validation methods, tools and techniques, Methods, tools and approaches for development, deployment and evolution of open source software.

Call 8 – Objective 1.2 Cloud Computing, Internet of Services and Advanced Software Engineering
- Advanced software engineering (Quality measure and assurance techniques, Management of non-functional requirements, Tools and methods for community-based and open source software)

Call 10 – Objective 1.2 Software Engineering, Services and Cloud Computing
- Software engineering for cloud and beyond, agile software technologies and tools,
FP7 project portfolio in Software

**Call 1**
Service/Software Engineering
(complexity, dependability):
- DEPLOY, Protest,
- COMPAS, ALIVE,
- MOST, MANCOOSI,
- DIVA, Q-Impress

**Call 5**

**Call 8**
Advanced Software Engineering
- MODAClouds
- PROWESS
- MARKOS
- RISCOSS

**Call 10**
Innovative software & tools for services
- Agile Software Prototyping
  - S-Case
- Model Driven Engineering
  - Mondo

**2007**
- 35,6 M €*

**2009**
- 23,3 M €

**2011**
- 31,1 M €

**2013**
- 5,1 M €

24 Projects
95.1 M €

*EC Contribution
From FP7 to H2020
Preparation process

Internal consultation

Public Consultation (early 2013, Workshop 17/4)

Other sources (e.g. ISTAG Report on Software, NESSI position papers)

1. Encourage the emergence of open source software repositories to gather and foster the result of cooperative R&D.

2. Launch a European initiative on software approaches for advanced computing systems.

3. Create a European Data Observatory that builds upon the open data initiatives for the public sector in Europe.

4. Develop interdisciplinary funding programmes to enable us to understand the concepts of social computing, its societal value and the innovation and entrepreneurship possibilities.

*Toward a Strategic Agenda for Software Technologies in Europe*, ISTAG July 2012.
ISTAG report on Software (2/2)

5. Support the effort that **by 2020, software intensive real time systems should be executable on shared hardware and easily connectable to the outside world.**

6. Europe should develop new scientific foundations, system design methodologies, development processes and tools to create the technical solutions tackling the challenges posed by system complexity.

7. Develop a European strategic initiative on enterprise software technology to maintain Europe’s leadership.

8. Set up a FET Flagship to support the right timescales, levels of ambition and long-term funding that would allow Europe to maintain its pre-eminent position in future generation software-intensive systems.
Public consultation – workshop
Key research challenges for Software

- **Software complexity and scalability**
  - Increasingly complex large software systems. Need for techniques to simplify and manage their development and maintenance

- **Software architectures and tools**
  - New software tools for cloud and data-centric programming models to simulate and test data-driven software/services and for user interface testing in heterogeneous/federated environments

- **Software lifecycle management**
  - Efficient lifecycle management tools, especially for critical software systems

- **Software for critical systems**
  - Software for secure and operational-critical systems, especially considering issues of software evolution and change-management
Public consultation – workshop

Conclusions (1/2)

- Tools and methods to manage complexity, system simulation, variability, testing and failure management across the software lifecycle
  - emphasis on robustness/reliability in the software development lifecycle;
  - software for critical systems;
  - a closer link between development and maintenance; composition as a means to manage complexity; management of emergent complexity;
  - data-intensive systems with data-driven software architectures and data abstractions.
Public consultation – workshop
Conclusions (2/2)

• Flexible and scalable tools for collaborative software development
  • little support for a distinct sub-objective on collaborative software development

• Software architectures and methods for system deployment in distributed environments
  • architectures for scalability/elasticity, adapting to hardware resources in heterogeneous environments;
  • managing data location in distributed elastic systems;
  • migration
What measures should be adopted to stimulate the European software industry?

* Source: Truffle100 http://www.truffle100.com
The Challenge

**Need:** Excellent quality (reliability, resilience and automatic adaptation) for complex & critical systems

- Need for innovative software development tools and methods

**Breakthroughs in the area could significantly:**

- Improve the growth and competitiveness of the European industry
- Encourage faster innovation cycles.
- Increase European software industry's competitiveness.
- Large and interoperable software systems
- Industrial and public sector applications
Theme 1: Software tools and methods for large, complex and data-intensive systems

- Tools and methods for incorporating integrity, robustness, reliability and resilience as built-in characteristics for evolving software systems.
  - Especially for complex and secure business-critical systems
  - Coverage of the whole software lifecycle.

- Innovation in managing the complexity of large software and data-intensive systems.
  - Inclusion of simulation, testing and verification
Theme 2: Software architectures and tools for highly distributed applications

- Novel approaches to development, deployment, management and dynamic reconfiguration of distributed applications
- Architectures and tools to maximise quality of experience in elastically scalable applications.
  - Particular account should be taken of data location, latency and data throughput in heterogeneous cloud environments
  - Inclusion of specialised hardware resources and sensors
Expected impact

• Productivity increase in the development, testing, verification, deployment and maintenance of data-intensive systems and highly distributed applications;

• Innovative tools for handling complex software systems.
  ✓ Credible demonstration that larger and more complex problems can be effectively and securely tackled;

• Macro level impact
  • Evidence of potential productivity gains through appropriate Use cases in EU industry.
Key actors

Leading players

- European software industries
- Research institutes/university labs
- Specialized SMEs (apps providers, web & cloud service providers)

Relevant European Technology Platform

- Networked European Software and Services Initiative (NESSI)
Implementation details for ICT9 topic

• Call 1 – 2014
  • Call opening: 11 December 2013 (Tentative)
  • Call closing: 23 April 2014 (Tentative)

• Budget: 25 M Euros

• Instruments: Research & Innovation Actions
  • Small projects
Cross cutting role of software in H2020
14 objectives in the WP’14-’15 mentioning “software” (1/2)

ICT 1 - 2014: Smart Cyber-Physical Systems
ICT 4 - 2015: Customised and low power computing
ICT 5 - 2014: Smart Networks and novel Internet Architectures
ICT 7 – 2014: Advanced Cloud Infrastructures and Services
ICT 10 - 2015: Collective Awareness Platforms for Sustainability and Social Innovation
ICT 14 – 2014: Advanced 5G Network Infrastructure for the Future Internet
ICT 15 – 2015: Big data – research
ICT 20 – 2015: Technologies for better human learning and teaching
ICT 23 – 2014: Robotics
ICT 27 – 2015: Photonics KET
ICT 30 – 2015: Internet of Things and Platforms for Connected Smart Objects


Some other interesting sessions

- **Conference session**
  - "Unleashing the potentials of Future Internet & Cloud towards a digital single market" Friday, 8 Nov, 11:00 - 12:30, Hall 3

- **Workprogramme 2014/2015 Sessions**
  - "Advanced cloud infrastructures and services/boosting public sector productivity and innovation", Thursday, 7 Nov, 16:00-16:45, Room H1A
  - "International Collaboration under ICT Workprogramme 2014/2015", Friday, 8 Nov, 11:00-11:45, Room H1B
Thank you

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BACK-UP SLIDES
Q&As

- **Q:** Won’t be any CSAs project in the area of software?
  - **A:** Yes but under topic 7 and in strong association with cloud computing.
  - “Support to collaboration among research projects in the areas of software, services and cloud computing, including support to common dissemination/exploitation activities and roadmapping.”

- **Q:** Are specific industry domains you are focusing?
  - Not really, but don’t forget ICT9 is under the “umbrella” of Future Internet

- **Q:** Are certain research areas you don’t wish to fund due to previous funding?

- **Q:** Since there was a lot of funding for Soft. Engineering in FP7, what’s the need for funding Soft. Engineering research in H2020?

- **Q:** what are you considering as “small projects” in terms of budget, consortium size, research scope?
  - **A:** 2-4 M€, 3-5 participants, Specific & Targeted

- **Q:** Are there any specific research areas/projects that you want to continue to fund from FP7
Cross cutting role of software in H2020
14 objectives in the WP’14-’15 mentioning “software” (1/2)

ICT 1 - 2014: Smart Cyber-Physical Systems
“.... The network must include vertical competences from embedded software and systems down to the components subsystems and components level ...”

ICT 4 - 2015: Customised and low power computing
“ Focus is on integration of hardware and software components into fully working prototypes”

ICT 5 - 2014: Smart Networks and novel Internet Architectures
“... Expected impact: new open source software releases...”

ICT 7 – 2014: Advanced Cloud Infrastructures and Services
“ .... Collaborative development, adaptation and testing of open source software for innovative and trusted cloud-based services ...”

“Expected Impact: Promotion of the reuse of open source software solutions in cloud environments”

ICT 10 - 2015: Collective Awareness Platforms for Sustainability and Social Innovation
“Expected Impact: Pioneering new promising models of participatory innovation based on open software”

ICT 14 – 2014: Advanced 5G Network Infrastructure for the Future Internet
“Combination of software defined network implementations with autonomic management of resources; “

“Strand Network virtualization and Software Networks “
Cross cutting role of software in H2020
14 objectives in the WP’14-'15 mentioning “software” (2/2)

ICT 15 – 2015: Big data – research
“Collaborative projects to develop novel data structures, algorithms, methodology, software architectures”

ICT 20 – 2015: Technologies for better human learning and teaching
“Public procurement of innovative devices and software (PPI)”

ICT 23 – 2014: Robotics
“One goal will be to define common hardware and software platforms”

ICT 27 – 2015: Photonics KET
“Pilot deployment of software-defined optics in backbone networks”

ICT 30 – 2015: Internet of Things and Platforms for Connected Smart Objects
“require a strong cooperation between the telecom, hardware, software and service industries, to create and master innovative Internet Ecosystems.”

ICT 32 – 2014: Cybersecurity, Trustworthy ICT
Security-by-design paradigms have to be developed and tested, to providing end-to-end security, across all hardware and software layers of an ICT system.