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

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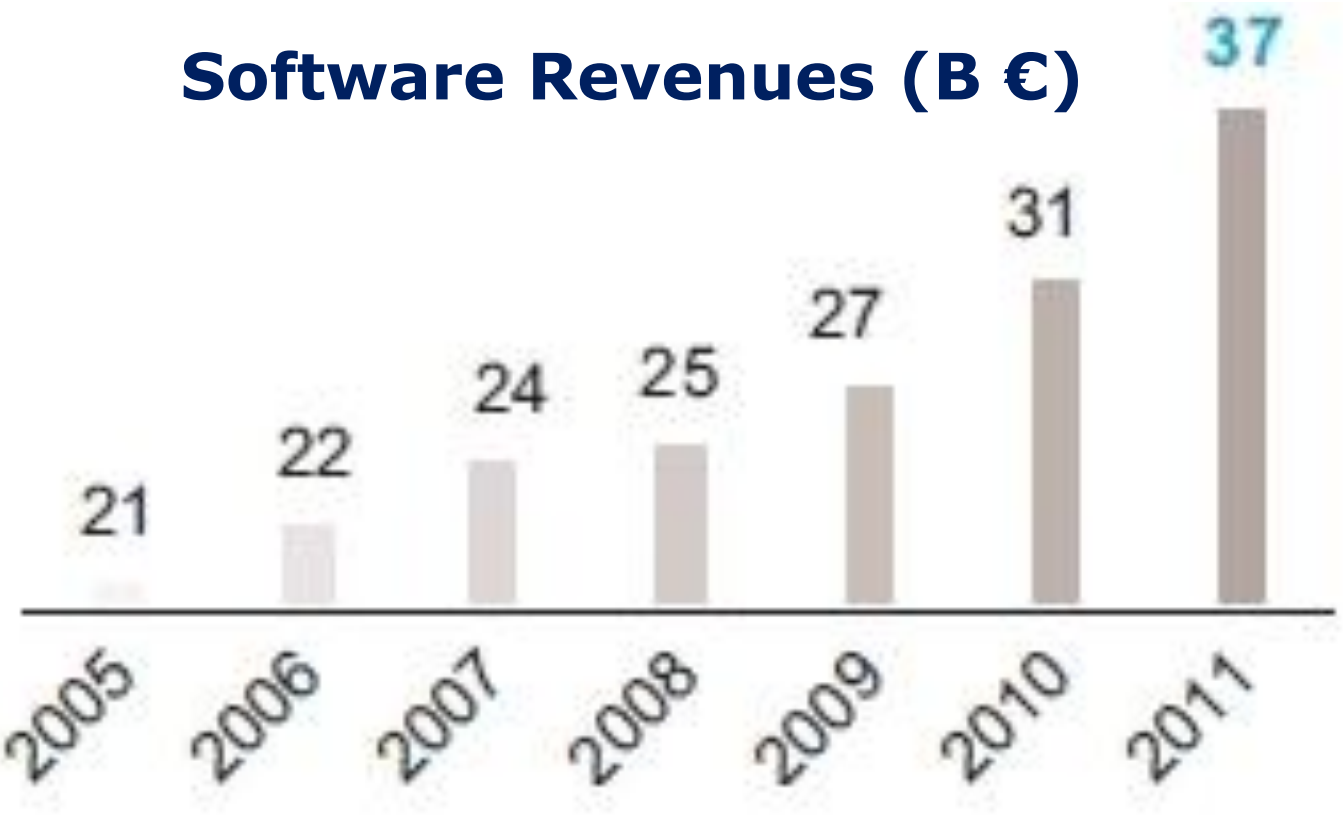
Session Outline

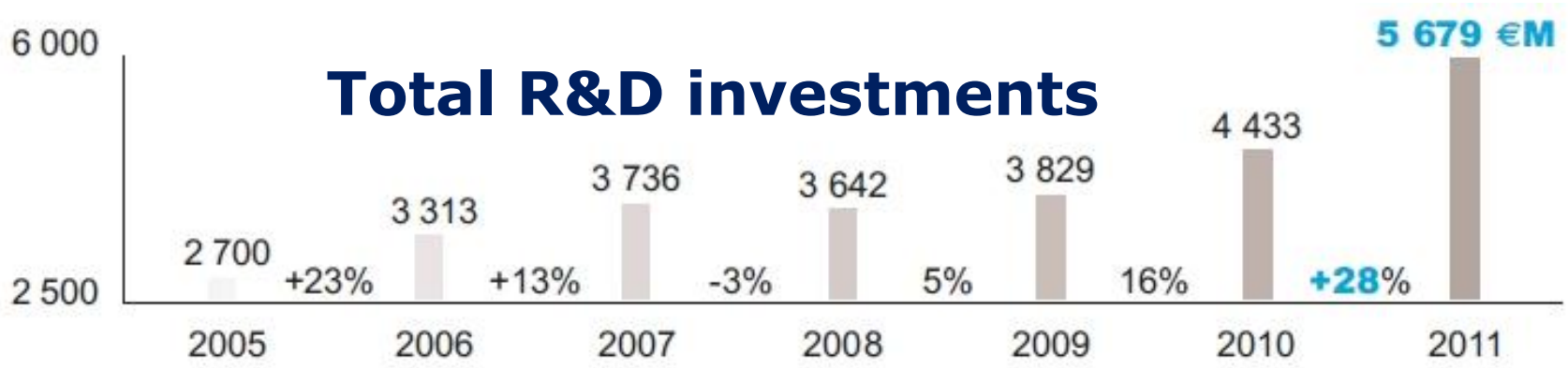
- "H2020 WP2014-205: Topic ICT9 - Tools and Methods for Software Development"
  - **Dr. Odysseas I. Pyrovolakis**, DG CONNECT – Unit E2 Software and Services, Cloud
- "Challenges for Software and Software Services Research"
  - **Prof. Klaus Pohl,** University of Duisburg Essen, member of NESSI board and Steering Committee
- Q & A session

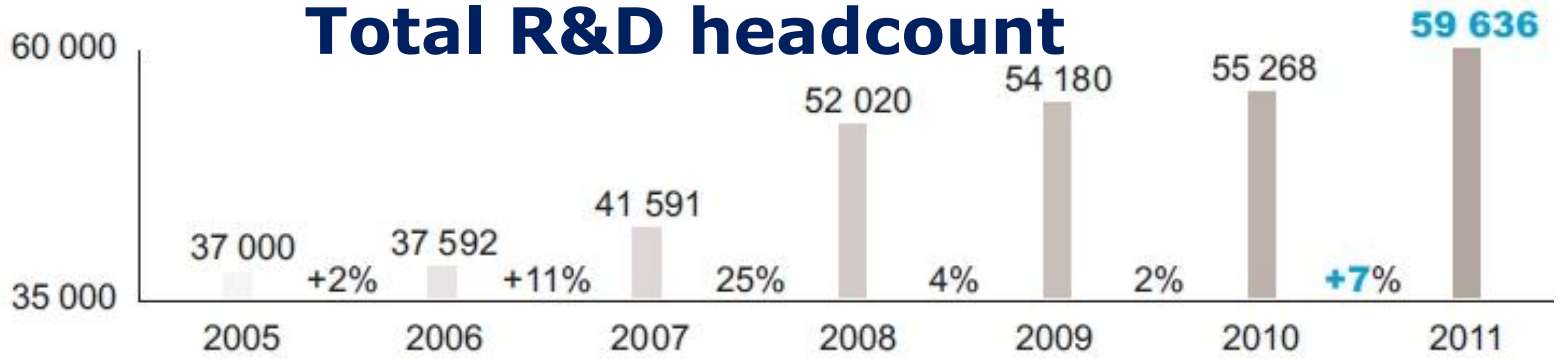
European Software Industry*



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

R&D and Software Industry*





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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

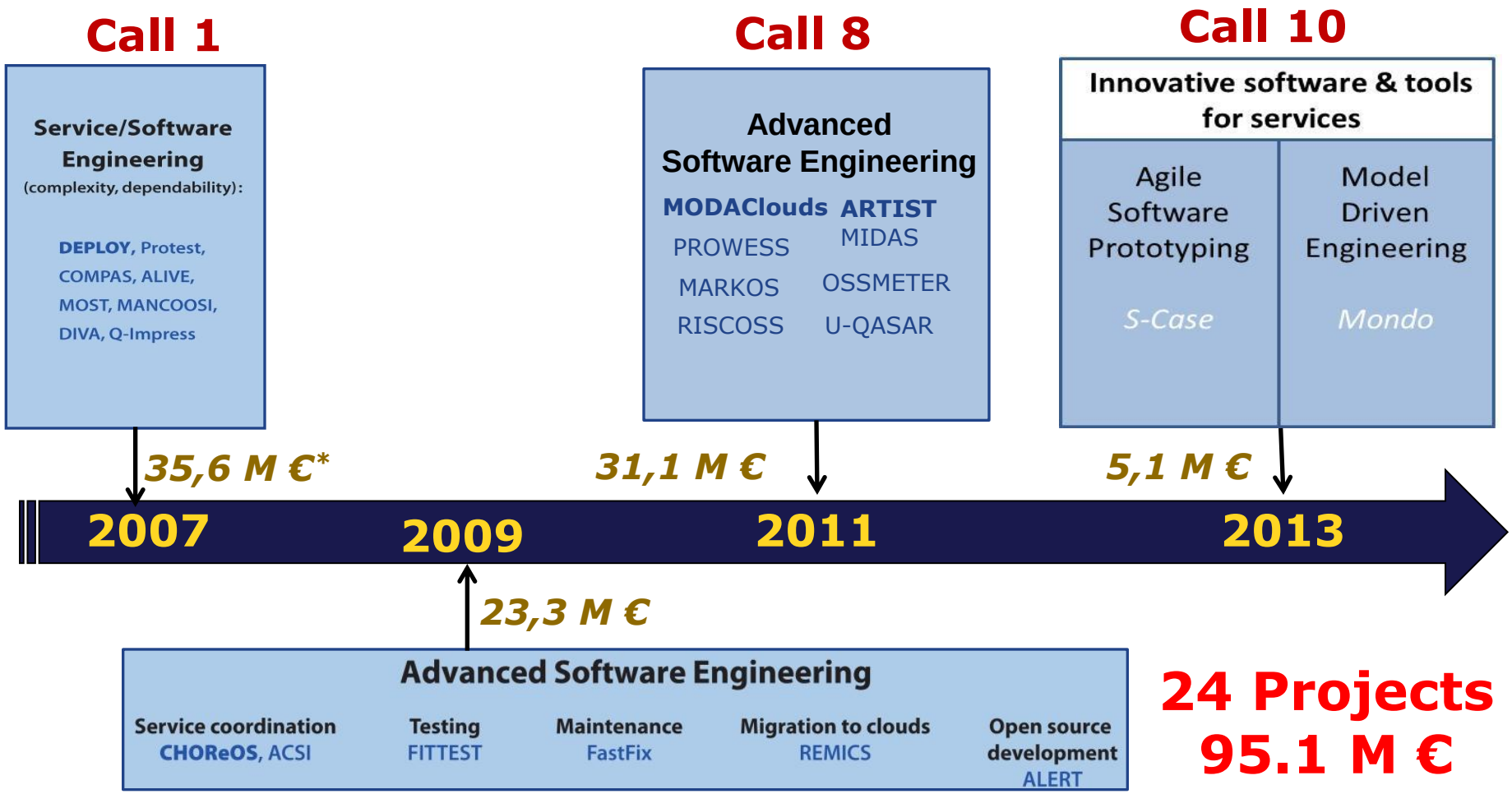
- Advanced software engineering (Quality measure and assurance techniques, Management of non-functional requirements, Tools and methods for community-based and open source software)

Call 10 – Objective 1.2 Software Engineering, Services and Cloud Computing

- Software engineering for cloud and beyond, agile software technologies and tools,

European Commission

FP7 project portfolio in Software



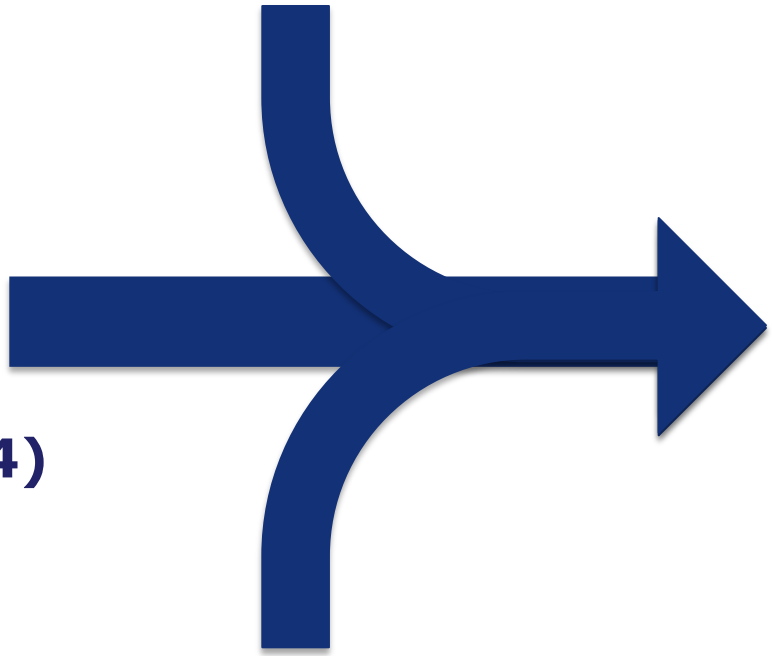
24 Projects
95.1 M €

*EC Contribution

From FP7 to H2020
Preparation process

Internal consultation

Public Consultation (early 2013, Workshop 17/4)



H2020 WP2014-2015 Topic ICT 9

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

ISTAG report on Software* (1/2)

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)

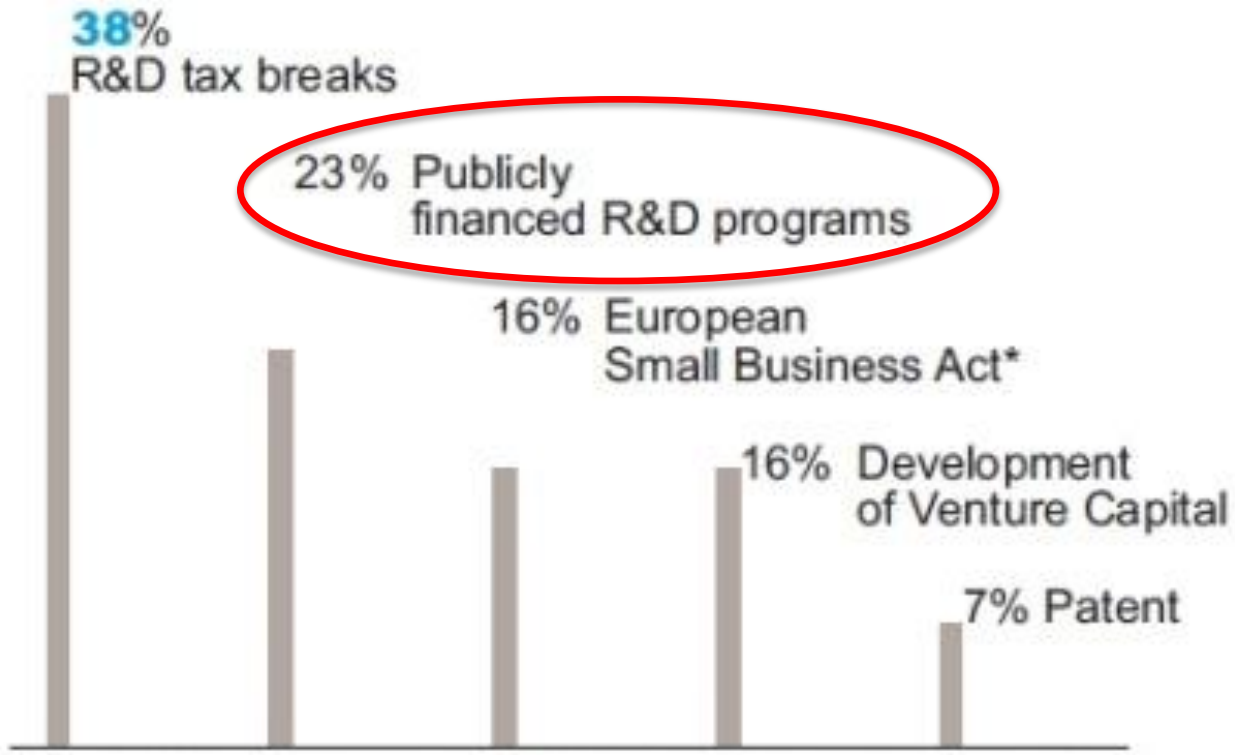
- Tools and methods to manage complexity, system simulation, variability, testing and failure management across the software lifecycle
  - emphasis on robustness/reliability in the software development lifecycle;
  - software for critical systems;
  - a closer link between development and maintenance; 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

Background documents

1. "Toward a Strategic Agenda for Software Technologies in Europe", Information Society Technologies Advisory Group (ISTAG), July 2012.
   http://cordis.europa.eu/fp7/ict/docs/istag-soft-tech-wgreport2012.pdf
2. "Strategic Research and Innovation Agenda", Networked European Software and Services Initiative (NESSI), April 2013
   http://www.nessi-europe.com/Files/Private/NESSI_SRIA_Final.pdf
3. Public Consultation on Cloud Computing, Software and Services, European Commission, March 2013
   http://ec.europa.eu/digital-agenda/en/public-consultation-cloud-computing-software-and-services
4. Post – consultation Workshop , European Commission, 14 April 2013
   http://ec.europa.eu/information_society/newsroom/cf/document.cfm?action=display&doc_id=2172

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.