Public consultation process for H2020 work programme 2016-17: Cloud Computing and Software

Rapporteur: David Griffin

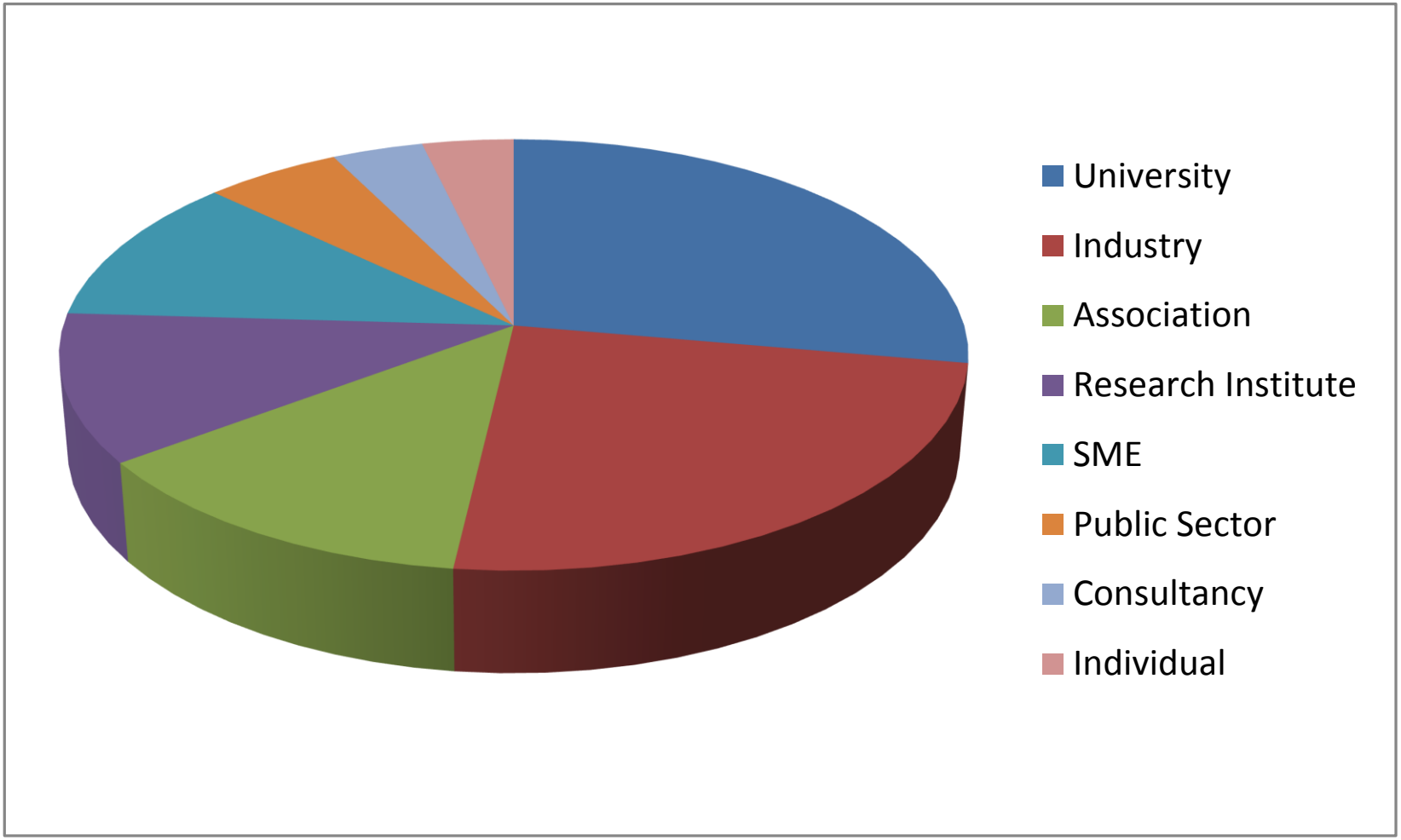
Consultation process

- Consultation on research priorities in cloud computing and software for H2020 WP2016-17

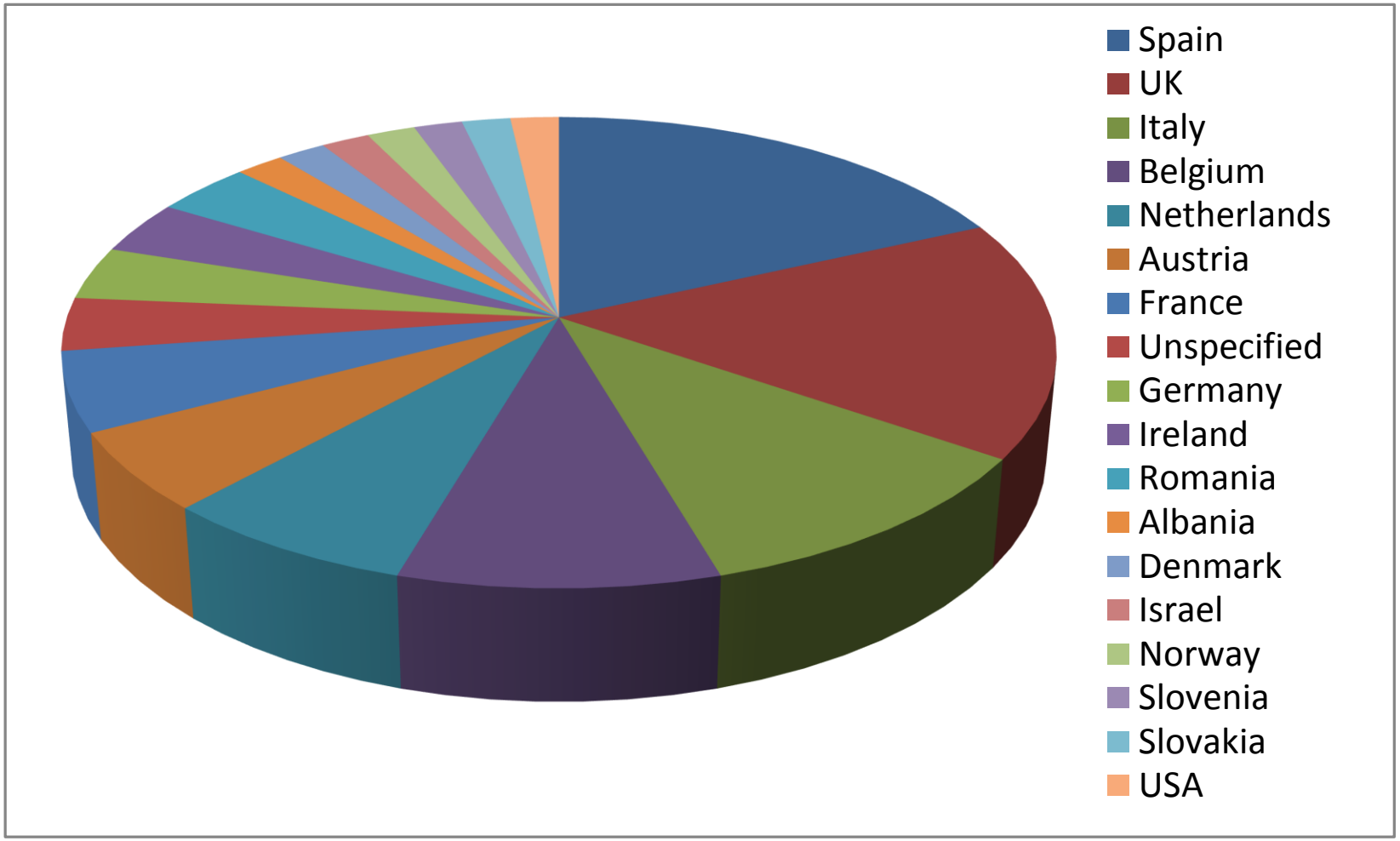
- Web-based consultation process (10 Sep-17 Oct 2014)
  - Two parts: Cloud Computing and Software (incl. Open Source)
  - Reports identified to trigger discussions:
    - EC reports, NESSI recommendations, Cloud Expert Group, CloudWatch concertation, US technical reports (Ignite, Berkley), Italian SE manifesto
  - Open invitation for input from interested sector actors/stakeholders (industry, academia, research institutes, SMEs, user communities…)
  - 87 written contributions (61 on cloud computing, 26 on software)

- Post-consultation workshop held on 4 Nov 2014

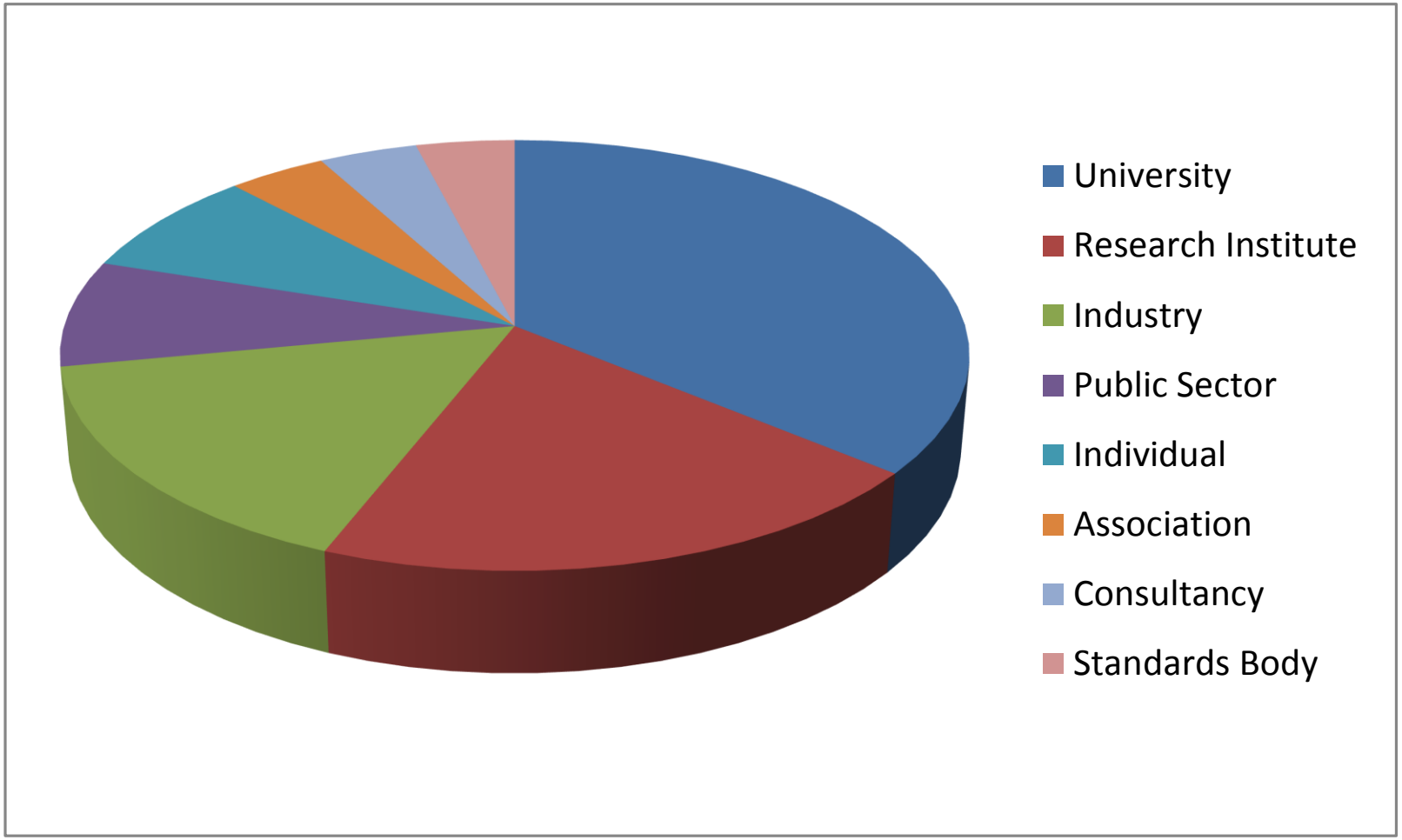
Contributions to Cloud Computing by organisation type



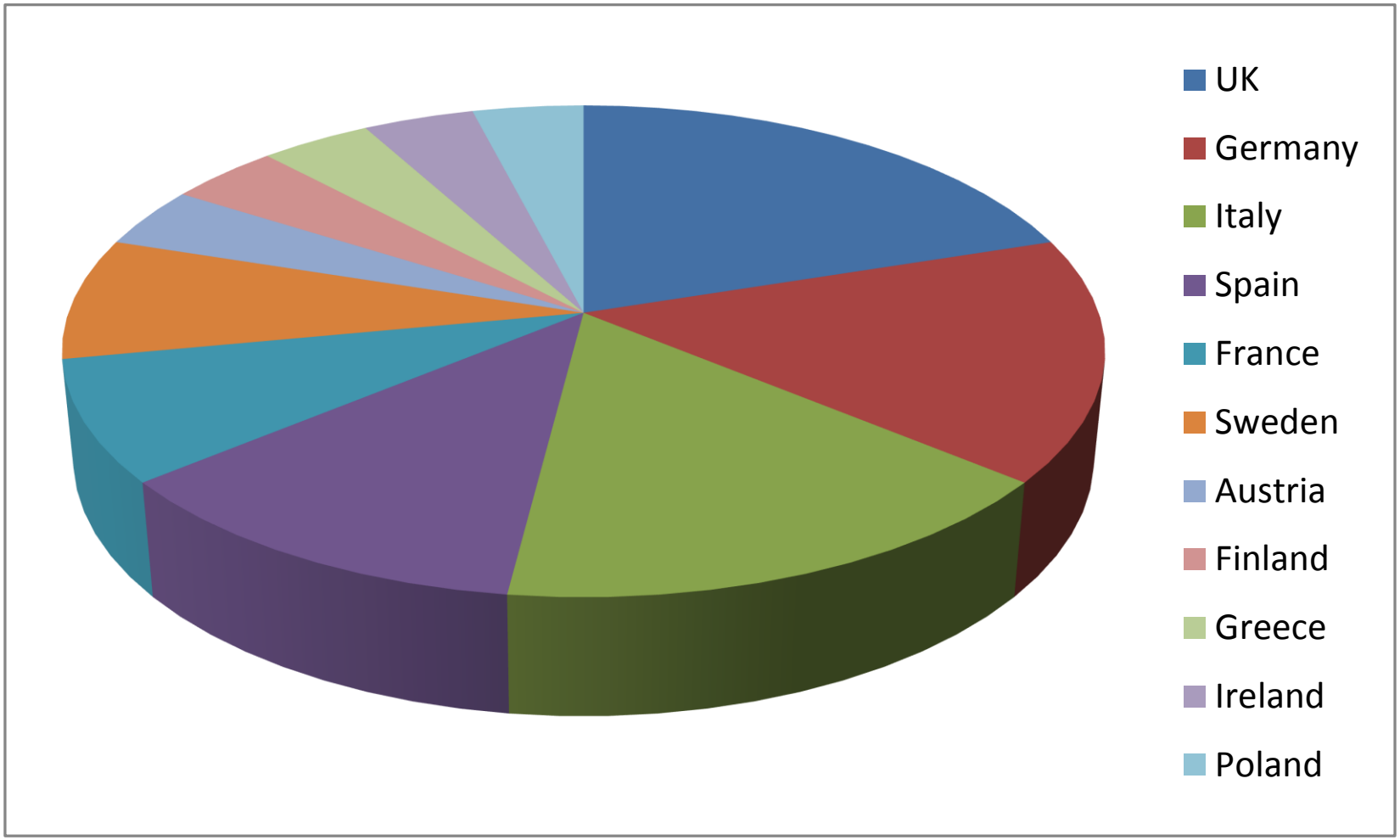
Contributions to Cloud Computing by country



Contributions to Software (incl. Open Source) by organisation type



Contributions to Software (incl. Open Source) by country



Post-consultation workshop

- 27 contributions selected for presentation and discussion:
  - Federated and Distributed Clouds, Interoperability (5 presentations)
  - Other Research Challenges in Cloud Infrastructures and Services, part I (6 presentations)
  - Other Research Challenges in Cloud Infrastructures and Services, part II (5 presentations)
  - Software Methods and Tools (8 presentations)
  - Open Source Software, Interoperability and Standards (3 presentations)

Report compilation process

- Written contributions were analysed and classified into research challenge priority themes
- Presentations, Q&As, discussions and conclusions summarised
- Draft report circulated to workshop participants for review and comment
- Comments addressed in final report published on 4 December 2014

Comparison with WP2014-15 call text on Cloud Computing (I)

- New research challenges in the five thematic areas of ICT 7, WP2014-15
  - **High performance heterogeneous cloud infrastructures**
    - expand on the management and configuration of **specialised hardware**
    - **more stringent SLAs** to support mission-critical and high-performance applications.
  - **Federated cloud networking**:
    - **resilience of services** deployed over federated clouds;
    - models and mechanisms for **cloud brokers**;
    - **management of networking resources** in the context of ultra-low latency and high capacity network technologies;
    - further **standards** to avoid vendor lock-in and to simplify switching between cloud providers.

Comparison with WP2014-15 call text on Cloud Computing (II)

- New research challenges in the five thematic areas of ICT 7, WP2014-15:
  - **Dynamic configuration, automated provisioning and orchestration of cloud resources:**
    - **simulation techniques** for modelling and evaluating cloud-based services;
    - design and optimisation of **big data and HPC applications** in the cloud;
    - **software migration** from multi-core systems to the cloud;
    - support for **DevOps environments** for managing cloud-based systems.
  - **Automated discovery and composition of services:**
    - **automated composition of semantic web services** to a specified target.
  - **Cloud security**:
    - **verifiable and measurable security metrics** and accountability chains;
    - **user control** of how data is stored, routed and accessed across cloud domains;
    - development of **blind storage, homomorphic and end-to-end encryption**;
    - mechanisms for **managing personal identity** across multiple cloud providers.

Comparison with WP2014-15 call text on Cloud Computing (III)

- Additional topics compared to WP2014-15, ICT 7:
  - **Agile dynamic system engineering** methods for cloud-based systems.
  - Integration with cyber-physical systems and mobile devices to extend **edge/fog computing to the extreme edge** of the network.
  - Support for **cloud-based IoT applications** through the integration of sensing and actuation resources and lightweight IaaS capabilities for constrained computing platforms.
  - **Large scale data processing and security analytics** for identifying unexpected system behaviour.
  - Improvements in **energy efficiency**.
  - **Experimentation** of cloud-based software and systems.

Comparison with WP2014-15 call text on Software (I)

- New research challenges in the thematic areas of ICT 9, WP2014-15:
  - **Software tools and methods for large, complex and data-intensive systems**:
    - new methods for linking **requirements engineering** with CASE systems;
    - higher-level, **intention-driven programming** models;
    - tools to support modern **agile/scrum** development frameworks to assist with developing **mission-critical** and **safety-critical** systems;
    - **model-driven software engineering** tools to automate interoperability and compliance testing, and identify, detect and mitigate risks.
  - **Software architectures and tools for highly distributed applications:**
    - **development environments** which treat the cloud as a single virtual machine;
    - algorithmic and processing models supporting **weak data consistency** in multi-core and distributed cloud-based systems.

Comparison with WP2014-15 call text on Software (II)

- Additional topics compared to WP2014-15, ICT 9:
  - Tools and mechanisms for **managing software quality** based on contextual data collected at runtime through sensors and other online data sources.
  - Big data **analytics of user feedback and software performance** monitoring metrics.
  - Reliable and sustainable **open source repositories** supported by communities with appropriate governance.
  - **Standardisation** of APIs and linked open data.
  - **Software development methodologies** and tools for IoT and other highly distributed systems.

Summary

- Open consultation process. Active involvement of representative stakeholders
- Comments/feedback indicated that the consultation represented views of the involved participants
- EC condensed the large set of research priorities to produce call text:
  - **ICT-06-2016: Cloud Computing**
  - **ICT-10-2016: Software Technologies**
- Full consultation report available online:
  - https://ec.europa.eu/digital-agenda/en/news/public-consultation-cloud-computing-and-software
    - Reports for triggering discussions
    - Written contributions
    - Workshop presentations
    - Final consultation report

Thank you for your attention

https://ec.europa.eu/digital-agenda/en/news/public-consultation-cloud-computing-and-software

(https://goo.gl/DwJauu)