STOA NEWS

Foundations of Cloud Computing: Summary of an Interim Project Report

In January 2013, ETAG delivered an interim report of the STOA project on "Cloud Computing" to the European Parliament. The project is run by Fraunhofer ISI, Germany, the Institute of Technology Assessment, Austria, the Danish Board of Technology, and ITAS. The report, titled "Foundations of Cloud Computing", outlines the technical features of Cloud Computing, the market for such services, as well as driving forces and barriers. In the next phase, the project will focus on assessing the risks and benefits of Cloud Computing in Europe. This task will be addressed by conducting an in-depth analysis of the impact on the IT industry, on consumers, businesses and governments, as well as on the society as a whole.

The take-up of Cloud Computing has been one of the most controversial developments in the information technology industry during the last years. While its proponents argue with cost savings, security and technological advantages that will result in more innovation and growth, its opponents argue the opposite way. The aim of the interim report is to lay the foundations for the overall project. This includes the following: (1) an analysis of the basic concepts, (2) an analysis of the evolution of the concept and of (3) the underlying technologies, (4) a review of the market situation, (5) an analysis of the adoption and usage patterns of Cloud Computing, and finally (6) an identification of the driving factors and barriers.

The analysis of basic concepts showed that many different types of definitions exist, but due to the evolving character of Cloud Computing none of them can be seen as the definitive one. The current definition provided by NIST (US National Institute of Standards and Technology) is the most widespread one and is therefore used in the project. NIST ascribes five characteristics to Cloud Computing: on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service (providing transparency of the used capacities). NIST differentiates between public, private, community and hybrid delivery as well as between Infrastructure as a Service (IaaS, i.e. computing resources), Platform as a Service (PaaS, i.e. a platform for running applications) and Software as a Service (SaaS, i.e. software provided by the operator). Cloud Computing services can also be classified in terms of the revenue base (subscription, usage, advertisement based). The resulting business models are still in flux.

The examination of the evolution of the Cloud Computing concept identified that it is not a new concept, but that it can be traced back to ideas from the 1960s. The technology is mainly based on the concepts of multi-tenancy and service orientation and their related technical implementations in the form of virtualisation and web services. Several requirements are necessary for a proper functioning of Cloud services, which include the availability of sufficient network capacity as well as reliable and fault-tolerant service provision. The evolving Cloud Computing technology still bears potential for further advances in technology in areas like scalability and flexibility.

The review of the market situation, existing service offers and suppliers made a number of things clear: (1) Cloud Computing is one of the fastest growing segments of the IT service market. Based on the revenues for public Cloud Computing as a proxy for the overall Cloud Computing development, its share may grow from a few per cent to 15-20 per cent of the overall IT market in 2020. These figures may include some "cloud-washing", i.e. traditional outsourcing is being declared as a Cloud service, e.g. if a data centre is run by an IT service provider in a building close to the customer's premises. The review also showed that (2) SaaS is and will remain the biggest of all three segments due to growing adoption by consumers and SMEs, while IaaS and PaaS will grow at higher rates but not overtake SaaS. (3) Finally, the review showed that many new Cloud providers have appeared, but the pioneers like Amazon, Salesforce and Google are still the leading companies. They have been followed by specialised suppliers like VMware or Rackspace. Others like HP or IBM have followed, while the classical software suppliers such as Microsoft, SAP or Oracle have been late starters. Companies like Dropbox or Evernote

are a remarkable new development as they offer services based on other companies' Cloud services. The US are and will remain the biggest market for Cloud services, followed by Europe, which has a lower rate of growth than the US.

The analysis of adoption and usage patterns of business, private and government users highlights that US companies, in particular SMEs, seem to adopt Cloud services faster than their European counterparts. The consumer adoption of Cloud services in Europe also lags behind the US. In Europe, as well as in the US, most of the consumers prefer free solutions instead of paid ones.

The identification and analysis of drivers and barriers based on existing studies outlines that (1) there is currently a strong research focus on the barriers in Europe. This research focuses on the business usage and less on the consumer usage. The barriers and drivers for the supply side, i.e. Cloud providers, have only been addressed in a few studies. (2) Cost savings and resulting competitive advantages are seen as the major drivers for business adoption, but in the long run other drivers like flexibility and innovation may gain importance. (3) The barriers on the demand side strongly cluster around data security and privacy, around the regulatory framework and legal issues, as well as around the complex of vendor lock-in and interoperability. (4) The barriers on the supply side cover a broad spectrum reaching from a lack of investments to market fragmentation.

These drivers and barriers need to be analysed more carefully in the subsequent project phases for identifying possible policy actions.

Timo Leimbach
(Timo.Leimbach@isi.fraunhofer.de)
Arnd Weber, ITAS (arnd.weber@kit.edu)

« »

Conference on eGovernment Systems in the European Parliament

On 19 February 2013, a conference on "Security of eGovernment" was organised by ETAG in the European Parliament on behalf of STOA. The conference was part of a STOA project run by the Danish Board of Technology in co-operation with ITAS and the Rathenau Institute, The Hague. The conference focused on central security and feasibility issues of EU eGovernment systems and the perspectives for establishing EU eGovernment services. The event included presentations of project results, statements from invited experts and stakeholders, as well as a debate with MEPs about policy options related to EU eGovernment systems.

After the conference, an expert group meeting summarised and debated the most important suggestions and policy options presented at the conference. The debates focused on five overall issues:

- The possibility of having a common European baseline of security regarding eGovernment systems. One topic discussed here was the funding of a provably secure operating system kernel, isolating applications from malware.
- How to promote Security by Design, e.g. by mandating best practice security engineering.
- How to promote Privacy by Design, e.g. by allowing anonymous use of ID cards and by conducting Privacy Impact Assessments.
- The challenge of matching political ambitions with actual technological possibilities.
- How to efficiently achieve interoperability, e.g. through gateways or by using a single method throughout Europe.

These issues along with three case studies that are part of the STOA project will serve as input for the last phase of the "Security of eGovernment" project, which includes developing policy options for promoting the security of eGovernment services. The report will be available for download from STOA's webpage in summer. For more information on the conference, go to the STOA website: http://www.europarl.europa.eu/stoa/cms/cache/offonce/home/events/workshops/egovernment;jsessionid=CBFB072EC797E00C73B4FB610080B046

Anders Jacobi, Danish Board of Technology
(aj@tekno.dk)
Arnd Weber, ITAS (arnd.weber@kit.edu)

« »