Cloud Select Industry Group: Research Priorities for a Competitive Cloud Computing Industry in Europe

In September 2012, the Commission adopted a Communication "Unleashing the Potential of Cloud Computing in Europe" setting out a series of steps to promote cloud take-up in Europe. Key actions include mapping current and emerging, including international cloud standards, recognising voluntary certification schemes, as well as overcoming concerns over contractual relationships between service providers and clients and boosting demand through procurement actions. As a whole, industry as represented by the Cloud Select Industry Group (C-SIG)[1] welcomes the key actions in this Cloud Strategy, as it reflects carefully the concerns industry raised in 2011 in a set of 10 recommendations for boosting cloud computing in Europe[2].

C-SIG recognizes the need for research projects to help achieve the objectives of the Cloud Strategy, and to fully exploit the cloud's potential in Europe. That is why industry as represented by C-SIG places great emphasis on identifying cloud computing research priorities for the next research and innovation programme (Horizon 2020). It welcomes the recent report prepared by the Cloud Research Expert Group[3]which addresses the predominantly technical challenges identified in 2010. C-SIG also recognizes the need for research projects specifically aligned to the Cloud Strategy with its focus on non-technical issues. Building on these foundations, C-SIG is calling for targeted short-term research and innovation initiatives to be complemented by a longer term research and innovation agenda aimed at key breakthroughs to overcome emerging IT barriers.

C-SIG supports a dynamic mapping of research needs to the industrial realities of the cloud computing business. In particular C-SIG considers it important to have research actions that help to overcome socio-economic and legal as well as technical barriers. Cloud computing technology is developing quickly as a result of normal competitive drivers and it would not be wise to direct European research funds towards results that will in any case be delivered by the market or would come too late for the problem that is addressed, bearing in mind the 2-5 year time lag for research results to come on stream.

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[1] The Cloud Select Industry Group (C-SIG) was established by the Directorate-General for Communications Networks, Content and Technology, Software and Services, Cloud Unit, with representatives from major European and multi-national companies and organizations with significant involvement in Cloud Computing, for the purpose of providing independent validation and advice on proposals related to Cloud Computing being considered by the EC.

[2] http://ec.europa.eu/information_society/activities/cloudcomputing/docs/industryrecommendations-ccstrategy-nov2011.pdf

[3] http://ec.europa.eu/information_society/activities/cloudcomputing/cloudresearch/expert_group.htm

Moreover, C-SIG recognizes that the Cloud Strategy and research projects would require the coordination of initiatives and collaboration between multiple organisations, including across the Commission.

Short-term research priorities on which a push is needed to overcome key obstacles are:

1. Techniques for improving trust in cloud computing, including both with respect to security and with respect to commercial arrangements
2. Initiatives to improve the consistency and user-friendliness of the multiple legal frameworks within the EU, and with other parts of the world, for the conduct of business in the Cloud, including for issues of data protection and data sovereignty.
3. Data and resource management solutions, e.g. for managing storage, computing and networking resources with carrier grade quality, reliability, resiliency and a high degree of elasticity
4. Approaches to reducing lock-in by promoting the use of standards and open interfaces

Mid to long-term research priorities should address the emerging requirements for managing the rising demand and usage levels of cloud computing. The main areas where work has to be done to prepare for the future are:

1. Development of new metadata systems that promote easy and portable management of data between platforms and applications;
2. "Cloud-aware" software engineering tools and programming methods that are built for the coming era of big data; which support the optimisation of middleware to allow application and data portability across different platforms and for use by different devices; and
3. Promotion of programming approaches to enable real time analysis of big data .

These research priorities are important if Europe is to have a strong cloud computing industry in the coming years. However, such research taken on its own will not be sufficient to reach this goal. A strong European cloud computing industry will only emerge if it supports value retention in Europe. This means that European based enterprises need to be developing their businesses in Europe, not just exploiting it as a market. Europe needs to aim at being more than just the best place to do business but to be the best place to launch and run a business in the world.

A European industrial policy for cloud computing therefore should aim at getting a good share of this rapidly growing sector of the world economy. This can be facilitated by setting up large-scale test beds and pilots in areas where Europe has technology and industrial leadership. Some of these are specifically:

1. Infrastructure provision for cloud computing that is high performance, low energy and connected by flexible, high bandwidth networks (Europe has strengths in low energy processors, fixed and mobile network equipment);
2. Achieving a critical mass of data sets and services hosted for Europe, attracting companies, governments and citizens alike, where European users can fulfil their security needs for their data and processing in a usable and compliant way;

3. Cloud-based concurrent engineering and simulation pilots in Europe's industrial lead sectors such as automotive, energy, aerospace;
4. Cloud-based business solutions in particular in areas such as financial or retail services where Europe's high security standards, and sector -specific regulation and legislation drive specialist expertise for Europe's systems integrators;
5. Digital entertainment in the cloud to build new metadata systems allowing Augmented Reality applications, rendering and integrating different media with highly immersive user experience (3D media), developing flexible licensing concepts and promoting multiple device use across platforms;
6. Government cloud computing services where the modernisation of the public sector can act as a testing ground for open "big data" and open cloud computing solutions. The European Innovation Partnership on Smart Cities could be a laboratory for such experiments.