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ROUND TABLE REPORT

RESEARCH INFRASTRUCTURE, CLOUD AND OPEN INNOVATION: HOW TO ENSURE TRUST IN GLOBAL SOLUTIONS?

1st of December 2016, Brussels

Report

Round Table

Research infrastructure, cloud and open innovation: How to ensure trust in global solutions?

Brussels, 1st of December, 2016

Silken Berlaymont, Boulevard Charlemagne 11, 1000, Brussels, Belgium

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Speakers

Matthew Dovey
Head of Research Technology, Jisc (UK)

Thomas Skordas
Acting Director of the Digital Excellence & Science Infrastructure Directorate (DG CONNECT)

Georg Greve
CEO of Kolab Systems AG, a member of the OpenPOWER Foundation

Complete recordings of the various speakers' introductory speeches are available online, on OpenForum Europe's Youtube channel.

Moderator Graham Taylor, Chairman, OpenForum Europe

Rapporteur Hans Graux, time.lex

Other details of the event, and the speakers' presentations, are available here.

Credits

Introduction

The session was introduced by Graham Taylor, who stressed the general objective of OFE Round Tables: to promote the importance of openness in the ICT industry, as a way of enabling innovation and economic growth. OFE's Round Tables are presented as moderated discussions, in order to obtain feedback from all participants, with discussion (but not the introductory presentations) taking place under the Chatham House Rule. This approach is reflected in the present white paper, in which only the interventions of the moderator (Graham Taylor), and the presentations of the three speakers are attributed to specific individuals.
For this Round Table, the discussion was not restricted exclusively to the European Commission's Open Science Cloud policy and its implementation in practice: it also extended to related topics such as open data, open access, and the free flow of data initiative. The Commission's Communication from April 2016 raised some new questions, including how the Commission's open science policy fits into the broader cloud strategy, as well as how these policies are intended to impact academia, industry and even citizens.

Three speakers first presented their views on these topics, before the round table was invited to comment:

- **Matthew Dovey**, Head of Research Technology, Jisc (UK)
- **Thomas Skordas**, Acting Director of the Digital Excellence & Science Infrastructure Directorate (DG CONNECT);
- **Georg Greve**, CEO of Kolab Systems AG, a member of the OpenPOWER Foundation

Presentations

Matthew Dovey first provided an overview of where the European Open Science Cloud idea came from, at least from JISC's perspective. Its origins lie in grid computing, which in essence is very similar to the cloud: at the heart stands the idea that the network, Internet and hardware collectively form 'the computer' to be used, including by research organisations. Organisations such as GEANT, PRACE, EGI, and EUDAT provide coordinated access to IT resources for

research purposes, and in that sense were important precursors to the current 'science cloud' concept.

For researchers, a key challenge is precisely the wealth of projects, infrastructures, resources, organisations etc., which can be variously segregated, according to research domain, nationality, etc. The result is fragmentation and confusion. Thus, one of the objectives of the European science cloud is simplification, by creating a common view of EU research infrastructure. The concept of a commons, originally financial-economic in nature, is useful in that perspective: research belonging to the commons should be open to the community, in a collegiate governance model under the stewardship of the research community.

Open science, then, is the mentality shift that the results from publicly financed research should be open and available both to the entirety of the research community, and to the public. Open access is the first step in this process, which focuses on making the data as such freely available, breaking through paywall models that currently still frequently restrict access to data. Data sharing between researchers furthermore facilitates research validation options, thus improving scientific progress. Open science builds on this sharing trend, by making not only data, but also research procedures and infrastructure commonly available as well. This can be driven by various considerations (e.g., democratic considerations, public good considerations, infrastructural efficiency, and pragmatic considerations), or even purely by measurements (e.g., improving research evaluation metrics to improve the effectiveness of funding allocation).

The outcome of this transition is a series of principles that should govern future research: it should be open, publicly funded and governed, research-centric, comprehensive, diverse & distributed, interoperable, service-oriented and social. DG Research developed its open science policies in parallel and interaction with this transition. The increasing importance of infrastructure in this shift coincided with the transition to the cloud paradigm, hence resulting in a Science Cloud vision, comprising the elements of the Communication of April 2016: the Open Science Cloud, integrating and consolidating e-infrastructure platforms, federating existing scientific clouds and research infrastructures, and supporting the development of cloud-based services. This policy is underpinned by the development and deployment of the European Data Infrastructure, which aims

to ensure the effectiveness of the Open Science Cloud by supporting it with infrastructural measures such as high performance computing, shared data storage and common network infrastructure.

As a part of the Open Science Cloud, a call was recently launched which resulted in a project (the European Open Science Cloud (EOSC) Pilot) which is led by the Science and Technology Council (UK), and which will develop governance principles and policies that are conducive to open science development (including, e.g., on topics such as copyright, data protection and ethics). Additionally, services, interoperability and science demonstrations will be developed for use in practice to facilitate data sharing and re-use. The emphasis is on bringing existing initiatives and best practices together, since many of these topics already have prior inputs now requiring further development and promotion, rather than entirely new implementations.

Thomas Skordas fully endorsed the presentation provided by Matthew Dovey, and highlighted the importance for Europe of the Open Science Cloud. This policy is not only necessary to support the research community, but also as a part of the Digital Single Market Strategy. Data is the fuel of the modern economy, as the saying goes, and research is a key instrument for bringing out the value of the data.

The Internet of Things is a good indicator of the quantitative growth and qualitative importance of data: today there are around five billion connected devices, which is expected to increase fivefold by 2020. One billion mobile connections will triple by 2020. The so-called digital universe is doubling in size every two years, which will result in 5,200 GB of created data per person in total by 2020. The growth is staggering, as is the potential of all this data.

For the Commission this has resulted in two major pillars of action, which will be gradually developed and implemented in the coming months. Firstly, the communication on the European Cloud Initiative published in April 2016 that focuses on the science perspective. Secondly, the free flow of data initiative (expected to result in a communication from the Commission by 11 January 2017, possibly under the Building the European Data Economy name) focuses on business and the possibilities of valorising all this data.

The European Cloud Initiative aims to offer a trusted, virtual, federated open environment supporting an ecosystem that comprises not only the scientific community, but (later on) additional communities, such as the public sector and industry (with particular focus on SMEs). The EU is the largest producer of science data in the world. However, the data is not systematically available to European researchers, or even necessarily stored in EU facilities. Much of it goes into the cloud, often outside the EU. Big data and high performance computing support this trend: data leaves the EU, along with the people that developed it.

This is a major driver of current policies: the EU needs to become better at keeping and expanding the value which it generates, including by extracting more value through shared open data. To achieve this goal, several barriers need to be overcome. Interoperability of data is a practical barrier to sharing, but the lack of the high-performance computing and data infrastructure needed for the data fully to be exploited is at least equally important. This is why the Commission's policy agenda also includes significant infrastructural investment. This approach is expected directly to support the 1.7 million researchers in the EU, across industries and research areas.

The second pillar of the European Cloud Initiative is the European data infrastructure underpinning the Science Cloud. PRACE and GEANT play a key role here, providing EU supercomputing capacity and the interconnection of supercomputer centres, thus ensuring that high performance computing investments can be optimally leveraged through a federated infrastructure. This will initially be open only to the scientific community, but could also be made available in the future to the public sector and industry. This will ensure that the investments can be optimally leveraged through the convergence of the infrastructure being used by these different communities. Although science is the start of this initiative, it is not the sole end objective.

Georg Greve complemented these policy perspectives with an SME view. Kolab is a Swiss business, with teams throughout the EU, which provides collaboration software (traditionally referred to as groupware). The central focus point is security: Kolab originated as a development for the German BSI (the *Bundesamt für Sicherheit in der Informationstechnik* - German Federal Office for Information Security), which required a fully secure, interoperable and open software solution for collaboration. This software is now managed through a spun-off company,

Kolab, which earlier in 2016 joined the OpenPOWER Foundation. Kolab itself however is a software company, which is fairly unique in the mainly hardware-oriented OpenPOWER Foundation.

Kolab's reason for joining OpenPOWER was that trust is central to security, since full verification of every risk factor is not feasible in any real life situation. But where does trust originate? There are only two models for that: belief (reliance on faith-based assumptions) and transparency (reliance on the possibility to verify and reconstruct). In technology, only the latter can realistically be advocated, but this is not always how the industry works. The hardware industry exemplifies this: some of the key chipset architectures in the market today are closed, and too complex to understand and reconstruct; as a result, third parties cannot learn, and therefore cannot understand, how and to what extent a technology works.

For a software company, this risk can be defused to some extent through an open source approach. In hardware, this approach is not commonly adopted. OpenPOWER aims to shift this situation, by promoting open architecture and open specifications, creating a completely open stack upon which users and developers can innovate.

This open approach can accelerate innovation. Chipsets exemplify the limitations of a closed model: the past decades have seen reasonable and incremental progress in terms of processing speed or memory size, but no fundamental shifts. An open approach might change this relative stagnation. This vision is also supported by several big players, such as IBM, AMD and Google, which have recognized that an open model can create new opportunities for technological innovation, and hugely accelerate performance for specific use cases. By way of example, the recent OpenCAPI interface from OpenPOWER is a new interface design specification which was developed in around six months with the co-operation of these large organisations. This shows the speed at which innovations can be realised in an open ecosystem which allows the collective brainpower of researchers around the world to be leveraged.

Debates

Next, Graham Taylor moderated the debate on these topics. The open innovation example provided by Georg Greve illustrates the capability of shortening the time to market through open collaboration. Is that also viable with the Open Science Cloud initiative? What is the time to market for realising such an objective, and to what extent is the market waiting for the European research community?

A concern presented by several participants was that **the deployment process at the EU level is slow**. Projects take a very long time to set up, which is often discouraging for industry, especially for research innovators. The access road – one year to set up a new project – is seen as excessively lengthy. Better interaction with industry could accelerate this, since companies increasingly think and plan in terms of calendar quarters, not multiple years.

This was recognised as being true; however, one of the challenges is the bundling of EU resources, which originate from various sources with diverging funding models and priorities. The slowness stems from the need to co-ordinate between Member States. This is a circumstance that cannot be avoided for EU initiatives, and which obviously does not affect industry.

The multitude of stakeholders as such is not the issue: OpenPOWER seems to show that, even with a substantial number of members, faster processes are possible. Of course, this speed is largely result-driven, rather than policy-driven: since industry invests in specific results, policy sensitivities thus don't play a role. This raises the question whether the EU could not support such an open model instead, e.g., funding organisations such as OpenPOWER with an opt-in approach, rather than trying directly to fund the research infrastructure?

This idea was found to have some merit, but it should also be recognised that some of the EU policy goals – such as establishing supercomputer initiatives through flagship visionary projects – requires a certain degree of central EU level funding; it would not be possible to achieve that kind of infrastructure purely by supporting an open innovation approach. Thus, a combination of these approaches is necessary, in which high performance computing is enabled through central funding, and open innovation is also encouraged in parallel. Focusing on the

second component alone would not be sufficient to maintain the EU's position as a leading research area.

A second debate focused on the **European Cloud Initiative, and its scope**. Some of the participants in the debate expected that the prior C-SIG (Cloud Special Interest Group) activities would be covered or more clearly recognised in the European Cloud Initiative as well. A lot of positive momentum was created by or around the C-SIG and industry's engagement in it; will this continue to be built upon in the future?

On this question, it was noted that the European Cloud Initiative is part of a broader communication, which still needs to be implemented gradually. Indeed, it seems inevitable that C-SIG activities will be taken up in the future work as well, given the potential synergies with the Science Cloud work. This call for integration and continuation of C-SIG work was strongly supported by several Round Table participants, who recalled the effort that the cloud industry has invested in the past few years - e.g., in a Code of Conduct, certification, and cloud standardisation activities. The lack of reference to this effort in the ECI was surprising to the industry participants, who are grateful to the Commission for initiating this work, whilst calling for improved coordination. As presenting a Science Cloud as a separate cloud 'silo' could create risks, it should be closely integrated with other cloud policy actions, including in relation to the C-SIG. This is necessary to foster a culture of collaboration between industry, research community and policy makers.

However, a number of tensions remain to be overcome in order to make this integration a reality. Firstly, the technical architecture must be considered; and on that point, C-SIG integration is essential. But there is also a social barrier, namely the mere fact of deciding that data should be shared, a decision which at present in many cases is only reluctantly made. This social barrier is an entirely different challenge, and much more specific to the scientific community, so that efforts to overcome it should be targeted specifically towards that community. The aforementioned EOSC Pilot also aims to implement some measures to overcome these barriers.

This sentiment is strongly supported: communities like the standardisation community have been successful in overcoming some of the technical sharing barriers, but for research and industry the transition to a fully open stack and fully open data model is much more problematic. That will be a key challenge to the European Science Cloud: providing an entry point where open access to science data can be made accessible on transparent, equal and fair terms.

It was recalled that the Communication is only a starting point: a lot of work remains to be done, and resources need to be focused. Building a science community is the first key priority; from that perspective, the feedback from the cloud community on the disconnect between the science initiative and prior industry focus is fair, and well understood; but the conclusion should not be drawn that C-SIG work is somehow being abandoned. This will be continued too, but as a separate track. A key challenge for 2017 will be to (re-)connect the various dots in the different policy tracks, including by reviving and resuming support for previously established and operating cloud expert groups.

A third crucial topic of discussion was whether it would be possible or desirable to have **a uniquely European Open Science Cloud**. Some of the participants felt strongly that the EU cannot try to reinvent an international trend, i.e., the shift to an open innovation model. It would be more effective under that perspective to support EU participation in international / global open initiatives. The creation of a European ecosystem only makes sense when there is no comparable international initiative. That global focus should not be equated to abandoning control of EU data and EU innovation, though; we can see that some economies (such as China) are better at shielding their markets. The decisive element should be that of trust: we should ensure that our research ecosystem is conducive for trust. If that requires an EU focus, then an EU-level initiative might be justified, but the default position should not be to opt for EU initiatives, rather than global ones.

The creation of a culture of sharing and collaboration will be the key challenge, in the view of most participants. In many segments of the scientific research community, there is no such culture. Overcoming that barrier is also the key element to overcoming the Fortress Europe fear: the EU policy objective isn't (or should not be) to keep data or infrastructure in Europe, but rather to make it easier for European research communities to work together and to share their

data, while respecting the European regulatory framework. The tools for doing that are often missing; that is a gap which needs to be filled, and EU policies can help to do this.

Several participants in the round table voiced the perspective that there is often a lack of openness in the EU to new ideas and new innovations, also from a policy perspective. This is the main element stifling European SMEs, as opposed to (e.g.) American SMEs: in Europe, there is often much more scepticism towards start-ups and a greater reluctance to give them their 'first sale'. That attitude can also be observed in procurement policies: European buyers strongly emphasize history and past achievement, rather than potential. If we want to overcome that barrier, then from a policy perspective we also need to encourage innovation through risk taking. Innovative SMEs often fail, both in the US and in the EU, which is normal and healthy; but it it's not normal and healthy that European innovative SMEs have better survival chances by moving to the American market and seeking funding and customers there. While this perspective is not universally shared among all participants, many of them felt that public policy should be more open to experimentation and innovative SMEs. This is not only a matter of procurement, but (e.g.) also simply of timely payment: late payment creates cashflow problems which are harder to overcome for SMEs. Legislation that aims to address this issue is not seen by many participants as being effective to ensure that invoices are indeed paid on time.

As a final point, the **link to the Free Flow of Data Initiative** was discussed, including issues of data location, data ownership, liability, etc. These problems were found to be universally applicable, and therefore also highly relevant to the scientific community. In practice, the research community is confronted with significant concerns when data flows outside the context outside of a project, for many reasons: data protection of course, but also intellectual property rights and publishing arrangements, and the culture of seeking credit combined with the metrics of performance for academia. Publications matter as a metric for achievement, whereas data openness, data sharing and data re-use are not valued, or at least not measured. That is counterproductive for scientific progress: all researchers are motivated to find data with their colleagues – which can enable publications that are valued – but not to share their own data, since this does not benefit the scientist's performance evaluation. The academic incentives are therefore misaligned for sharing.

This can be resolved to some extent through common data management policies, which can factor in such issues as data protection and intellectual property rights without encumbering the possibilities for data sharing and re-use. However, it is very difficult for parties to align and agree on shared data management policies, unless the culture and incentives also change. The re-use of data to support further research – whether entirely new research or the validation of prior research – requires more policy focus. Similarly, a broader concept of publication is needed: it should not only be about papers, but also about databases or software. Why should there not be a concept of peer-reviewed data and peer-reviewed software, valued equally to peer-reviewed papers?

Wrap-up and take-aways

Graham Taylor invited the speakers briefly to summarise their own main take-aways from the discussions. What were the main points that they would be reflecting upon?

- Georg Greve was fascinated by the emphasis on federation as a part of the Open Science Cloud; federation is also a big issue in the open source development community. But the even bigger take-away point for him was that openness by default should be the future policy orientation. Europe should position itself more carefully and consciously behind that position, supporting open ecosystems, and only allow deviations for important public policy reasons. The aviation industry is an interesting analogy, where the EU came together to build its own global competitor through Airbus. Arguably the ICT industry is more important right now than the aviation industry was at the time. Perhaps something similar can grow from the EU cloud policies.

- Thomas Skordas noted that the objective was to have a shared vision between Commission, Member States, industry and the research community. Today, what had been emphasised in particular as key enablers for openness and for future cloud policy were the aspects relating to security, standardisation and interoperability . The Commission will continue to support these elements, and invites everyone to participate in its future European data economy initiative that will comprise much of these priorities, and for which a public

consultation will likely be organised. This would be a good opportunity for the community to give its feedback on future actions.

- Matthew Dovey observed that the OpenPOWER structure was an interesting example of how diversity can be leveraged to work more effectively and quickly. It would be worth examining to what extent a similar model could be leveraged at the EU policy level to create a more agile scientific research community as well.

Graham Taylor expressed his thanks to the speakers in particular, as well as to participants from the audience, and called for a continuation in the collaboration between all participants in order to achieve the maximum benefit from future EU policy actions.

Speakers' biographies

Thomas SKORDAS,
Acting Director of the Digital Excellence & Science Infrastructure Directorate (DG CONNECT)

Thomas Skordas received his diploma in Electrical Engineering in 1984 and a PhD in Computer Science in 1988. From 1988 to 1995, he worked in France as a Research Fellow and project leader in EU-funded R&D projects in the areas of Information Technology and Robotics.

In 1995, Thomas joined the European Commission as a Research Programme Officer in the Directorate General Information Society & Media (DG INFSO). Ever since, Thomas worked in various units of DG INFSO (which, in 2012 became DG CONNECT) dealing with ICT research in the context of EU's Research and Innovation Framework Programmes. From 2006 to 2009, he was Deputy Head of Unit in ICT Security and Trust. In 2009, he was appointed Head of the Photonics Unit and in 2014, Head of the Flagships Unit. Since July 2016, Thomas is the acting Director of DG Connect's "Digital Excellence and Science Infrastructure Directorate".

Georg GREVE,
Chief Executive Officer, Kolab Systems AG

Georg Greve is an entrepreneur and strategist. He is currently CEO and president of the board at Kolab Systems AG. As a founding president of the Free Software Foundation Europe (FSFE), he initiated the battle against OOXML, consulted Google and various governments. In 2009 he received the Federal Cross of Merit on Ribbon for his work for Open Standards and Free Software.

Matthew J. DOVEY,
Head of Research Technologies at Jisc

Matthew J. Dovey oversees work within Jisc Strategic Technologies, the UK's expert organisation in the use of digital technologies for education and research. There, he develops digital infrastructure services which support and enhance aspects of the research lifecycle – from discovery of information and data, to data analysis and manipulation, and collaboration and research impact and dissemination.

Previously, Matthew was Technical Manager at the Oxford University e-Science Centre, where he advised scientific research projects based on WebService and GridService architectures. Prior to this, he worked for the Oxford University Library Services, implementing numerous library and digital library technologies and projects on preservation of digital material.

Matthew is the chair of the Executive Board and Council for EGI.eu and a member of the newly formed EUDAT CDI Council. He is the UK invited expert on the Digital ERA Forum and holds membership of the UK Cabinet Office Open Standards Board and the Software Sustainability Institute Advisory Board.

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