EuroTech Universities
Excellence in Science and Technology

EUROTECH UNIVERSITIES ALLIANCE CONTRIBUTION TO THE PUBLIC CONSULTATION

"SCIENCE 2.0-SCIENCE IN TRANSITION"

A: INTRODUCTION TO THE ALLIANCE'S CONTRIBUTION

The EuroTech Universities Alliance is a strategic partnership of four leading universities of science and technology: Technical University of Denmark; Ecole Polytechnique Fédérale de Lausanne; Eindhoven University of Technology and Technische Universität München. Together, the EuroTech Universities are committed to finding technical solutions which address the major challenges of modern society.

The EuroTech Universities are among the leading institutions of science and technology in Europe and have strong individual and collective interests in embracing the developments highlighted in the Consultation. The EuroTech Universities are already experiencing many of these key trends identified in the Consultation. Accompanied by the completed questionnaire, this contribution by the Alliance is firmly grounded on the practical experience of key actors in its member institutions.

The Alliance's contribution to the Consultation consists of 2 parts:

B – Responds to and comments on the European Commission's Background Document.

C - Highlights issues in the Consultation in relation to which the Alliance could provide immediate and concrete support based on its existing capacities and expertise.

For its part, the EuroTech Universities Alliance is fully prepared to play an appropriate role in future developments. Its contribution below - offering support as well as constructive criticism – is made in that spirit.

B. COMMENTS AND SUGGESTIONS CONCERNING THE BACKGROUND DOCUMENT

1. SCIENCE 2.0 CREATES PRESSING NEEDS ACROSS EDUCATION, RESEARCH AND INNOVATION

There is an increasing awareness of the trends mentioned in the Consultation. The rapid growth in the production of digitized data is overwhelming traditional approaches to scientific enquiry and creates a pressing need for education, research and innovation in data science, big data analytics, meta-analyses, etc.

The creation of infrastructures is urgently required in order to cope with and benefit from these changes; the Commission should give immediate attention to the design and implementation of smart and targeted policy measures.

2. CHALLENGES AND OPPORTUNITIES OF SCIENCE 2.0 EXTEND WELL BEYOND THE PROJECT CYCLE

The Consultation suggests that the trends "have already grown well beyond individual projects". The EuroTech Universities agree with this assertion and identify two immediate consequences as follows:

i. Science 2.0 can help to break down communication barriers between individual projects; ex-ante and/or ex-post clustering of projects around specific research and innovation issues can add value to the sum of their individual outputs.

ii. Moving "beyond" projects, Science 2.0 can be a strong enabler to support the currently rapid growth of partnerships, alliances, actors and stakeholder communities. Indeed, the Consultation specifically mentions "new forms of collaboration" as one of the trends associated with Science 2.0. But since, at present, H2020 funding instruments predominantly support project based activities, there is a case for examining new, innovative policy measures which could promote the initiation and strengthening of partnerships, including those of strategic inter-institutional character.

The EuroTech Universities have a number of suggestions on how Science 2.0 can support the whole research life cycle. These are illustrated in Part C below and include some specific domains where the EuroTech Universities would be in a good position to pilot some of the relevant new initiatives.

3. ***THERE ARE SIGNIFICANT ONGOING CHANGES IN THE UNIVERSITY LANDSCAPE WHICH ARE HIGHLY RELEVANT TO SCIENCE 2.0***

At the same time, a number of other key trends that are outside the "research cycle" may be as important in driving Science 2.0 (sometimes even more so) than those identified in the Consultation. By way of example, the university landscape in Europe and beyond is experiencing unprecedented changes driven by increased demand for education, the utilization of digital technologies for online learning (e.g. Massive Open Online Courses) as well as financial constraints. There are important causal links between these developments and the trends outlined in the Consultation. These connections need to be better understood, with possible policy interventions in mind.

4. SCIENCE 2.0 CARRIES IMPLICATIONS FOR UNIVERSITY-INDUSTRY COOPERATION

The trends identified in the Consultation are also relevant to the future development of public-private partnerships in general and of university-industry relations in particular. Reasonable expectations on the part of industry in relation to confidentiality, IPR and related issues need to be reconciled with the increasing openness of the science system.

5. SCIENCE 2.0 IS OCCURING IN A GENERAL ENVIRONMENT OF PUBLIC MISTRUST AND CONCERN ABOUT INVASION OF PRIVACY

There are broad societal trends which may slow down or change the trajectory of Science 2.0 related changes. There is some societal backlash arising from recent revelations concerning invasion of citizens' privacy, ranging from apparently widespread surveillance by security services to the potentially uncontrolled capabilities of some major internet based companies and social media platforms to assemble and utilize profiling of individuals and communities. These fully understandable concerns are likely to lead to reinforced data protection legislation. Smart and reflexive policy measures are called for in order to minimize the possible adverse impacts of these developments on "open science".

6. THE "HARDWARE" OF DIGITAL TECHNOLOGIES DRIVEN COLLABORATIONS MUST BE ACCOMPANIED BY THE "SOFTWARE" OF TRUST BUILDING

The Consultation correctly identifies globalization and the growth of the science community as well as of data supply as key drivers of Science 2.0. These are necessary but not sufficient conditions to deliver significant changes in the quality and quantity of collaboration. These trends must be accompanied by creating mutual trust within primarily virtual collaborative environments. This requires the understanding and positive engagement of the rapidly growing and increasingly diverse communities of actors and stakeholders.

7. SCIENCE 2.0 IS ALSO RELEVANT TO NEGLECTED RESEARCH DOMAINS, CAN HELP ADDRESS BARRIERS TO INTERDISCIPLINARITY AND ALSO FACILITATE COLLABORATIONS WITH REGIONS WHICH ARE LESS WELL PERFORMING IN TERMS OF RESEARCH

While successive EU Framework programmes have created dynamic and cohesive European research communities, these have largely been based on collaborative projects and have tended to favour those research domains which are addressed by challenge driven EU programmes and which are primarily aligned with public policies on health, environment, energy and mobility. Science 2.0 could help promote cooperation in more neglected, sometimes "less fashionable" research areas. It can also facilitate collaboration across regions and institutions with differing levels of research capacities and performance. Finally, Science 2.0 could help to speed up the relatively slow progress in inter-disciplinary cooperation.

8. AS WELL AS RESEARCH, THE DRIVERS OF SCIENCE 2.0 ARE DRIVING INNOVATION AND EDUCATION

The trends, drivers and impacts outlined in the Consultation are also relevant to the other two corners of the knowledge triangle: education and innovation. Educational curricula and training programmes will need to pay attention to teaching the skills required to make best use of the opportunities offered by Science 2.0. New curricula are needed - for example Masters courses combining computer science and mathematical skills, or life sciences courses including bioinformatics. Furthermore, while qualitatively different, some of the experiences gained in relation to open innovation systems may be relevant to Science 2.0.

9. PARADIGM SHIFTS IN THE CONDUCT OF SCIENCE SHOULD BE ACCOMPANIED BY PARADIGM SHIFTS IN THE ENGAGEMENT OF SCIENCE AND SCIENTISTS WITH SOCIETY

The Consultation rightly identifies increases in the "number of actors and addressees of science" as important features of Science 2.0. Increases in scientific production and in data availability pose important challenges in relation to the predominantly "quality blind" character of the web. This greatly increases the importance of individual researchers' - and in some cases of their institutions' willingness to provide independent scientific advice to society. Such willingness should be accompanied by training activities to enhance the public communication skills of researchers and of their institutions.

10. SCIENCE 2.0 CAN HELP PROMOTE MORE DYNAMIC AND REPRESENTATIVE DEFINITIONS OF SOCIETAL CHALLENGE PRIORITIES

While there is broad consensus that the seven societal challenges specified in H2020 are highly appropriate for EU level collaborative research, there are alternative ways to identify and classify grand challenges. For example, while being closely aligned with public policy domains the current classification does not necessarily correspond to the "grand challenges" perceived by individual citizens, communities or civil society. Furthermore, the persistence of the current classification over several successive Framework Programmes has led to the creation of some challenge "silos", which might hinder innovative approaches and novel ideas. While tinkering with challenge definitions should be avoided, truly cross-challenge approaches and an improved integration of societal stakeholders' world views would provide new impetus to grand challenge related research.

11. THE POTENTIAL INTERACTIONS BETWEEN SCIENCE 2.0 AND THE EUROPEAN RESEARCH AREA REQUIRE FURTHER ATTENTION

The Consultation addresses ERA almost exclusively in terms of Open Access policies. However, there are many other ERA priorities which can be and should be addressed by Science 2.0 – other priorities identified in the ERA Communication of July 2012, as well as the strategic ERA priority of reducing fragmentation and of providing critical mass.

IN CONCLUSION

Since 1982 successive EU Framework Programmes have helped to create a dynamic and increasingly cohesive European research community. Its existence provides a unique opportunity for taking full advantage of Science 2.0.

C. HOW THE EUROTECH UNIVERSITES ALLIANCE CAN CONTRIBUTE TO EU POLICIES AND ACTIONS IN RELATION TO SCIENCE 2.0

The EuroTech Alliance is fully prepared to assist and support possible future policies as well as actions on the part of the EU in relation to Science 2.0. This support can consist of a variety of activities including technology demonstration, exchanges of experience and best practices, test labs for innovative solutions. EuroTech Universities' expertise in relation to data intensive science, data mining, bioinformatics, research cloud services and research infrastructures are just some examples of areas of existing knowhow.

Science 2.0: European Research Cloud Services

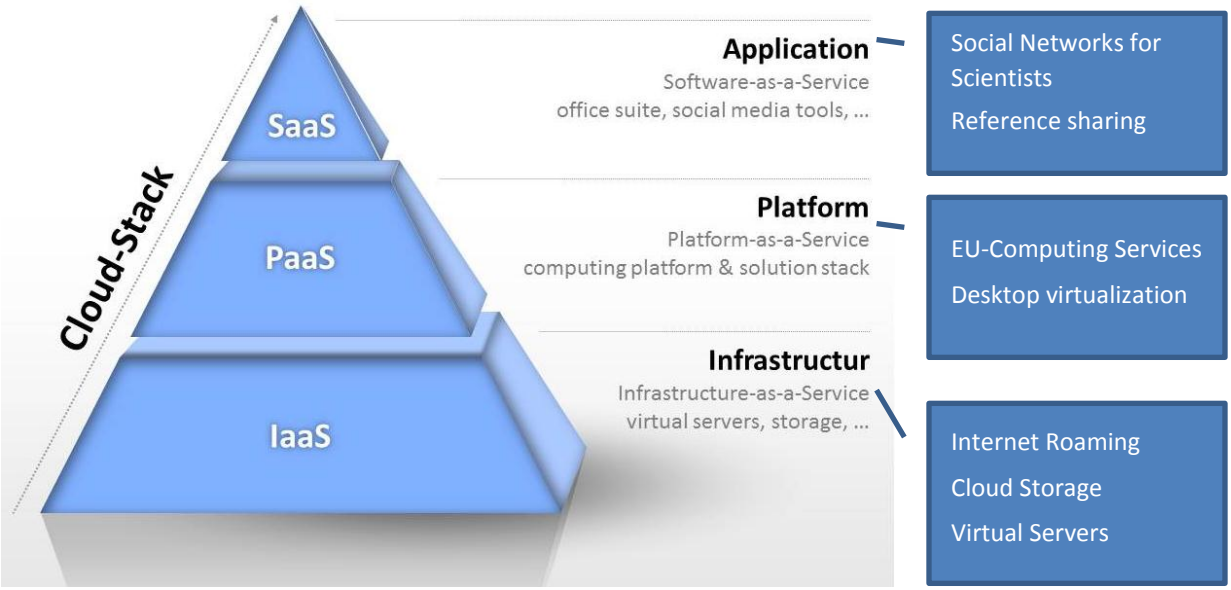

Figure 1: Cloud-Stack

The EuroTech Universities believe that Science 2.0 provides an opportunity to support the whole research life cycle, as illustrated above.

1. *INFRASTRUCTURE*

In relation to infrastructures, the EuroTech Universities have positive experiences with *Eduroam*, the pan-European and international secure roaming infrastructure which allows free internet access for students and staff from universities when visiting other participating institutions. The EuroTech Universities would like to help promote a wider discussion on the evaluation and usage of EU electronic identification (eID) and electronic trust services (eTS).

Based on its in-depth collaboration on various research projects, the EuroTech Universities Alliance advocates the need for a "Science Dropbox" in Europe. This would require simple and reliable synchronization and sharing features, whilst still providing the necessary data protection and security. Implementation could occur either through a European single solution or via featured EU vendors, such as a PowerCloud. The EuroTech Universities are willing to volunteer to pilot such a cross-border "Science Dropbox" within the trust-based environment of the Alliance, including the wide dissemination of evaluation of such a service to other European stakeholders.

The EU could usefully support regions with lower capacity in ICT infrastructure through the founding of a Science Cloud Computing Centre for Higher Education Institutions. This would also contribute to the goal of reducing energy consumption.

2. *PLATFORM*

European universities require independent platforms that provide adequate data privacy and data security. The EuroTech Universities advocate the development of Europe-wide platforms, which have been approved by the EU in terms of quality standards. In this light, the Alliance welcomes the FIWARE initiative. Furthermore, the EuroTech Universities would stress the need for more funding of projects that develop desktop virtualization, enabling scientists to work from all over the world with an internet connection to their home desktop.

3. *APPLICATION*

As illustrated in the European Commission's Background Document, researchers are increasingly engaging in the use of social media (e.g. Research Gate) in order to gain more visibility and outreach, new collaborations. The EuroTech Universities are willing to share their evaluation of these social media channels over time, including the influence on appointments, strategic partnerships and data exchange.

Furthermore, the EuroTech Universities would support the idea of creating an EU data management helpdesk, in order to provide the necessary support in the development of data science. Finally, the EU should stimulate knowledge exchange on big data, including cross-border collaboration of research and education programmes in this field.

4. EDUCATION

The EuroTech Universities are already collaborating in the development of innovative new degree courses (e.g. in green technologies, as well as in economics and management of innovation and entrepreneurship). The Alliance would be willing to develop cross-border pilot Science 2.0 projects in one such educational domain.

For more information:

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