White Paper Shaping EU Brazil ICT Future Priorities Oct 2014

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The EU-BR 2016 Working Group

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1 Executive summary

Europe and Brazil has a strong tradition in joint collaboration in the field of ICT and since 2010 have been running joint calls for project proposals – known as "Co-ordinated Calls". The 3rd Call was published in October 2014 with a deadline for submission April 2015[1]. In parallel, a working group is preparing a report on themes and topics for the 4th (2016) and other future calls to be presented to the European Commission and Ministry of Science, Technology and Innovation (MCTI), Brazil.

This white paper brings together the ideas and wishes of the stakeholders which was presented as a short survey circulated to more than 500 contacts ranging from stakeholders from academia and industry (see Annex I for further details) working in ICT to collect input on future co-ordinated calls between Europe and Brazil.
The majority of respondents are European (70%) with Portugal, Italy, France, Spain and UK the most represented. Over half the respondents (53%) have experience of working on initiatives with EU-Brazil collaboration. Most of this collaboration is recent, dating back to 2012 / 2013.

Brazil has a huge IT market. According to IDC, it is the fifth largest market in the world, accounting for USD 144 billion or 2% of global IT revenues. This is, in itself, an incentive for companies to invest in the country. However, the business model requires proper infrastructure and regulatory framework, which Brazil is still building.
Moreover, Web entrepreneurs, start-ups and ICT-savvy SMEs are the innovators taking new products and services to market, creating new jobs and boosting economic growth. Both Brazil and Europe are making significant investments to create a healthy environment where new businesses can flourish in this area.
A number of obstacles such as expensive energy, high taxes, scarsity of last mile broadband, erratic data privacy legislation stand in the way of making Brazil internationally competitive[2]. Nevertheless, it is evident from the outcomes of the survey that EU & Brazilian cooperations in ICT are seen as mutually beneficial.

Brazilian SaaS, according to a recent report by Frost & Sullivan claim that it will remain the biggest market in cloud computing reaching $584.3 million by 2017 allowing for both Brazilians & Europeans to exchange mutual expertise and know-how, a key factor for future collaboration calls.

Market demand is therefore, a key driver underpinned by specific support mechanisms and stakeholders from the public and private sector. The following survey can compare efforts in Europe and consider practical steps to increase business participation in international co-operation partnerships whilst introducing cross-cutting collaborations with EU & BR Scientific & Business achievements.

Areas of interest for future co-ordinated calls indicated by respondents can be grouped into 5 macro areas for those that are already collaborating: ICT services, Data Management, Industry & Business, cross-disciplinary and specific domain application areas. While respondents who have no previous experience in EU-Brazil collaboration (47%) indicated ICT services, data management and domain application areas.

At the recent Cloudscape Brazil3 event, organised in Rio on 20th October 2014 within the remit of the FP7 framework funded project EU-BrazilCLoudConnect4, a result of the 2nd coordinated EU

[1] http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-eub-2015.html
[2] Techpolis Report Feb 2014 Authors Henrique Barbosa, Philipe Moura, Ricardo Tavares.
[3] http://eubrazilcloudconnect.eu/cloudscapebrazil2014
[4] http://eubrazilcloudconnect.eu/

Brazil call, the outcomes revelled that different scientific problems in **biodiversity, climate, medical informatics and genomics** demand intensive compute and data. All of these problems were of common interest to Europe and Brazil. It is equally important to outline the **role of the infrastructure and the importance on security and privacy**.

Other major outcomes of the Cloudscape Brazil events which are necessary to highlight on considerations for future topics in calls are the impressive and constant growth of the Start-up Brazil[5] programme, a virtuous cycle of innovation, funded by the Brazilian Ministry of Science, Technology and Innovation (MCTI), the programme helps accelerators take new solutions to market that address real-world problems in cities, homes and everyday life. The aim is to ultiimately help business development for SMEs, entrepreneurship and enterprise strategy. There are practical agreements on mutual EU & BR cooperation with funding opportunities if an EU organisation is committed to opening a legal entity in Brazil. A concrete synergy has been established within the remit of Cloudscape Brazil between StartUp Europe[6] leaders and StartUp Brazil.

2 Background

2.1.1 Ongoing collaborations

Exactly half of those who have worked on EU-Brazilian collaborative initiatives state that this was due to links with a university. It is important to point out that some Brazilian Universities (e.g. University of Campinas, Universidade de Sao Paulo, Federal University of Paraiba, UNESP University of Sao Paulo, Federal University of Rio Grande do Sul) have links with European Universities from Portugal, Italy, Austria, France. Staff & researcher exchanges, conferences and publication of papers are examples of this collaboration in practice. In addition, student exchange programmes are also common such as CAPES bi-lateral cooperation projects, Science Without Borders programme, BE MUNDUS project (Erasmus Mundus), Marie Curie International Research Staff Exchange Scheme (IRSES).

An interesting comment made by some of the Brazilian Universities involved in EU-Brazil collaborative activities is that there is a lack of funding for international research from the Brazilian side. EU funding was the source of just under half of EU-Brazilian collaborative activities (43%) Examples are:

EUBrazilCLoudConnect7, EUBrazilOpenBio8, OFELIA9 with its island to Brazil EDOBRA (Extending and Deploying OFELIA in Brazil)10, FI-WARE through the FI-Lab Brazil11, BELIEF12, TEFIS13, PRO-IDEAL, and PRO-IDEAL PLUS14, AMERICAS15 and LEADERSHIP16, HPC-GA17, ELECON18, DEPLOY19. Industry actors are also involved in this collaboration, with some Brazilian Universities working with international ICT companies. Another example is provided by some European national research

[5] http://www.startupbrasil.org.br/
[6] http://ec.europa.eu/digital-agenda/en/about-startup-europe
[7] www.eubrazilcloudconnect.eu
[8] www.eubraziloponbio.org
[9] http://www.fp7-ofelia.eu/
[10] http://www.fp7-ofelia.eu/news-and-events/project-progress/updates-edobra-extending-and-deploying-ofelia-in-brazil/
[11] https://account.lab.fi-ware.org/
[12] http://www.beliefproject.org/
[13] http://www.tefisproject.eu/
[14] http://www.pro-ideal.eu/
[15] http://www.americasportal.eu/
[16] www.leadershipproject.eu
[17] https://project.inria.fr/HPC-GA/fr/
[18] http://www.elecon.ipp.pt/index.php/2013-04-22-11-22-56/description
[19] http://www.deploy-project.eu/index.html

centres which established industrial R&D cooperation with specialized research branches of big companies in Brazil (big IT, transport and oil companies) through FP7 projects.

Major international Research Organizations have ongoing research activities with Brazil. In the cloud computing domain, there is much effort to engage global cloud providers in Europe and Brazil for research purposes. Cooperation is also in place for research centres and universities to work on common IT standards in different disciplines. Finally, large national actors are contributing to defining joint strategies on data sharing in sectors related to agriculture and biodiversity where Brazil provides unique sources of data.

3 Experiences on Processes & Procedures for Future Call Considerations

The **Research & Academic vision** proclaimed some consistent comments around their personal experiences on processes and procedures from a process view. In short, a clear, common set of rules needs to be implemented and adopted in the process of launching, evaluating, negotiating and implementing the coordinated calls.

Additonal comments are mostly related to the lengthy, bureaucratic process and lack of support from the Brazilian side. Other issues for room for improvement concern the rules governing projects should somehow be unified across Europe & Brazil. Moreover, such a set of shared rules should be flexible enough to speed up the collaboration. Processes and models should be put in place contributing to create a single cross-continental team in the context of a project. The projects suffer delays in the start of the projects due to different models and timings.
Projects should be longer to truly benefit from the cross-continent team after its establishment.

It is necessary to make the coordinated calls more attractive for the Brazilian enterprises. Brazilian research agencies and Europe have different points of view. The metrics to evaluate research groups in Brazil are mostly based on the number of papers and impact factors of journals. It would be useful to incorporate the possible impact analysis and quality of the proposal. This could increase the chances of small groups to succeed.

The feedback for the rejected proposals must to be more detailed and longer.

The communication around guaranteeing that there is availaibility of financial resources for supporting the coordinated calls should be made clear to incentivise organisations to invest their time and resources to pursue participation.

From a positive perspective from the research community, the initiatives are considered a truly added asset to increase international networks, cultural experiences from across the globe & to clearly capitalise on past investments made. The call sare a unique and very different experience compared to the traditional relations bewteen EU RTD renowned organisations. of well known people in Europe.

The collaboration was very organized and an extraordinary opportunity to develop joint BR-EU RD&I Project.
To maximise the workload it is positive that the submission of the same project in English in both sides.

From an **Industry perspective** bilateral cooperation brings mutual learning on complementarities that may disclose interesting business opportunities. Factors of succesa are linked to well organised and managed project by experienced and skilled Project Managers (from both regions) are the key

for success. Local cooperation among Academies and Enterprises is essential for long-term-sustainability and brign about innovation into the market sooner.

4 Proposed topics & trends in ICT

4.1.1 Answers from those who have experience in EU-BR collaboration

ICT SERVICES	✓ Federation of cloud ✓ Cloud and cybersecurity ✓ Trustworthy clouds ✓ Hybrid cloud systems and user interactions ✓ Cloud computing & cloud based services ✓ Resource pooling and computational resources sharing supported by cloud computing and/or virtualized e-Infrastructures ✓ Information and Systems Safety and Security ✓ Privacy & security ✓ Mobile computing ✓ Mobile Systems ✓ Future Internet, including smart Networks and novel Internet Architectures ✓ Advanced Cloud Infrastructures and Services and FIRE+; ✓ Internet of Things and Platforms for Connected Smart Objects ✓ High bandwidth backbone networks ✓ Wireless sensor networks, vehicular ad-hoc networks ✓ Content distribution networks (CDN) ✓ Smart interactions: virtual / augmented reality, wearable, 2D/3D visualization
DATA MANAGEMENT	✓ Open Data & Open Access - Reuse of scientific data ✓ Big Data aggregation and sharing of data from collection databases ✓ Semantics Modelling with NeoSQL technologies ✓ Big data for e-Science ✓ Biodiversity Informatics for species names infrastructures & exchange ✓ Spatial Data from Copernicus, essential for a number of scientific and commercial services ✓ Digitisation of biological collections
INDUSTRY & BUSINESS	✓ Mutual co-operation opportunities for SMEs & Start-Ups ✓ Need for a marketplace for Public Private Partnerships ✓ EU and BR should coordinate on how to develop business models for the sustainable uptake of scientific infrastructures ✓ Development of the cloud market
CROSS-DISCIPLINARY	✓ Training & eSkills development ✓ E-learning and e-skills ✓ Remote labs ✓ Networked media ✓ Networked research in Amazonas ✓ Exchange of goods between Brazil and Europe using more efficient processes ✓ Computer Architectures that needs low power consumption

DOMAINS OF APPLICATION	✓ Healthcare ✓ Biology ✓ Spatial Data ✓ Smart Cities ✓ ICT-enabled open government ✓ ICT for learning and health ✓ Environment ✓ Climate change and biodiversity ✓ Agriculture ✓ Microelectronics ✓ Computer Science and Engineering ✓ Electronic Instrumentation for Industry ✓ Bio Medicine ✓ Sensors, Robotics ✓ Nanotechnologies ✓ Multi-modal Transport, Logistics, Infrastructure ✓ Energy ✓ Geophysics ✓ Energy Efficiency ✓ Hydrology & Water Management ✓ Mathematical Education

4.1.2 Answers from those who have no previous experience of EU-BR collaboration

ICT SERVICES	✓ Smart cities ✓ Software engineering ✓ Cloud computing ✓ Energy Performance Contracting ✓ Research Infrastructures including "virtual" ones ✓ Test-driven Software Development Life Cycle (SDLC) methods and tools for these applications ✓ Cloud- and grid-based infrastructures and services, with focus on interoperability ✓ Radically new and native cloud applications as services, incl. aspects as elasticity, pay-per-use, availability, security ✓ Convergence Network, Cloud, Data Analytics ✓ Cloud Forensics
DATA MANAGEMENT	✓ Distributed, heterogeneous data integration and knowledge management ✓ Data quality/usability improvement tools, linked open data for biodiversity information, workflows for biodiversity research. ✓ Mobilizing data and literature on biodiversity; making it open, linked and accessible ✓ Research data publishing practices and services; ✓ Data analytics facilities at scale" ✓ data analytics ✓ Interoperability & standards (ISO) ✓ Data Analytics for Security & Forensics ✓ Big data in health and data mining, computational health and systems medicine)
DOMAINS OF APPLICATION	✓ Biodiversity informatics to manage natural heritage with citizen sciences ✓ Instrumental informatics to manage cultural heritage with pedagogical e-learning, for example with the Brazilian guitar ✓ Aerospace applications, targeting, mainly the space industry. ✓ Sound and Music Computing ✓ Clinical Informatics ✓ ICT in health (assisted living, telemedical services) ✓ Smart Cities (Urban mobility, Urban land-use, Car sharing) ✓ Railway and automotive domains

Cloud computing and all the aspects related to cloud services are at the core of the interest for future trends in ICT, including key aspects such as security, privacy, interoperability (across regions),

federation aspects & trust. Interesting references are made towards the need to push forward the creation of unified cloud infrastructure, better coordinated and designed, that can provide better support to accelerate the process of integration of a new economy with more traditional ones.

The second main field of interest is **Data Management** with special attention to the openness of data, data sharing & scaling, data quality assurance.

Mobilisation of data & access to data is also important with Brazil being an interesting source of potential new data for Europe in strategic fields. One of these is biological biodiversity and agriculture: Brazil is a powerful aggregator of biodiversity data, with national libraries and institutional & university repositories as unique sources of data, and could even act as a catalyst for the whole Latin American Region. This will also strengthen collaboration opportunities between the research groups in Europe and Brazil in the general "green" movement, encompassing agriculture.

With reference to the scientific fields of applications, several respondents highlighted biodiversity & biology as domains of importance for future research. This is easy most likely due to the potential of Biodiversity in Brazil, together with agriculture, **eHealth and bio-medicine, open government and Smart Cities and transports** (incl. smart grid environment). With reference to this point, Brazil would be an excellent country to apply and test models developed for European cities, as the characteristics and requirements of South American's cities differ.
Intelligent & green transport is also one of the possible domain applications for mutual research in ICT, including the exchange of goods. The establishment and maintenance of good ICT networks is another point addressed by the respondents, mainly from the Brazilians who are aware of the lack of infrastructures that their country is still facing.

Finally, Results show that those with experience in EU-Brazilian collaboration believe that that future calls should focus on the future sustainability of research results and potentially industrial & market uptake, and greater emphasis on eskills development and training / elearning.

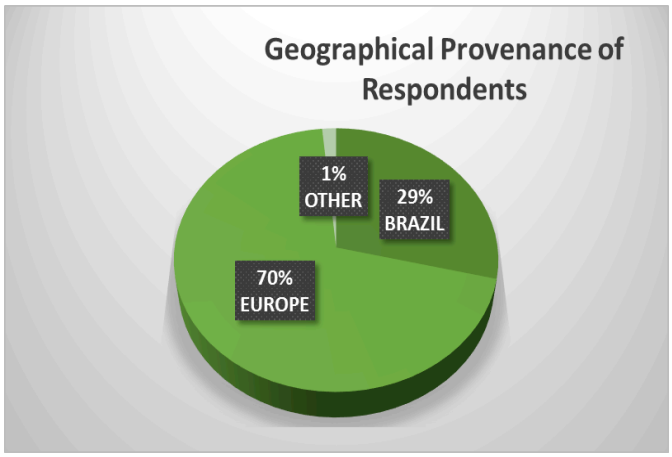
5 Conclusions

To summarize, the points below need to be taken into consideration in the forthcoming collaborative calls:

- ✓ **Participation rules, evaluation rules & timings must be aligned between the 2 funding agencies, the European Commission and MCTI/CNPq.**
- ✓ **The reporting activity is unbalanced and needs to be re-thought. With no specific commitment from the Brazilian partners to report on the activity performed, the results achieved may not be fairly represented and the effort unbalanced against the Europeans.**
- ✓ **Good management approaches need to be preferred and awarded to ensure an effective cross-regional interaction**
- ✓ **Consortia must include Industry partners & SMEs**
- ✓ **A support service may be provided specific for these calls, especially within Brazil**

6 Annex I – Survey Statistics

The majority of respondents are European (70%) with Portugal, Italy, France, Spain and UK the most represented. Over half the respondents (53%) have experience of working on initiatives with EU-Brazil collaboration. Most of this collaboration is **recent**, dating back to 2012 / 2013.



European Country	% Respondents
Austria	2%
Belgium	7%
Czech Republic	2%
Finland	2%
France	13%
Germany	2%
Greece	4%
Ireland {Republic}	2%
Israel	2%
Italy	15%
Luxembourg	2%
Netherlands	2%
Portugal	20%
Spain	11%
Switzerland	2%
United Kingdom	11%