



FUTEBOL

Federated Union of Telecommunications Research
Facilities for an EU-Brazil Open Laboratory

CONNECT
Networks of the Future

FUTEBOL

Where optical meets wireless

Dr Raquel Harper

CONNECT

Trinity College Dublin

Brazil Ireland Research Event

Rio de Janeiro, 13 April 2018



Meet our Director

Professor of Telecommunications (personal chair) at Trinity College Dublin, **Prof. Luiz DaSilva**, a native of Rio de Janeiro, also holds a research position in the Bradley Department of Electrical and Computer Engineering at Virginia Tech. Professor DaSilva is an IEEE Communications Society Distinguished Lecturer (2015-2018), Fellow of Trinity College Dublin, and a Fellow of the IEEE, for contributions to cognitive networking and to resource management in wireless networks.



CONNECT

Networks of the Future



- A 60 M€ Irish research centre in communications and networks
- Broad international collaborations
- Experience in hosting Brazilian students (e.g., doutorado sanduiche) and academics

Rapid Prototyping and Experimentation

Media Rich Applications
M2M/D2D applications
Audio-visual media processing
service platforms
privacy/security services
cloud services
mobile services
network performance monitoring
network optimization
virtualization techniques
cognitive networking
optical/wireless interface
optical architectures
cyberphysical systems
sensor networks
wireless/mobile architectures
spectrum management
software/cognitive radio platforms
PHY layer signal processing
PHY layer monitoring
RF design
antennas
optical technologies
thermal strategies
energy harvesting strategies
microelectronic circuits
smart sensors

What is FUTEBOL?



- A 3 M€ research project Coordinated by Trinity College Dublin and UFRGS

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Federated **U**nion of **T**elecommunications Research
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Beginnings



- European Commission and the MCTI through Rede Nacional de Ensino e Pesquisa (RNP) came together to honor international collaboration agreements in the ICT area, and in particular IoT and 5G.

EU – Brazil ICT dialogues



Roadmap for EU – Brazil S&T cooperation

1. BRAZIL as a partner of the EU

Brazil and the EU share a long-standing relationship based on strong cultural and historical ties. In fact, Brazil was one of the first countries to establish diplomatic relations with the EU. Today, Brazil is one of the EU's main partners and interlocutors in Latin America.

Brazil is Latin America's largest country and the world's seventh-largest economy. Its trade with the EU accounts for 30.0% of the EU's total trade with the Latin American region. The EU is Brazil's first trading partner, accounting for 19.0% of its total trade and Brazil is the EU's 11th trading partner (1.7% of total EU trade -2016). As regards foreign direct investments (FDI), the EU is the largest foreign investor in Brazil.

The EU and Brazil hold regular summits at the highest political level, focusing on key global challenges. The last EU – Brazil Summit, held in 2014, reiterated the importance of cooperation on research and innovation in addressing the shared economic, environmental and societal challenges within the context of the overall EU-Brazil relations.

The relationship between Brazil and the EU is governed by the EU-Brazil framework cooperation agreement (1992). This relation was upgraded to a strategic partnership in 2007. This has led to a significant widening of the scope of the cooperation, with several ongoing sectorial dialogues ranging from agriculture, intellectual property rights, environment, climate change, in air and maritime transport, education, drugs, non-proliferation, financial services, science and technology, energy, space cooperation, etc.

Brazil is a founding member of Mercosur with which the EU signed a Framework Cooperation Agreement in 1995 and is currently negotiating a free trade agreement.

Cooperation between the European Union and Brazil on research and innovation is governed by the [Agreement for Scientific and Technological \(S&T\) Cooperation](#), signed in 2004, entered into force in 2007 and renewed in 2012 for 5 more years. It is currently under renewal procedure. The S&T Agreement is intended to encourage, develop and facilitate cooperative activities in areas of common interest and is based on the principles of mutual benefit, timely exchange of information, reciprocal access to activities undertaken by each Party and appropriate protection of intellectual property rights.

In the area of Fusion Energy Research, a [Bilateral Cooperation Agreement](#) under the Euratom Treaty, was signed in 2009 and entered into force in 2013. Brazil is one of the first non-ITER parties with which Euratom has signed a bilateral fusion cooperation agreement. Brazil is an emerging global player in nuclear fusion, determined to play this role with an ambitious fusion national programme supported by the National Fusion Laboratory in Sorocaba, São Paulo.

Research and Innovation

October 2017



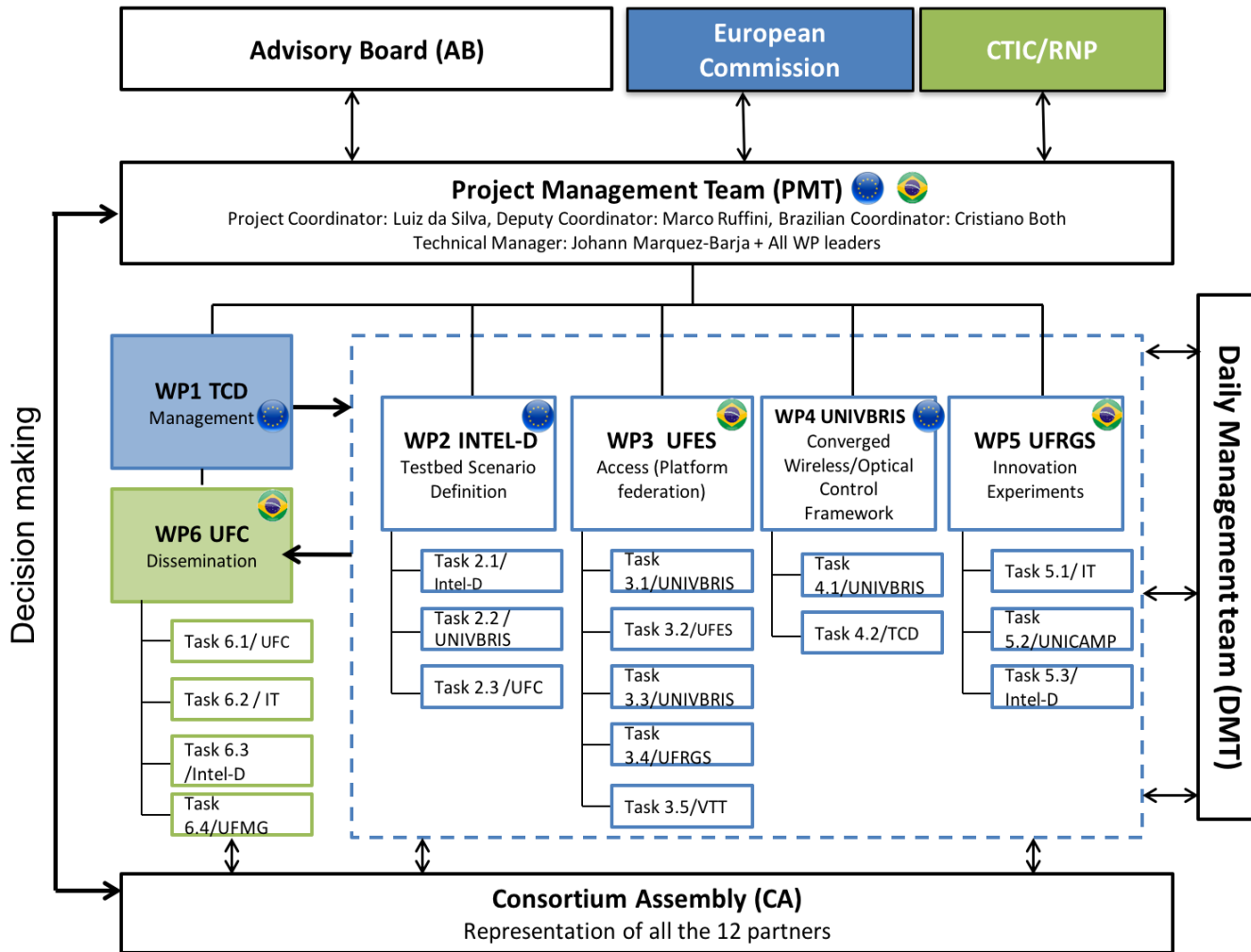
Roadmap for EU – Brazil S&T cooperation

https://ec.europa.eu/research/iscp/pdf/policy/br_roadmap_2017.pdf

Consortium

- 3 universities (Trinity College, University of Bristol, IT Aveiro), 2 research centres (VTT, IMEC), 1 company (Intel) in Europe
- 5 universities (UFRGS, UFMG, Unicamp, UFC, UFES) in Brazil



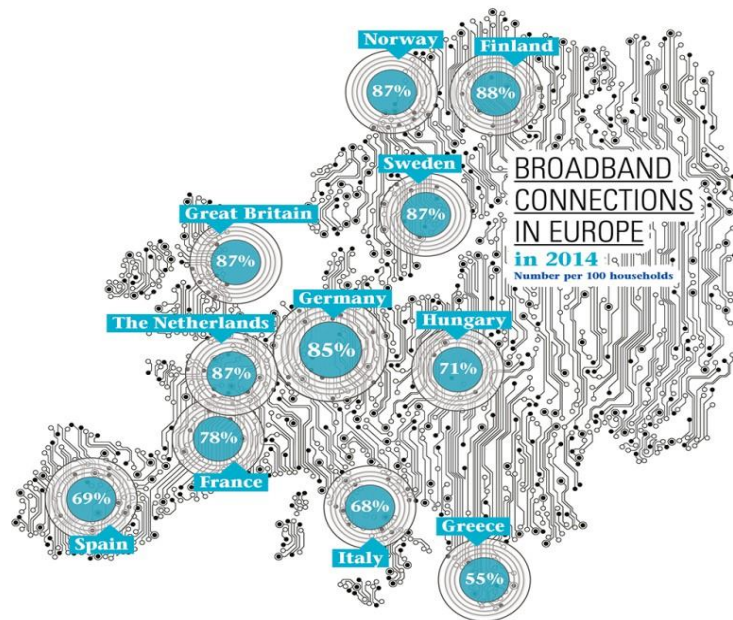


The Goal of FUTEBOL

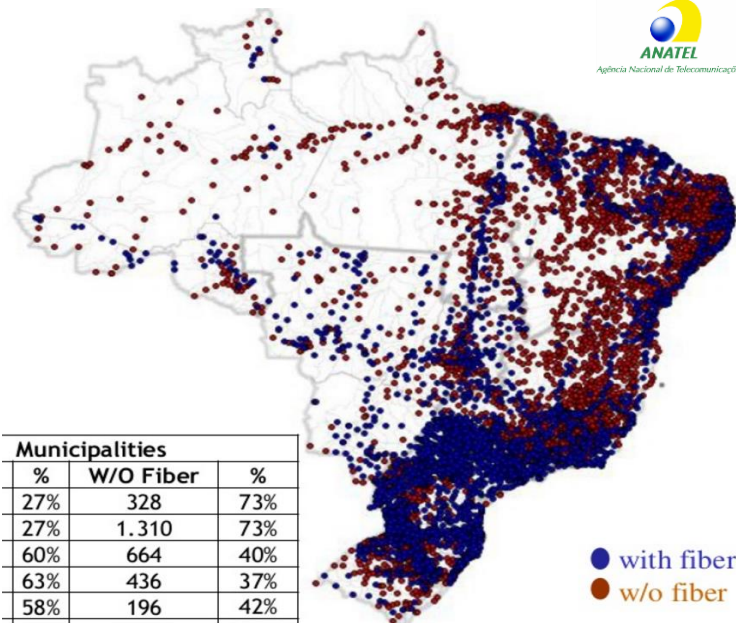


To develop and deploy research infrastructure, and an associated control framework for experimentation, in Europe and Brazil, that enables experimental research at the convergence point between optical and wireless networks

Relevance to European and Brazilian markets



Europe: 3 out of 4 homes have broadband Internet connectivity



Brazil: 53% of municipalities do not have access to fibre





FUTEBOL will facilitate the co-design of **wireless** and **optical** network resource management through experimentation

\$ 10B

market for NFV, SDN, virtualization in 2015 alone

\$ 1.5T

value IoT will add to the economy by 2019

\$ 2.7B

small cell market by 2017

Objective 1: To deploy facilities in Europe and Brazil that can be accessed by external experimenters for experimentation that requires integration of wireless and optical technologies

Build on





***Objective 2:* To develop and deploy a converged control framework for experimentation at the wireless/optical boundary, currently missing in FIRE and FIBRE research infrastructure**



Objective 3: To conduct industry-informed research using the optical/wireless facilities

***Objective 4:* To create a sustainable ecosystem of collaborative research and industrial/academic partnerships between Brazil and Europe**



***Objective 5:* To create education and outreach materials for a broad audience interested in experimental issues in wireless and optical networks**



In summary...



This will lead to enhancements to commercial products and services, telecommunications business models, and education, thus generating a positive impact on society.



Who is it for?



- Wireless and optical network **operators**
- **SMEs** dealing with network deployment and management
- Network equipment **manufacturers**
- **Solution providers** for the Internet of Things
- Over-the-top **service** providers
- **Students and researchers** in higher education



Impact

- **52** publications in major conferences and journals (both in optical and wireless domains)
- **13** joint publications.
- **16** invited talks
- **2** industry-facing workshops (Europe and Brazil), and 1 contribution to 3GPP.
- **YouTube** channel tutorials
- **82** female researchers
- Audiences reached: **13 414** (science, civil society, policy makers, industry, media)

Parting words



- FUTEBOL has been developing research infrastructures in Europe and Brazil to advance research and innovation on integrated wireless-optical telecommunication
- A large-scale project is built over many years of smaller-scale collaborations between the partners
 - Some of the relationships built or strengthened in this event will be an important step towards the success of other projects like FUTEBOL

Future calls



- In 2020, under H2020 ICT programme the following call topic

ICT-43-2020 – EU-Brazil 5G Collaboration.

https://ec.europa.eu/research/iscp/pdf/policy/br_roadmap_2017.pdf

Questions? Comments?

<http://www.ict-futebol.eu>



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