FUTEBOL

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

Open Call for Experimentation

1 INTRODUCTION

The objective of this document is to announce an open call for external experimenters to use the FUTEBOL research infrastructure. As such, this document describes FUTEBOL testbeds and the requirements for an experimenter to participate in the open call. Selected experimenters will receive support to conduct their research using the FUTEBOL integrated infrastructure for converged optical/wireless networks.

Selected experiments will receive a higher level of support from the FUTEBOL team than the usual support provided in Fed4Fire testbeds. The experiments will not receive any kind of funding or equipment as a result of their acceptance in the call. Further details on the eligibility criteria, selection process, types of support as well as intellectual property and privacy protection clauses will be detailed in the following sections.

2 ABOUT FUTEBOL

The overall objective of the FUTEBOL project is 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. The FUTEBOL research infrastructure provides resources to perform experiments using optical and wireless devices for the design of novel solutions for future telecommunications systems. The infrastructure and control framework created in FUTEBOL is federated according to principles developed in the FIRE program and provides testbeds in the Brazil and Europe, interconnected through the infrastructure deployed by the FIBRE project. The FUTEBOL project gathers the work of important universities like Federal University of Minas Gerais, Federal University of Ceará, Federal University of Rio Grande do Sul, Federal University of Espírito Santo, UNICAMP, University of Bristol, Trinity College Dublin, as well as research institutes and companies like Teknologian Tutkimuskeskus VTT Oy, Instituto de Telecomunicações - Aveiro, Intel Mobile Communications GmbH, Intel Brazil, Digitel S.A. Indústria Eletrônica.

FUTEBOL provides a research infrastructure tailored to the needs of experimenters throughout Brazil and Europe, who are interested in issues that cross the boundary between wireless and optical networks. This infrastructure, shown in Figure 1, can be used to perform experiments using a number of communication technologies and paradigms, as follows:
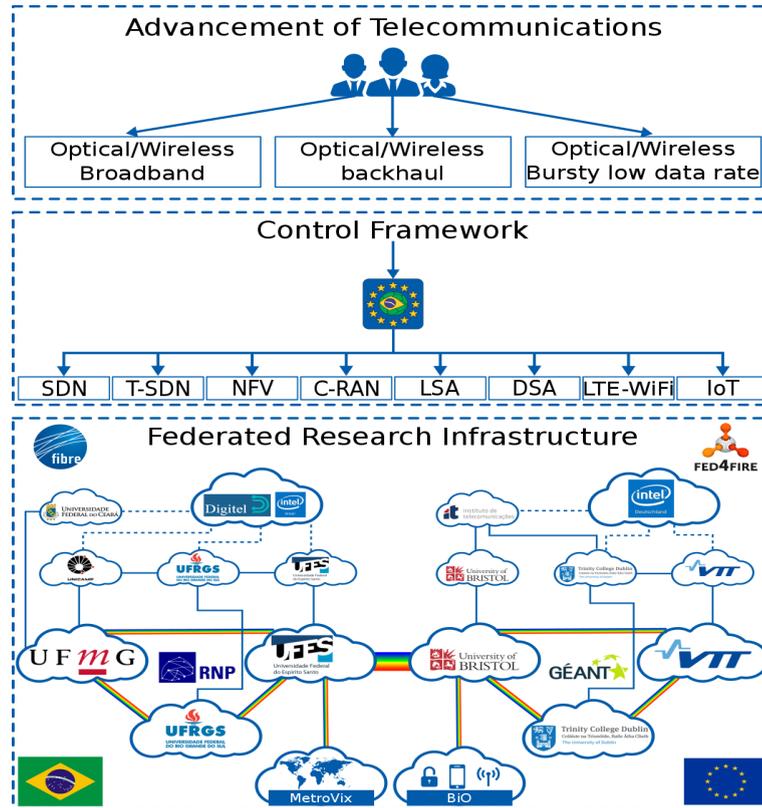
Figure 1: Illustration of the layered nature of FUTEBOL.

- Optical and wireless network virtualization: C-RAN, NFV, SDN;
- Quality of service and quality of experience in optical and wireless networks;
- Internet of Things;
- 4G and 5G networks, and their relation with the optical core;
- Licensed Shared Access (LSA)

For further information on the types and amount of resources available on each of the FUTEBOL testbeds please refer to Section 4.

3   CALL FOR EXPERIMENTS

Objective of the call

FUTEBOL aims to provide an environment for experimentally driven research to the scientific community. Given the wide audience that the project aims at, it is crucial for the community to be engaged and benefit from the project's results as well. This call is addressed to anyone interested to use the methodologies and tools that have been developed within the FUTEBOL project, in order to

conduct original research in networking and telecommunications, especially in the integration of optical and wireless technologies.

This call seeks proposals for the development of experiments in networking and communications, for subsequent deployment at the testbeds provided by the FUTEBOL project. The expected types of participants are educational or research institutions, universities, small/medium/large enterprises, and anyone in general interested in realizing experiments with optical and/or wireless networks.

The project consortium will support these community-driven experimentations by implementing (or by aiding external participants so that they can implement) requested tools and application programming interfaces (APIs) with the project tools that are developed in FUTEBOL. Interested parties will connect their systems to the projects' tools following the defined FUTEBOL approach.

The FUTEBOL consortium will evaluate the achievements and feedback collected through this call and its main results will be presented to the community as part of the project's dissemination activities.

Open Call timeline

This open call has several phases. First, the experimenter will submit a proposal for evaluation. Second, the FUTEBOL consortium will evaluate the submitted proposals and notify the accepted ones. After the notification, each accepted proposal will have time to implement their project on the FUTEBOL testbeds. During this time the approved experiments will have all the benefits described in this document. Finally, at the end of the experimentation phase, the approved projects should submit a small report about the outcomes of the project, as well as their evaluation of the use of the FUTEBOL testbeds. The main dates are listed as follows:

- Publication of this call: August 31st, 2017
- Proposal submission cutoff date: November 20th, 2017
- Notification of acceptance: December 6th, 2017
- End of experiments and submission of the final project report: October 1st, 2018

Proposal submission

All interested parties are welcome to submit their proposals for research, education and innovation projects using the FUTEBOL platform. Proposals will be submitted in a single stage, by submitting a project proposal having the structure presented in Annex A. The application template as well as this call will also be published on the FUTEBOL project website (http://www.ict-futebol.org.br/opencall/).

It is highly recommended that researchers planning to submit a proposal to contact FUTEBOL before submitting a proposal. FUTEBOL researchers as well as testbed owners will be able to assist prospective experimenters with regards to the features available in each testbed, as well as the feasibility of the proposed experiment.

Proposals will be submitted by e-mail to the following address: ict-futebol@connectcentre.ie. An acknowledgement of receipt will be emailed to the email address of the principal investigator as soon as possible after the FUTEBOL consortium receives the proposal. Participants will be able to submit

their proposals at any time after the official announcement of the call. However, proposals submitted after the cut-off date (or any cut-off dates that will be set for the consecutive submission phases) will be considered for future next round of proposal submissions.

The open call will employ a fast submission process based on a simple proposal template. Therefore, the burden for proposers is small. By submitting a proposal, the participants confirm, in case their proposal is accepted, that they have the necessary manpower and financial resources to execute the proposed work.

Any discussion or clarification of any aspect of the call or their planned scenario of exploitation of the FUTEBOL tools and processes throughout the duration of the call will be conducted by e-mail to the following address: ict-futebol@connectcentre.ie. Potential proposers are strongly encouraged to discuss their ideas with the FUTEBOL consortium prior to the submission of their proposal. Further, since the FUTEBOL testbeds are already available for use using Fed4Fire, proposers are also strongly encouraged to test them prior to submitting their proposal.

Eligibility Criteria

Eligible proposals must use the FUTEBOL tools and/or infrastructure for the implementation of the proposal. Proposals will be ranked following the criteria outlined in Section 6 of this call. These criteria include the use of FUTEBOL facilities, its feasibility, the reach of the proposal and its dissemination aspect, the interactive elements it comprises, as well as the amount of support required from the FUTEBOL consortium. It is important to stress that this open call is not funded, that is, the accepted proposals will not receive any form of financial support or equipment to conduct their research.

Expected Outcomes

Experimenters must fill a concise report on the use of the FUTEBOL testbeds (as described in Annex D), as well as the results obtained during the time using the testbeds. Further, any publication that is a consequence of the use of FUTEBOL resources should acknowledge the FUTEBOL project, for example citing the use of the FUTEBOL resources and providing a link for the FUTEBOL web site: "The experiments were performed with support of the FUTEBOL testbeds (http://www.ict-futebol.org.br/)".

Implementation and Support

The implementation of proposals will begin right after the notification of acceptance by the FUTEBOL consortium. Support will be given during the entire period of the experiments.

Terms and Conditions

Participants from accepted proposals of this call will not become official partners in the FUTEBOL project. However, the call offers free access to the FUTEBOL tools and processes, as well as training and support by the FUTEBOL consortium, covering guided training and technical assistance. Moreover, the participants will be acknowledged as associate users and will receive recognition and visibility through the project's website.

As already mentioned above, each proposal has to make use of the tools and processes developed within the FUTEBOL project. The participants will also commit that they will evaluate the results of their work and provide useful feedback to the FUTEBOL consortium. Experimenters must acknowledge the use of FUTEBOL testbeds in any scientific journal, paper, dissertation or thesis whose results (or part of them) were obtained with FUTEBOL resources.

Accepted participants will be asked to sign a lean Memorandum of Understanding (MoU) for using the FUTEBOL facilities, a draft that is annexed to the present document (Appendix B). This MoU will be used to formalize the terms and conditions for accessing the FUTEBOL tools and processes, as well as collaboration between successful proposers and the FUTEBOL consortium. By submitting a proposal, the principal investigator indicates that he/she and his/her team agree with the terms and conditions stipulated in the MoU as well as the usage of private information under the terms presented in Annex C.

4   FURTHER INFORMATION ON THE FUTEBOL TESTBEDS

FUTEBOL provides six testbeds, located in Finland, Ireland, the United Kingdom and in Brazil. The following institutions host FUTEBOL testbeds:

- Teknologian Tutkimuskeskus VTT Oy (Oulu, Finland)
- Trinity College Dublin - TCD (Dublin, Ireland)
- University of Bristol - UNIVBRIS (Bristol, UK)
- Federal University of Espírito Santo - UFES (Brazil)
- Federal University of Minas Gerais - UFMG (Brazil)
- Federal University of Rio Grande do Sul - UFRGS (Brazil)

Each testbed provides a different set of experimentation capabilities, allowing for experiments spanning many optical and wireless standards and applications. A brief description of the resources of each testbed is presented below. For further information, such as tutorials, more detailed documentation on the testbed resources, as well as hands-on examples, please refer to http://www.ict-futebol.org.br/tutorials.

UFES - In the UFES testbed, it will be possible to make experiments using computing resources, Openflow switch and a Intelligent Space (composed by a robot, a set of cameras and access points). The SDN and Openstack cloud capabilities can be employed to investigate the integration of diverse technologies, such as SDN, NFV, and edge computing, to help systems running real-time applications with low E2E latency and high bandwidth requirements. One use case in this scenario is the next generation of robotics as a service, that can involve rehabilitation therapies, robot localization and navigation, and assistive robotics. Link for the testbed homepage: http://futebol.inf.ufes.br/projeto/

UFMG - The UFMG testbed was designed to allow the experimentation in a number of wireless

technologies related to the SDN and/or IoT concepts. It supports a number of wireless technologies, such as WiFi and Bluetooth, and many others using programmable radios (USRPs). Further, the testbed connects those devices using a SDN switch that is also available for experimentation. Link for the testbed homepage: http://futebol.dcc.ufmg.br/

UFRGS - UFRGS's FUTEBOL Testbed makes available an environment for experimentation with many wireless technologies, such as Software-Defined Radios, WiFi, Bluetooth 4.0, Software-Defined Network equipment and IoT devices (Raspberry PI and Arduinos). Therefore, providing resources for experimentation using wireless devices is the main objective for UFRGS's FUTEBOL Testbed. Link for the testbed homepage: http://futebol.inf.ufrgs.br/

TCD - The Iris Testbed aims to provide the resources for flexible radio experimentation, through virtualization technologies and Software Defined Radio (SDR). The testbed is comprised of 16 ceiling mounted USRPs, mounted with SBX daughterboards, giving them a frequency range between 40 MHz and 4 GHz. Those radios support many SDR frameworks, such as GNURadio, or even LTE implementations (e.g. srsLTE). Link for the testbed homepage: http://iris-testbed.connectcentre.ie/

UNIVBRIS - The main experimentation capabilities in UNIVBRIS testbed are SDN networks over packet and optical SDN networks. This enables experimenters to test advanced SDN applications, and to play with parameters for both packet and optical devices in order to experiment traffic flow forwarding and monitoring. The unique capability that the testbed provides in this regards is the ability of users to configure optical cross connections using optical lightpaths. VMs enables users to install applications and VNFs to experiment using NFV and orchestration technologies. Link for the testbed homepage: http://www.bristolisopen.com/

VTT - VTT LSA Testbed provides capabilities for testing various spectrum sharing scenarios related to Licensed Shared Access (LSA) concept. VTT will provide interfaces for defining the actual frequency used by each commercial LTE base station and simulated map location of each base station. The experimenter can define the time, location and frequency of primary spectrum user (incumbent user / owner of the spectrum license). The testbed also provides performance measurements of the LSA system. Link for the testbed homepage: http://www.cnl.fi/

5   CRITERIA FOR SELECTION OF EXPERIMENTS

A jury composed of FUTEBOL researchers will carry out the evaluation and ranking of the submitted proposals. Selection will mainly be based upon the following criteria:

- Criteria 1 - Feasibility: The jury will evaluate if the proposals are feasible using the FUTEBOL testbeds and within the time limit of the call.

- Criteria 2 - Usefulness: the degree of expected future use of the experiment. Here, the jury will take into account how useful the FUTEBOL testbeds are for the proposed projects.

- Criteria 3 - Impact: The expected outcomes of the proposal (publications, formation of graduate and undergraduate students, patents, standards, free software, etc.) will be taken into account.

- Criteria 4 - Potential for Feedback: FUTEBOL is seeking feedback regarding the testbeds, so experiments that explore the full potential of the infrastructure will be prioritized.

6   SUPPORT DURING EXPERIMENTS

Experimenters in this open call have access to basic and/or advanced support. The notification of acceptance will determine the kind of support that will be available to the project. This support will be provided within the constraints of time and the capabilities of the FUTEBOL team.

Basic Support

We provide walk-in and remote services for a set of common support issues. Our support team (staff and students at several FUTEBOL testbeds) will provide the following kind of support as described below:

- Guaranteeing that the facility is up and running (e.g. answering questions like "Could it be possible that server X is down?")
- Providing pointers to documentation on how the facility can be used (e.g. "How to use the virtual testbed" => Answer: "Check out our tutorial online at page x")
- Providing pointers to solutions to relevant technical questions (e.g. Answering "Do you know how I could change the WiFi channel?" => Answer: "Yes, it is described on page Y"; Example of irrelevant question: "How to copy a directory under Linux?").

Advanced Support

Advanced Support provides remote services and technical assistance in setting up your experiments, as well as online-based training. Advanced Support can help speed your implementation, helping you maximize productivity, minimize downtime, and lower costs. The level of support that each experiment will receive will be detailed in the acceptance e-mail. Here are some examples of Advanced Support that we may provide to your experiment:

- Deeper engagement from the FUTEBOL team: FUTEBOL will invest effort to fully understand what the proposed project goals are, suggesting (alternative) ways to reach their goals.
- Help with setting up the experiments via teleconferences or with screen sharing.
- (Joint) solving of practical technical problems (e.g. "Do you know how I could change the WiFi channel?" => "Yes, it is described on page Y, in your case you could implement this as following:..., perhaps we should quickly make a script that helps you to do it more easily, ...").
- Custom modifications in the testbed if needed (e.g. Adding third-party hardware/software and preparing an API for this).
- Technical consultancy during/after the experiments (e.g. "I get result X but would have expected Y, what could be the problem?").

ANNEX A. FULL PROPOSAL TEMPLATE

There is no upper or lower limit on the number of pages for the proposal. However, we suggest the proponents to follow the structure below, in order to facilitate the evaluation.

- Section 1: Project Summary

  Project Title:

  Universities/Institutions participating in the Project:

  Name and e-mail of leading researcher

  Abstract: description in one paragraph of the objectives of the experiment and the expected outcomes

- Section 2: Detailed description

  This section should describe the details on the planned experiment: what does the experimenter hopes to obtain, how, why is it relevant? This section should also include all information with respect to the State-of-the-Art, and show how the testbeds would be useful to support your experimentation.

  - Section 2.1: Main and secondary objectives

    Describe the specific objectives of the proposed experiment, which should be as clear, measurable, realistic and achievable as possible within the duration of this call. Show why FUTEBOL platform is necessary to perform the experiment. Describe and explain the overall concept that forms the basis for your experiment. Describe the main ideas, models or assumptions involved.

  - Section 2.2: Impact

    Describe the potential impact of the experiment for the scientific community and industry, in terms of new knowledge or products being generated.

  - Section 2.3: Description of the State-of-the-Art

    Describe how the topic of the experiment is currently mobilizing the scientific and innovation communities.

  - Section 2.4: Methodology and associated Work Plan

    Provide a work plan and a timing for your experiment.

- Section 3: Needed resources

  This section should include a summary of the FUTEBOL resources that will be necessary through the experiment. It should cite which FUTEBOL testbeds will be used as well as the number and types of resources that should be used during the experiment. This section should also cite the connectivity requirements among the testbeds, if necessary.

- Section 4: Background and Qualifications

This section should describe the proponent and his team, and includes an overview of the proponent's qualifications, technical expertise and any other relevant information to allow the reviewers to judge the proponent's ability to carry out the experiment.

ANNEX B. MEMORANDUM OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING

I _____ (Print Name) would like to confirm that I accept to participate in the FUTEBOL Call for Experiments of the FUTEBOL project under the following terms and conditions.

I understand that any questions arising from the Information Sheet or explanation already given to me should be resolved before I decide whether to participate in the call of proposals. I will be given a copy of this Memorandum of Understanding to keep and refer to at any time.

I understand that if I decide at any time during the research that I no longer wish to participate in this project, I must notify the FUTEBOL project immediately. I understand that my eventual withdrawal from the call would have no negative consequences whatsoever for me.

I consent to the processing of my personal information for the purposes of the selection of the projects to be supported in this call. I understand that such information will be treated in accordance with the terms of Data Protection Laws, the Ethics Policy of the FUTEBOL project, and the laws of Brazil and the European Union.

I consent to the monitoring of my experiments, in the form of monitoring of my resource usage and data traffic. I approve that information about my project will be used solely for research purposes in the context of the project, following the usage presented in Annex C of the call, and that my personal data will not be made public.

I also understand that FUTEBOL does not hold any rights on the intellectual property produced within the experiments carried out using the FUTEBOL testbeds. However, I understand that I must acknowledge the use of FUTEBOL resources in any kind of scientific publication or communication that arises from the use of the FUTEBOL platform.

During the experiment I will receive support from the FUTEBOL project, which will attempt to help my project within the capabilities of the FUTEBOL team and following the terms defined in the call. I also understand that I should not use the FUTEBOL resources for any kind of illegal activity or any activity harmful to third parties, including and not limited to activities such as spamming, hacking, denial of service attacks or attempts to violate the privacy of others. If such actions take place, I understand that the FUTEBOL team will terminate my access and that I am liable for legal prosecution based on the laws of Brazil and the European Union.

Contact details of the participant:

Name (in capitals):

Organization:

E-mail:

Telephone:

Signed:

ANNEX C. USE OF PROPOSAL INFORMATION

Open calls organized by other projects were very successful and have revealed that many submitted non-granted proposals also contain very interesting and valuable information that could be used for setting up collaborations or to extract ideas for further improving the federated test infrastructures. Therefore the FUTEBOL project would like to have the opportunity to collect more detailed information and further use this information, also if the proposal is not selected for funding. In any case, the FUTEBOL consortium will treat all information of a proposal confidentially.

Two types of information usage are envisaged:

1. Information which is part of the Sections A, B, C and D will be used within the FUTEBOL project as input for tasks related to testbed optimizations, sustainability studies, etc. The information may be used in an anonymous way to create statistics and reports about this first open call. All proposals submitted to this open call are subject to this form of information access and usage.
2. The FUTEBOL consortium, only if allowed by the corresponding proposer, might also access other types of information belonging to this proposal. Any use of such information will be discussed and agreed upon with the proposers. Proposers have the freedom to select if they wish to support this kind of information usage.

ANNEX D. FEEDBACK TEMPLATE

Name of the project: _____

Name of the principal investigator: _____

The following questionnaire seeks to know your opinion regarding the services offered by the FUTEBOL project. Please indicate the degree of agreement / disagreement in the following questions, and fill the corresponding boxes with a number, according to the following scale:

Terrible   Excellent

0   1   2   3   4   5
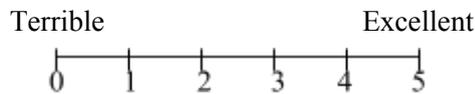
1. In general, how would you rate the FUTEBOL testbeds?

    Answer: _____

2. Are you satisfied with the technical support provided by the staff of FUTEBOL?

    Answer: _____

3. What is the probability that you would give positive references for the FUTEBOL testbeds?

    Answer: _____

4. How useful have the FUTEBOL testbeds been to you?

    Answer: _____

5. If another open call is made, what is the probability that you will use the FUTEBOL testbeds again?

    Answer: _____

FUTEBOL project offers experimentation services to any student, researcher, or developer, regardless of sex or gender identity. We would be grateful if you could let us know the number of male and female participants involved in your experiment:

Number of females: _____   Number of males: _____

What were the results of your project so far, considering both approved results as well as under consideration:

Accepted and under submission publications in journals and conferences: _____

Number of patent proposals or software projects developed: _____

Please feel free to provide any other kind of feedback that was not covered by the questions below: