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Abstract

This deliverable contains the overview and documentation related to the Open Call process in the Triangle project.

Keywords

Open Call, Funding, Application submission, dissemination



Executive summary

One of the main goals of the TRIANGLE project is to assess the viability of the Test-as-a-Service (TaaS) business model for 5G application & devices. In order to do so, the project is interested in engaging with potential customers, not only for verifying their interest and refine the offered services, but also for building up a testbed that allows all the type of tests that the 5G End-to-End ecosystem requires.

Such engagement will be pursued through Open Calls, where potential customers and technology contributors for the testbed expansion will be able to receive funding in order to perform tests on their products or provide their products as part of the service offerings.

This deliverable address the Open Calls, how they will be structured, including the conditions and requirements for the experiments to apply for funding to become an experiment.

There will be two types of Open Calls as previously mentioned, Experiments and Extensions.

Experiments are to test the effectiveness of the Triangle testbed and to allow application developers and device manufacturers to benchmark and evaluate their applications/devices, leading to a Triangle certification.

Extensions allow organisations or groups of companies to contribute to the Triangle testbed by adding more components or technologies, increasing the benchmarking capabilities of the overall testbed.

This document outlines the description of these Open Calls, how they are communicated to the public and how the evaluation, scoring and selection process will be carried out. The various Open Call documents are included in the Appendix of this document. For applicants, the documents are available on the open call webpages and the only one to be taken into account.



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List of Abbreviations

| AEC | Application Committee | Evaluation |
|------|--------------------------|------------|
| E2E | End-to-End | |
| TaaS | Test-as-a-Service | |

| MNO | Mobile Network Operator |
|------|--|
| RAN | Radio Access Network |
| FIRE | Future Internet Research & Experimentation |



1 Introduction

One of the main goals of the TRIANGLE project is to assess the viability of the Test-as-a-Service (TaaS) business model. Starting from the existing Testing House concept, which is widely used by device manufacturers nowadays for certifying their own products. The project intends to push the boundaries of such a model extending it not only to a completely End-to-End (E2E) fashion that includes mobile Apps and services, but also making it more open and flexible, including open experimentation and not only certification.

In order to test the model and refine which are the interesting features and capabilities for such a market, the project is interested in engaging with potential customers that could use the TRIANGLE services and provide feedback on their perceived service level, and what are the technical features of current interest. Given the E2E nature of the project, the identity of the expected customers varies considerably. In particular, the consortium expect interest in experimentation and certification from App developers, device manufacturers, Service developers (including IoT devices and services) and Mobile Network Operators (MNOs) that want a sandbox to experiment with advanced features and network configurations before pushing them to their networks.

Another interest of the project is to engage with providers of current and future technologies that will be part of the future 5G systems. The spectrum of the potential technology is very broad, ranging from experimental Radio Access Network (RAN) components to network and service elements.

Such engagement will be pursued through Open Calls, where potential customers and technology contributors for the testbed expansion will be able to receive funding in order to perform tests on their products, or provide their products as part of the service offerings. The Open Calls will be opportunities for creating an iterative learning process for the project to improve not only the technical offer, but also the service delivery process of the considered TaaS business model.

An Open Call is a process that consists in mainly four phases:

- 1. Announcement phase: where the text that defines the areas of engagement currently considered by the project is released to the public and disseminated.
- 2. Opening and submission phase: where third parties can apply for funding and for participating actively to the project activities.
- 3. Review phase: where the project consortium, aided by external experts, will review the applications and select the ones that will receive funding and will participate to the project activities.
- 4. Development phase: where the applicants together with the consortium partners will carry out the experiments or the technology extensions.

In the following parts of the document the process will be explained in more detail, providing a clear ground for the applicants, the application reviewers, but also the project auditors to verify the effectiveness and transparency of the process.

The project is foreseeing two types of Open Calls: the first open to potential customers, hereafter referred also as Experimenters, where products can be put to test and eventually certified. It will be also referred to as Experiments Call. The second will target specific extensions of the testbed, attracting technology providers. Hereafter it will be referred to as Extensions Call or Open Call for Tools.

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1.1 Open Calls Timeline

During the life span of the project there will be 2 Extension Calls (the first of which excludes existing FIRE partners) and then 3 Experiment Calls. Given the time overlapping of some of the Calls, the Open Calls will be arranged in three Waves. In the first two Waves one Experiment Call and one Extension Call will be opened at the same time, while in the last Wave only an Experiment Call will be opened. The expected timing for the last Wave is around the end of 2017, however, the exact date and allocated funding amount will depend on the outcome of the first two experiments and extension Open Calls and the amount of funding therein allocated. This last Experiment Call will be concluded by mid 2018 to allow for the experiment results to be processed.



Figure 1 - Timeline for Open Call during the life span of the project

In Figure 1 it is possible to see the entire timeline of the Open Calls during the life span of the TRIANGLE project. Each Wave is depicted with a different colour. It is possible to see that the three Waves will overlap. While such time overlap could create logistic difficulties in the use and availability of the testbed, it will provide an opportunity for interaction between all the involved experimenters and technology providers, creating a de-facto testbed community.

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2 Open Call process

As previously mentioned, the Open Call process consists in four main phases, the last of which has two separate parts. An overview of the process can be seen in Figure 2. Independently from the nature of the Open Call itself, being Experiments or Extensions, the process is identical, with only details on the content of the experiments differing from one to the other.



Figure 2 - Process description for a single Open Call

In the **Implementation Process**, the whole documentation for applying is opened to the applicants is defined, in order to have from the very beginning a solidified and transparent selection procedure. The board of external reviewers, as later explained in the document, is selected in order to reserve their availability for the review process. At the time of this document publication, the project is in the Implementation Process phase.

In the **Open Call Application Process** the project disseminates the news of the Call opening and potential applicants are directly contacted or made aware through, events and digital media. A description of how this is done is outlined later in this document). The partners support the applicants through the application process until the close of the Open Call, when **Selection of Experiments (or Extensions)** happens. The interaction between candidate applicant and the consortium will be mandatory for the extension calls. The process consists of all the administrative work for evaluating both the proposed idea, but also the proposers credibility through a due diligence process.

Finally, the selected applicants move to the **Contractual Process**, which will concern all the administrative and legal work of signing the contract with UCL as a subcontracting partner of the consortium. The Experiments (or the Extension work) can finally start and run. At the end of the **Experimentation Process** the applicants will need to deliver detailed reports of the developed work in order to be assessed.

2.1 Funding Possibilities

The funding, as a tradition of the FIRE projects, is an interesting way for attracting experimenters. Each of the Open Calls will have assigned by the consortium a certain budget

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for financing the experiments and the extensions. The budget will be assigned based on the outcome of the previous Wave, whenever possible.

Funding for the Open Calls will be on a staged payment basis. The breakdown of payments for each Open Call is based on the size and type of the funding application, the expected participants and the lifecycle of the commitment. The funding of both experiments and extensions are via subcontracting, and are administered by UCL.

2.1.1 Experiments Funding

The likely applicant for this funding are SMEs, where cashflow can be an issue, so the Triangle project recognise that having sufficient funding for the experiment in a timely fashion is important. However, a reasonable amount of money is held back until the experiment report is complete, to ensure that the company comply will all requirements. Companies are made aware that a condition of funding is that a final presentation/demo may be required at Annual Triangle Audit. The duration of the experiment is capped at 6 months, and the amount of funding at maximum 20,000 euros per experiment. The breakdown and the different percentages are explained in Table 1.

| Payment Portion | Stage |
|-----------------|--|
| 50% | Paid in advance of the experiment work commencing |
| 35% | Interim payment after experiment deployment to the Testbed |
| 15% | After the reports and all required feedback have been completed. This may be further split into two equal phases in case the project review is not close to the end of the experimentation |

Table 1 - Breakdown of the payment stage for Experimenters

2.1.2 Extensions Funding

Extensions are open to all but likely to attract larger research institutions and organisations or groups of companies where cashflow is less of an issue. The amount of funding at maximum 100,000 euros per extension while the lifetime of the extension is expected to be until the end of the project. A substantial amount of funding is also retained to ensure that the applicant supports the extension in the testbed throughout the project. The breakdown and the different percentages are explained in Table 2.

| Table 2 - Breakdown of the payment stage for Extensions | Table 2 | 2 - Breakdown | of the paymen | t stage for | Extensions |
|---|---------|---------------|---------------|-------------|------------|
|---|---------|---------------|---------------|-------------|------------|

| Payment Portion | Stage |
|-----------------|--|
| 40% | Paid in advance of the extension work commencing |
| 30% | Interim payment after the extension is integrated into the Testbed |
| 30% | At the end of the project |

2.2 F6S Application Portal

In order to facilitate a more structured and simple Open Call application process lifecycle, the F6S platform [2] will be used to manage applications. This is a popular platform with SMEs that apply for Accelerator platforms and for investment. The platform is already in use by UCL for

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evaluating SMEs that apply for access to their services. The platform has a number of advantages for this project including.

- It avoids the need to build a custom platform for managing the application, evaluation and review process
- The platform is free to use
- The platform is something that many SMEs are already using and avoids the need to enter existing data. This also gives the reviewers more information about the history of the applying company (if present)
- Reviewers can easily be invited to review and score applications according to the agreed criteria. Reviewers can review all associated information on the platform about the applying companies and the application questions answers and supporting documentation

In Appendix B of the document a more detailed overview of the platform and the application methods is shown.



3 Applying to the Open Calls

3.1 How do applicants get know about the Open Calls?

The Open Calls will be promoted as much as possible through diverse actions.

3.1.1 Website & social media

Short blogs will be written on the Triangle website. In addition, Triangle produced a video explaining the open calls which will be promoted on the YouTube channel. The information will also circulate via the quarterly newsletter distributed to the project mailing list held on MailChimp, as well as the individual project participants' mailing lists and through the FIRE mailing list. The project will also use YouTube and video podcasting as a way for promoting the Open Calls and facilitating the application process.

The consortium will make use of other social media such as f.e. LinkedIn to promote the project and the Open Calls. Each of the partners will use existing social media channels such as Twitter to promote the project announcements.

3.1.2 Conferences and events

Each conference attended and presented at by TRIANGLE will promote the Open Calls, in particular the ones where booths (directly or through partners' booths) and demos will be available. This will ensure direct contact with the conference audience.

The presence of partners at specific events such as TADHack Global 2016 and Hackathon 2017, both hosted by UCL, will allow the project to make contact with a wide pool of potential applicants.

Each partner will also promote the Open Calls at through their own booths at MWC 2017 that is considered a massive event within the mobile community.

3.2 Application Process

Both types of Open Call have a similar application process, both involving the Triangle website, fillable documents and the F6S application platform. The content of the web pages and documents vary according to the type of Open Call and the full list of documents is outlined in Section 4.

The process for an applicant to apply for the appropriate Open Call will be described on the section of the TRIANGLE website related to Open Calls [1]. From there the applicant will follow the instructions for the appropriate type of Open Call that they are interested in applying for. The breakdown of steps is outlined in the next Sections.

3.2.1 How can I apply if I have an App, a device, a service, or a network configuration I want to test or certify?

The potential applicant for experiments is expected to be made aware of the Open Call via the previously mention communication channels, or via a direct interaction with one of the consortium partners. As a practical example, the first Open Call for Experiments known as OC1, the process as a potential applicant would see it is depicted in



Figure 3.

An initial set of short documents will be released on the TRIANGLE website and continuously updated until the Call opening. Intention is to increase awareness and understanding around all details related to the various Open Call waves. By September 1st 2016 the full text of the initial Open Calls will be released and frozen.



Figure 3 - Application stages for Experiments

The potential applicant will have until October 31st 2016 to prepare the necessary documentation, assisted by the various tutorials and materials made available by the consortium. For the duration that the Open Call remains open, potential applicants will be able to contact the consortium for receiving preliminary consulting about the technical aspects related to the testing and experimentation of their own idea. Further information is available in Section 3.3.1. At submission an acknowledgement of receipt will be send to the submitter.

By mid-November 2016 the applicants will be notified about the outcome of the review process. Assuming a positive selection, the applicants and the consortium will start an interactive and iterative process that will be concluded with the signing of the contract between the applicant and UCL representing the consortium. When the legal documentation is in place, the applicants will receive the pre-financing part of the grant as described in Table 1.

Once the legal documentation is in place, the experiment planning can also start. At this point the consortium will provide the needed support for running the experiments from January 2017 and beginning the certification processes. This will include granting the successful applicants, for a limited period of time, exclusive access to the testbed in Malaga.

After an expected period of 6 months, the experiments are expected conclude, and by August 2017 results are expected to be presented by the applicants to the consortium in a short deliverable form. Together with the deliverable on the results, the applicants will be requested

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to provide feedback on the testbed, and on the service delivery process, as a needed condition for receiving the final tranche of the payment.

3.2.2 How can I apply if I have a technology component that can improve the Testbed functionalities?

The potential applicant for extensions is expected to be made aware of the Open Call via the previously mention communication channels or via a direct interaction with one of the consortium partners. As a practical example, the first Open Call for Extensions known as OC2, the process as a potential applicant would see it is depicted in Figure 4.

An initial set of short documents will be continuously released on the TRIANGLE website in order to make more and more aware the potential applicant of the details related to the Call. By September 1st 2016 the full text of the Open Call will be released and the Open Call officially opened to the applicants.



Figure 4 - Application stages for tesbed Extensions

The potential applicant will have until October 31st 2016 to prepare the necessary documentation, assisted by the various tutorials and materials made available by the consortium. For the duration the Open Call remains open, potential applicants will be in contact with the consortium to receive preliminary consulting about the technical aspects related to the inclusion of their technology within the testbed, as further explained in Section 3.3.1. For this type of calls, technical discussions will be mandatory. At submission, an acknowledgement of receipt will be send to the applicant.

By mid-November 2016 the applicants will be notified about the outcome of the review process. Assuming a positive outcome, the applicants and the consortium will start an interactive and iterative process that will be concluded with the signing of the contract between the applicant and the consortium. When the legal documentation is in place, the applicants will receive the pre-financing part of the grant as described in Table 2.

Once the legal documentation is in place, the technology providers can also start planning and working on the technology integration to the testbed and it's various components. At this point the consortium will provide the needed support for working on the testbed, including the availability for hosting the applicants in Malaga and granting them, for limited period of time, exclusive access to the testbed. The exclusive access is in this case paramount, because technology extensions will be considered as downtime for experiments.

Technologies providers are expected to be require more time than experimenters to fit their tools into the testbed. For this reason, the technology enablers are expected to conclude their

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work by the end of 2017 where, when they will present results to the consortium, in a short deliverable form. Together with the deliverable on the results, the applicants will be requested to provide feedback on the testbed technical possibilities and on the testbed learning curve. As a necessary condition for receiving the final tranches of the payment, the technology providers will be requested to provide support for their technology throughout the remaining life span of the project (until end of 2018).

3.3 Review Process

The review process is composed of two stages. The first stage is a "consulting stage" or preliminary feasibility check available from open call announcement until the open call closes. The second stage is the final review and selection process happening after the Open Call is closed.

3.3.1 Consulting stage or feasibility check Ongoing

From the open call announcement to the open call closing date, the Triangle partners will be available to interact with interested potential applicant. Applicants are invited to inform the consortium about their interest as early as possible to ensure appropriate resources are assigned for these interactions. The interaction will allow the applicant to receive additional technical or administrative feedback on their application. The interaction will also ensure the applicant proposal can be technically implemented on the test bed. This will be crucial and mandatory for the open call on project test bed functionality extensions.

For the first two Open Calls an intermediate preliminary review will take place during the next consortium meeting early October.

3.3.2 Complete review process at Open Call closure

The Open Call application review process will be carried out in three stages:

- 1. Evaluation review and Scoring
- 2. Technical Review
- 3. Ethics and Privacy Review

Each of these three phases is outlined in the sections below with responsibility split between consortium members and independent experts. For the initial evaluation, external experts will evaluate the feasibility and applicability of the applications to the Open Call. The external experts will be included in the TRIANGLE Application Evaluation Committee.

3.3.3 TRIANGLE Application Evaluation Committee (AEC)

The TRIANGLE Application Evaluation Committee will consist of

- A panel of 2 independent experts
- 1 chairperson from the consortium acting only as facilitator with no scoring nor ranking right.

The consortium will identify potential individuals based on their knowledge in the area of mobile communications. In particular, the Open Calls for Extensions will require individuals who are familiar with the components of the testbed and what types of extensions may add the most value to the testbed. Different individuals may therefore be selected based on availability and the type of Open Call.

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The consortium will invite a panel of alternate experts in the event there are issues with one of the experts not being available during the Open Call selection. Experts will need to have no conflict of interest with the applicants and will keep the information shared by the applicant as confidential. The consortium will make the best effort possible to ensure this but will also be relying on the experts' good faith.

3.4 Evaluation review and Scoring

Responsibility for the initial Open Call application review and evaluation will lie with the AEC (outlined above). The invited expert can log in to the F6S platform using a LinkedIn account or email & password and see each application. The reviewer can view information about the company (or groups of companies if applying as a group), the answers to the application questions (see Appendix for the list of questions) and any accompanying documents such as the budget spreadsheet and a planning timeline PDF (if supplied by the applicant).

The reviewers will then score the applications based on the Evaluation Criteria outlined below in Sections 3.4.1 and 3.4.2. The chairman will then evaluate the scores and present the applications with the higest score to the consortium for Technical and Privacy&Ethics reviews.

3.4.1 Evaluation Criteria for Experiments

The Evaluation Criteria for the scoring applications are aligned with EU scoring criteria and is outlined below:

The applications will be evaluated based on three aspects: the quality of his idea, the expected effect or impact of the proposed experiment, and whether his plan is feasible (i.e. is it realistic in light of the technical facilities available, as well as in regards to time, human and financial resources). Below we list the points evaluators will consider under each of these aspects with the associated questions to the applicant.

Idea (0-5 points)

- Have you described your idea convincingly?
- Does your proposed idea include innovative elements (for example, development of new products, processes, data or services, adapting a solution to a new context...)?
- Does 5G enable your idea?

What is the impact of your idea (0-5 points)?

- In which ways can your experiment use the features of the Triangle testbed?
- Will your application/device/system benefit from 5G technologies, in particular, what features/improvements would it bring beyond existing technologies
- Relevance of the idea to the <u>NGMN 5G Use Cases</u> [4] and application areas that have been identified in the Appendix A
- The impact of the KPIs (Key Performance Indicators) which you anticipate will be measured
- How does your idea impact the European societal development towards 2020?

Feasibility of your idea (0-5 points)

- Is your idea technically ready for experimentation?
- Need for testing/Are the Triangle testbed tools available suitable for your experiment?
- Are the experience and skills you and your team have sufficient to develop the experiment?
- Is your budget and plan realistic in relation to the activities listed?



3.4.2 Evaluation Criteria for Testbed Extensions

The applications will be evaluated based on three aspects: the quality of your idea, the expected effect or impact of your proposed experiment, and whether your plan is feasible (i.e. is it realistic in light of the technical facilities available, as well as in regards to time, human and financial resources). Below we list points evaluators will consider under each of these aspects.

Idea (0-5 points)

- Have you described your idea convincingly?
- Does your proposed idea include innovative elements (for example, development of new products, processes, data or services, adapting a solution to a new context...)?
- Is your idea enabling the testbed further evolution towards 5G?

What is the impact of your idea (0-5 points)?

- In which ways can your technology improve the features and benchmarking of the Triangle testbed?
- What is the expected impact in terms of enabling new use cases, experiments, and market potential of your technology in the context of the TRIANGLE testbed?
- The KPIs (Key Performance Indicators) that your technology will enable to measure.
- How does your idea impact the European societal development towards 2020?

Feasibility of your idea (0-5 points)

- Is your idea technically ready for inclusion in the testbed and experimentation?
- Are the Triangle testbed tools available suitable for fitting your technology in?
- Is the experience and skills you and your team has sufficient to include, test, verify, and support the technology?
- Is your budget and plan realistic in relation to the activities listed?

3.4.3 Technical Review

Each application will need to be evaluated based on the technical feasibility of using the Triangle testbed. Certain Use Cases may not be feasible based on a number of scenarios:

- The Triangle testbed may not have the necessary equipment to accommodate certain types of experiments or measurement criteria or accuracy levels
- The Triangle testbed may not be at a mature stage technically to accommodate certain types of experiment for the first Open call
- The type of device or application may not be suitable for the type of testing that is facilitated by the Triangle testbed
- The Use Case may have an external dependency that is not feasible to reliably test in any meaningful way
- The Use Case may involve proximity to certain devices or networks that are not practical to reproduce in the Triangle testbed
- The behaviour of the application or device behaviour may not be practical to automate for testing purposes.

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Given the wide variety in nature of both the experiments and the technology extensions, the cases listed above are not an extensive list of all potential issues that could arise. It is not practical to predict, in advance, all possible reasons why a single experiment or component would not be feasible, given the existing testbed conditions at the time of the application. To limit the risks, the consortium strongly encourage potential applicants to contact the project team. A more specific set of criteria will be defined for the external experts to review before the opening of the Open Call.

Triangle can refuse applications based on the result of the technical review.

3.4.4 Ethics and Privacy Review

Members of the Triangle consortium will in parallel to the technical review conduct an Ethics and Privacy review according to the same EU directives required by every H2020 project. Applications that the experts and the consortium feel do not adequately comply with the Privacy and Ethics criteria will be refused.



4 Open Call text and supporting documents

This section outlines the supporting documentation for the Open Calls. These documents are produced by the consortium to support the full application process. The target audience are the applicants.

While the Open Call text for experiments OC1 will be made available roughly at the delivery of the current document, a deeper discussion about the technology extensions has been deemed needed by the consortium. For this reason the release of the text for extensions OC2 will be postponed of few weeks to allow the discussion and iteration within the consortium to take place.

4.1 List of Open Call Documents

Table 3 reflect the list of all documents created for the Open Call. It reflect on their name, the status as of end of May, the format in which they are delivered and in which Appendix a copy of it is made available.

| Open Call | Document Name | Status | Format | Appendix |
|-------------|--|----------|---------|----------|
| Both | Privacy Policy | Draft | PDF | С |
| Both | Landing Page with Information on Open Calls | Final | webpage | D |
| Both | Frequently Asked Questions (FAQ) List | V1 ready | webpage | E |
| Experiments | Short Text for Experiments for publishing on external websites | Final | webpage | F |
| Experiments | How to Apply | Final | webpage | G |
| Experiments | Experiments Application Instructions | Final | PDF | Н |
| Experiments | Experiments Agreement | Final | PDF | I |
| Experiments | F6S Experiments Application form | Final | webpage | J |
| Experiments | Experiments Budget Template | Final | XLS | К |
| Extensions | Short Text for Extensions for publishing on external websites | Draft | webpage | L |
| Extensions | How to Apply | Final | webpage | М |
| Extensions | Extensions Application Instructions | Final | PDF | Ν |
| Extensions | Extensions Agreement | Draft | PDF | 0 |
| Extensions | F6S Experiments Application form | Final | webpage | Р |
| Extensions | Extensions Budget Template | Complete | XLS | Q |

Table 3 - Documents List Available during the Open Calls

| Document: | ICT-688712-TRIANGLE/D5.1 | | |
|-----------|--------------------------|----------------|-----|
| Date: | 02/06/2016 | Dissemination: | PU |
| Status: | Final | Version: | 1.0 |

4.2 Open Call Documents flow and interrelationships



Figure 5 - Relationship and relative placement of the documents related to the Open Call

The diagram in Figure 5 outlines the relationship between the various documents and the Triangle website. The diagram helps to map the user journey from finding out about Triangle Open Calls to applying for the Open Call. The steps in Blue are web pages that the user will view. The Green steps are downloadable documents for the user to read and/or to complete. The final purple step is where the user uses the F6S platform to complete the application.

| | Document: | ICT-688712-TRIANGLE/D5.1 | | |
|--|-----------|--------------------------|----------------|-----|
| | Date: | 02/06/2016 | Dissemination: | PU |
| | Status: | Final | Version: | 1.0 |

5 Conclusion

In the current Deliverable it has been explained what is the role of the Open Calls within the framework of the TRIANGLE project, their timeline, and process. It is especially important too remark that while the process is consolidated, documents can undergo minor changes from the moment of writing the Deliverable to the moment of effectively opening the Call. The consortium will make the major effort possible, though, for making the entire process as transparent and seamless as possible for the potential applicants.

The review process is considered the core of the document, since it is a critical point that would require the presence of external reviewers for guaranteeing a transparent and conflict of interest-free review procedure.

| | Document: | ICT-688712-TRIANGLE/D5.1 | | |
|--|-----------|--------------------------|----------------|-----|
| | Date: | 02/06/2016 | Dissemination: | PU |
| | Status: | Final | Version: | 1.0 |

6 Acknowledgement

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7 References

- [1] Triangle Project website (<u>http://triangle-project.eu/opencall</u>)
- [2] f6s platform (<u>http://f6s.com</u>)
- [3] Organicity (<u>http://organicity.eu</u>)
- [4] NGMN_5G_White_Paper (https://www.ngmn.org/uploads/media/NGMN_5G_White_Paper_V1_0.pdf)



Appendix A – 5G Use Cases

The following are the 5G Use Case areas identified in the 5G Whitepaper produced by NGMN (Next generation mobile networks) Alliance in 2015 [4].

| Use case family | Example use case |
|--|---------------------------|
| Broadband access everywhere | 50+ Mbps everywhere |
| Broadband access in dense areas | Pervasive Video |
| Higher user mobility | High speed train |
| Massive Internet of Things Sensor networks | mobile video surveillance |
| Extreme real-time communications | Tactile Internet |
| Lifeline communications | Natural Disaster |
| Ultra-reliable communications | E-Health services |
| Broadcast-like services | Broadcast services |

a. Application Areas

The following areas have been identified by the project as key Application / Device / Service Areas:

- Commercial services
- Safety of life service
- Public regulated services