



LOCAL CHALLENGE  
FOR FABSPACERS IN ITALY



TACKLE REAL CHALLENGES BY USING EARTH OBSERVATION TECHNOLOGY

# IMPROVE THE PLANNING, OPERATION AND MAINTENANCE OF TRANSPORT INFRASTRUCTURES

Submit your solution until 30.06.2017



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## FABSPACE 2.0

# Improve the planning, operation and maintenance of transport infrastructures

- Local Challenge -

### Background

The FabSpace 2.0 project (the Fablab network for geodata-based innovation – by leveraging Space data in particular, in universities 2.0), funded by European Union under the Horizon Programme, aims at making universities open innovation centres for their region and improving their contribution to the socio-economic and environmental performance of societies. In order to achieve these general objectives, the FabSpace 2.0 project focuses on Earth Observation data, an area with high expected socio-economic impact. In this context the Universities involved in the project must endorse a new role beyond knowledge providers: co-creators of innovations. This does not mean that they will replace businesses and give up basic research, but that they collaborate with businesses to tackle market challenges and capitalize on opportunities.

### Local Partners

The FabSpace 2.0 project is managed in Italy by the Università degli Studi di Roma “Tor Vergata” and the Business Innovation Centre of Lazio Region (BIC Lazio).

### The Challenges

Each FabSpace offers a *Space Application Shop* service, that collects the needs and the societal and economic challenges of external stakeholders, linked to application domains of EO and satellite navigation uses (i.e. agriculture and forestry; energy; environment and resource efficiency; insurance; intelligent transport systems and infrastructures; smart cities; health and well-being, etc.). The scope is to provide independent participatory research support in response to concerns experienced by external stakeholders, offering a demand-driven and bottom-up approach to the FabSpace facility and screening questions provided by these stakeholders. The *Space Application Shop* staff will translate these questions into challenges for the contests. Different runs of local challenges will be launched during the project. They will take the form of idea/solution competitions. Each local run will be based on the challenges identified in the *Space Application Shop*. Participation is expected to build cross-sectoral and multi-disciplinary collaborative teams as the diversity of applicants is a prerequisite for the emergence of innovative ideas. **The most promising solutions will be selected to be part in the *FabSpace Bootcamp* period, meant as an intensive course that aims to provide participating aspiring entrepreneurs with the fundamental business concepts and knowledge that will help them to successfully turn their ideas into an innovative start-ups.**

### Context of the Transport Infrastructures Challenge

Transport is vital to the well-functioning of economic activities and a key to ensuring social well-being and cohesion of populations. Transport ensures everyday mobility of people and is crucial to the production and distribution of goods. Adequate transport infrastructure is a fundamental precondition for transport systems and is one of the most important factors for a country's progress and competitiveness.

Since the mid-1990s, spending on transport infrastructure has increased significantly across Europe, reaching a peak in 2009. It has subsequently decreased each year. Despite these reductions, in 2014, the level of spending was 8 % higher than in 1995. Roads and rails, by far, attract most of the spending.

Infrastructure growth is slowing, so the maintenance, preservation, and rehabilitation of existing infrastructure are becoming increasingly more important. As public funding shifts from construction to maintenance, maintenance organizations become more accountable to administrators, politicians, and the public for a safe, convenient, and accessible transportation system. This shift in emphasis brings new governance and institutional issues.

Innovations in management systems, resources, materials, technology, equipment, and work methods help improve maintenance effectiveness and efficiency at the network and activity levels. Technology is changing the kinds of information that are available and must be maintained and, as a result, new maintenance procedures and different set of skills are being developed.

### Objective of the challenge

The present challenge is aimed at identifying innovative solutions that supports roads and rails planning, operation and maintenance by both transport infrastructure operators and Public Administrations that have policy and controlling roles.

The innovative solutions should be based on Earth Observation derived information (from Sentinels and other VHR optical and radar satellites) combined with information derived from Meteorological satellites and from other open geodata (vectorial and geo-referenced databases).

Topics of interest for this challenge include, but are not limited to:

- conditions (including deformation/movements) of transport infrastructure bodies and of the close natural/anthropic environment;
- conditions of the upper surface of the transport infrastructure and related deformation or levelling (e.g. road dips and ponding, rail track geometry)
- nowcasting and monitoring of the impact of meteorological events on transport infrastructures (e.g. flooded areas or roads covered by snow);
- information supporting predictive maintenance of transport infrastructures;
- information related to traffic and traffic management derived information, including parking areas;
- impact of transport infrastructures on the surrounding environment and on citizens' quality of life.

### Dataset

The area of interest will be Italy and in particular Rome and its surroundings. The remote sensing imagery provided comes from the Sentinel 1 and Sentinel 2 platforms. The imagery of the first platform consists of Synthetic Aperture Radar (SAR) satellite data with 10 meters spatial resolution. The imagery provided by the second platform consists of multi spectral, cloud-free satellite data. The bands for images from this latter platform have different spatial resolutions: 10 meters for bands B2 (490nm), B3 (560nm) B4 (665 nm) and B8 (84nm). 20 meters for bands B5 (705nm), B6 (749nm) B7 (783nm), B8a (865nm) B11 (1610nm) and B12 (2190nm). Sentinel 1 and images can be downloaded from Sentinel Data Hub (<https://scihub.copernicus.eu/dhus/#/home>). All Sentinel images have been clipped to match the bounding box of the areas of interest. Very High Resolution images over limited subareas will be also available together with streets vectorial data at different spatial scales. More in general the ideas shall capitalize on EO data (with particular focus on ESA EO archive, Sentinels, Meteorological data and European national missions, Copernicus), open data (e.g. reanalysis, met data, government data) and new digital technologies and tools (e.g. artificial intelligence, computer vision, cloud computing).

### Expected outcome

The expected outcome of the Challenge is that the participant teams prepare a consolidated document exhaustively describing the used methodology. In the document the participants need also to include the results obtained by applying the methodology to the area of interest. A light mock-up of the EO prototype service will be included in the technical part of the outcome for illustrative purpose. The ideas must be original. Applicants may propose new or improved ways to implement existing solutions, combine them, or adapt them to a different context or target group, but they cannot be exact copies of those. Applicants must demonstrate the novelty of their solution, in comparison with those already developed/implemented

by themselves or by others in their context. Applicants must also address the sustainability of the idea by including a draft business model (CANVAS) that outlines how the users uptake of the idea could be achieved in the following steps. The idea shall be both technically feasible and have the prospects of being commercially viable.

### Evaluation

The evaluation shall be partly based on the **methodology used and described** by the participants (**weighting factor 50%**). A board formed by Earth Observation experts from University of Rome “Tor Vergata” will review procedure as described in the submitted document and will evaluate it according to the following criteria:

- clarity and completeness in the explanation of the methodology
- level of exploitation of Earth Observation data
- level of automation
- generalization capabilities to other areas of interest

The evaluation shall be also based on the **experimental results** that the team will obtain applying the methodology to the area of interest (**weighting factor 30%**).

Last but not least the proposals shall be evaluated against the criteria of the **sustainability** of the solutions and **quality of the draft business model (weighting factor 20%)**

Selected applicants will be invited to pitch their proposal in front of a jury composed by EO data experts as well as business experts.

### Team Spirit

Although you can submit alone or as a team of more people, you are warmly invited to group into teams, with the goal to help you learn from others and get you out of your comfort zone.

### Submission

Each participant shall to send the documentation to the following email address: [info@fabspace.uniroma2.it](mailto:info@fabspace.uniroma2.it) **until the next 30th June 2017**. The subject of the email message should be “*FABSPACE Italy: Transport Infrastructures Challenge submission*”

### Prize

Selected and mature projects will benefit of a **pre-incubation period at ESA BIC Lazio** (BIC Lazio) that will lead participants through a period of unconditional free bootcamp to support them turn their concept into a start-up. Bootcamp activities will include further support on how to use the FabSpace facility, training on how to foster entrepreneurship (idea generation, business modelling, team composition, fund raising, networking) and support from the ESA BIC Lazio on how to elaborate a Business Plan based on a lean approach in order to be able to apply to the ESA BIC Lazio Programme ([here](#)).

### Contacts and questions

For more information and if you have any further questions, please contact the local FabSpace:

- [info@fabspace.uniroma2.it](mailto:info@fabspace.uniroma2.it)
- [fabspace@biclazio.it](mailto:fabspace@biclazio.it)

The FabSpace team at University of Rome “Tor Vergata” will be available to provide technical support in tackling this challenge.

### Disclosure of personal information

By participating in the FabSpace Challenge, all participants acknowledge that Università degli Studi di Roma “Tor Vergata”, BIC Lazio, the other FabSpaces partners (<https://www.fabspace.eu/consortium/>) and the European Commission may use their names, country of origin, comments, photos (incl. photos taken of the participants during the events), and short descriptions of their solution in publicity or advertising concerning the FabSpace project or otherwise in any medium now known (including the Internet or other interactive networks) at any place and time without further compensation or right of review. They also thereby agree to waive their rights with respect to any such publicity and advertising.



### Conditions

The intellectual property of the provided solution will remain property of the FabSpace participants that have developed it. Specific agreements with any stakeholder interested in the use of the provided solution will be defined on a case by case basis. Neither the FabSpace partners nor the FabSpace participants have any performance obligation.