

EU Space User Consultation Platform 2022

EO-related User needs and requirements

Infrastructure session

Frederic Collomb - FDC 03/10/2022





## Contents

- Context
- Role of Reports on User Requirements (RURs)
- Overview of the RUR for Infrastructures
  - Document structure
  - Applications and operational scenarios
  - UR gathering approach



## Context

- Past User Consultation Platforms (UCPs) addressed infrastructures through two different angles:
  - GNSS for construction activities (Sessions on Surveying)
  - GNSS for network synchronisation in the domains of Telecommunications, Electricity transmission and Finance (Sessions on Timing and Synchronisation)
- First time that infrastructures are addressed through a dedicated session
- First time that the contribution of Earth Observation to the infrastructure market is addressed









## Reports on User Requirements (RURs)

- Aim at providing EUSPA with an upto-date view of current and potential future user needs and requirements
- Living documents periodically updated by EUSPA
- Serve as key inputs to the UCP
- Publicly available

#### **Approach for latest RURs**

- Build on the latest EUSPA market report (2022) and previous Reports on User Requirements for GNSS (e.g. RUR "Surveying" and RUR "Timing and Synchronisation" for the RUR on infrastructures)
- 2. Identify relevant applications & operational scenarios
- 3. Define what user needs & requirements to collect
- 4. Collect preliminary **needs & requirements** from experts (e.g. service providers, users)
- 5. UCP: review & update the reports

## Introduction to the RUR "Infrastructure"

Aims to start gathering user needs and requirements related to the various phases of the infrastructure life cycle and relevant to:

- Position, navigation, and timing (PNT)
- Earth Observation (EO) → primary focus

### Also includes:

- Market overview & trends
- Overview of main user communities and market players
- Considerations about policy, regulation and standards





## Selection of applications





#### 15 applications grouped into 4 "clusters":

- Infrastructure planning
- Infrastructure construction and monitoring
- Environmental impact monitoring
- Timing & Synchronisation for Telecom networks

Different levels of investigation for the applications:



**TYPE A**: Applications for which needs and requirements relevant to EO have been investigated. GNSS-related requirements from previous RURs have been kept "as is".



**TYPE B**: Applications for which GNSS requirements existed from previous RURs and have been kept "as is". No further analysis has een made.



**TYPE C:** EO-only applications for which needs and requirements have not been investigated at this stage

#### Final selection of applications (Type A - UR relevant to EO)

- Infrastructure site selection and planning
- Construction operations (monitoring)
- Post-construction operations (monitoring)
- Environmental impact assessment of infrastructures



Subsegment	Application	Types of Application / Level of Investigation	
Infrastructure	Infrastructure Site Selection and Planning	А	
Planning	Permitting	С	$\bigcirc$
	Vulnerability Analysis	С	$\bigcirc$
Infrastructure	Constructions Operations	А	
Construction and Monitoring	Monitoring of impact of human activities on infrastructure	С	$\bigcirc$
	ODA Support Monitoring	С	$\bigcirc$
	Pipeline Monitoring	В	
	Post-Construction Operations	А	
Environmental Impact Monitoring	Environmental impact assessment of infrastructures	А	
Timing &	Data Centre	В	
Synchronisation of	Digital Cellular Network (DCN)	В	
Networks	Professional Mobile Radio (PMR)	В	
	Public Switched Telephone Network (PSTN)	В	
	Satellite Communication (SATCOM)	В	
	Small Cells	В	

EO only application GNSS only application Hybrid/synergetic application (combined use of EO and GNSS)

## **Operational scenarios**



## **Operational scenarios** defined for the four **selected applications** to support the gathering of user needs and requirements

	Application "Infrastructure site selection and planning"	Application "Construction operations (monitoring)"	Application "Post-construction operations (monitoring)"	Application "Environmental impact assessment of infrastructures"	
	<b>Operational scenarios</b>	<b>Operational scenarios</b>	<b>Operational scenarios</b>	<b>Operational scenarios</b>	
•	Site characterisation (Land cover / Land use, topography, geological evaluation)	<ul> <li>Construction progress monitoring (alignment with schedule)</li> </ul>	<ul> <li>Ground deformation monitoring (to assess risk on structural health)</li> </ul>	<ul> <li>Ground motion monitoring (caused by works during the construction phase)</li> </ul>	
•	Risk assessment wrt. ground deformation	<ul> <li>Construction conformity monitoring (alignment with plans)</li> </ul>	<ul> <li>Vegetation encroachment monitoring</li> <li>Land cover (land use change)</li> </ul>	<ul> <li>Air and water pollution assessment</li> <li>Biodiversity loss assessment</li> </ul>	
·	hazards (e.g. floods, droughts)	Construction stability     monitoring	monitoring (in the surroundings)	• BIOUIVEISITY IOSS assessment	
•	Risk assessment wrt. climate change	0			
				7	

# Characterisation of user needs and requirements relevant to EO

- Two types of "users":
  - End users (e.g. infrastructure managers)
  - Intermediate users (service providers)
- Characterisation:
  - (End) User needs: "What is the problem to be solved?"
    - $(\rightarrow$  "User needs" part of the table)
  - Solution: "How the problem can be solved?"
     (→"Service Provider Offer" part of the table)
  - EO-related requirements: "Which data are needed to deliver the solution?"
     (→" Service Provider Satellite EO Requirements" and "Service inputs" part of the table)



#### Example

ID	TBC				
Application	Construction operations				
Users	Infrastructure owners and/or operators, Construction and public works companies, Financial institutions financing the construction (including international organisations in case of ODA projects).				
User Needs					
Operational scenario	Construction progress monitoring (alignment with schedule) - Monitor the progress of construction activities to verify that construction progresses according to the original planning and detect deviations from schedule if any.				
Size of area of interest Size of area of interest 1-15 km <sup>2</sup> for localised infrastructures 1-15 km <sup>2</sup> for extended infrastructures					
Scale	Not applicable				
Frequency of information	From weekly to quarterly				
Other (if applicable)	f applicable) Not applicable				
Service Provider Offer					
What the service does	Provide reports on the construction progress achieved between two different moments in time and assess its compliance to the planning (when the planning is available to the provider).				
How the service works	e service works Automated or semi-automated detection of newly built assets based on algorithms comparing successive images of the construction area.				
Service Provider Satellite EO Requirements					
Spatial resolution	From a few dozens of cm up to ~5 m				
Temporal resolution	al resolution From daily to monthly				
Data type / Spectral range	/ Spectral range Optical Visible and NIR, SAR.				
Other (if applicable)	er (if applicable) Not applicable				
Service Inputs					
Satellite data sources	VHR/ HR Optical satellites and SAR satellites.				
Other data sources	UAV				



www.euspaceweek.eu | #EUSW 2022









