

ESA & Rail

ESA COMMERCIALISATION GATEWAY

SPACE FOR BUSINESS
BUSINESS FOR SPACE

How ESA can support digitalisation in rail

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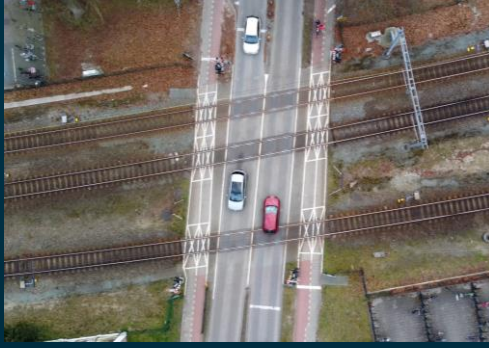
ESA Transportation Day, 27 Nov 2023

ESA UNCLASSIFIED – For ESA Official Use Only



Why space is important to rail

Signalling



Railway infrastructure monitoring



Tracking and Tracing



Broadband to passengers



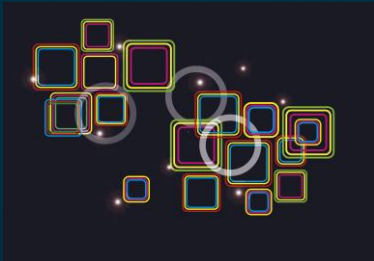
Rail journey through ESA



Service development
and demonstration



Integration

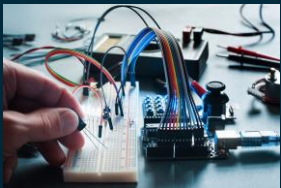


Prototype



Source: Rx4Rail ESA

Breadboard



Low maturity

High maturity

Space4Rail is a cross-directorate ESA initiative to support the railway community by raising awareness of the added value that space-based assets can bring to the digitalisation of railway

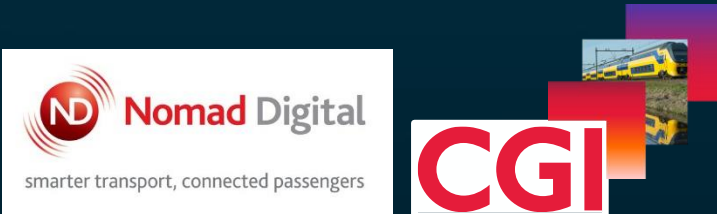
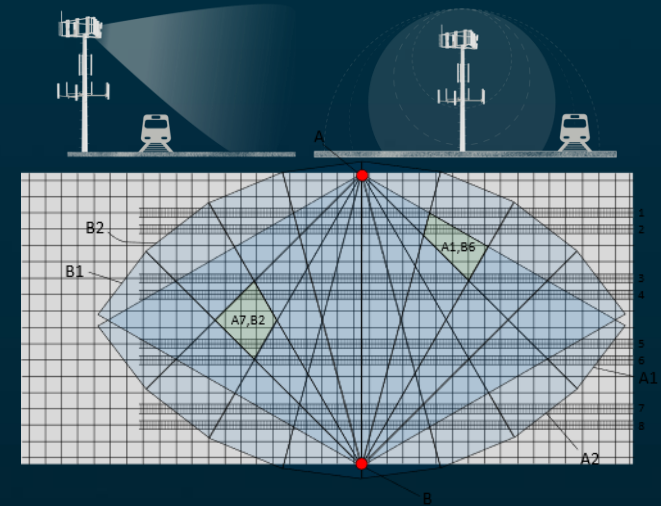
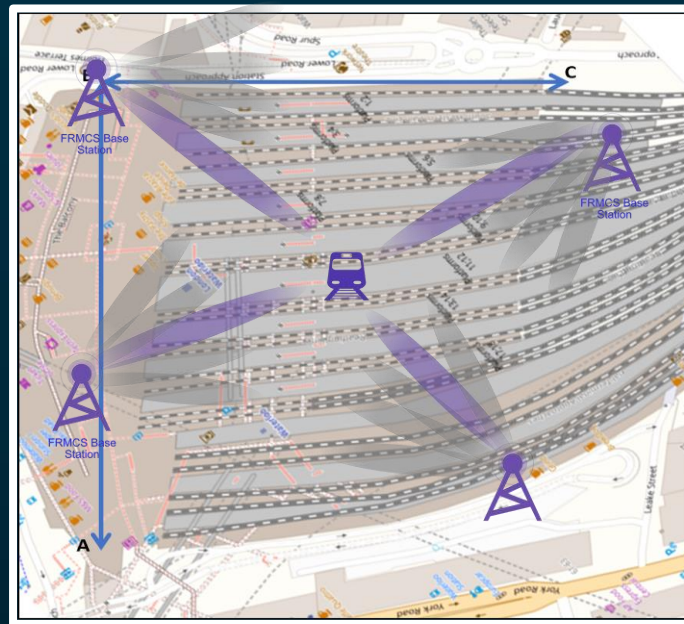


<https://space4rail.esa.int/opportunities>

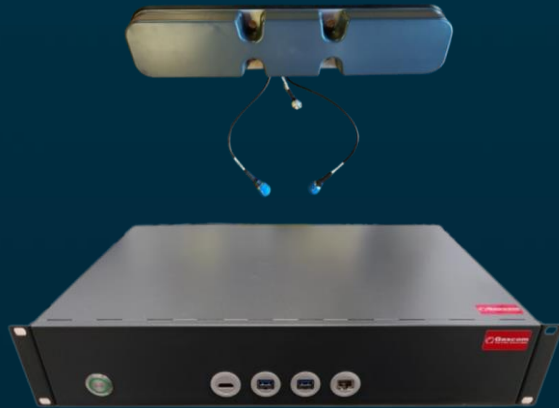
Disruptive PNT Technologies for Future Railway Signalling Applications

Assess technical feasibility of enhanced train positioning concepts for train control:

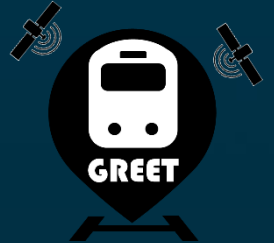
- ✓ Focusing on operational scenarios/capabilities that today are considered challenging for on-board train positioning using GNSS
- ✓ Concepts include disruptive GNSS and non-GNSS PNT technologies, such as 5G NR PRS
- ✓ Modelling hybridisation with potential FRMCS 5G PRS capabilities allows for assessment of both accuracy and integrity contribution



RX4RAIL – GNSS Receiver Chain Technology Enabler and Integrity Techniques for the Railway Environment



GREET – GNSS for the Railway EnvironmEnT



Development of GNSS Receiver Platform for Railway as a component of safe train localisation unit



ESA GSTP EL1

ESA GSTP EL1

Voliera (Phase 1 + Phase 2)

Next generation Location Determination System based on the integration of a multi-constellation GNSS receiver with Visual Odometry and Lidar technologies.



EGNSS Mate

Development of GNSS Localisation for ETCS Level 3 and map assisted sensor fusion algorithms.



SODOR CCN#1

Satellites for Digitalisation Of Railways (train connectivity)

- 35 km double track, electrified
 - Max speed 180 Km/h
-



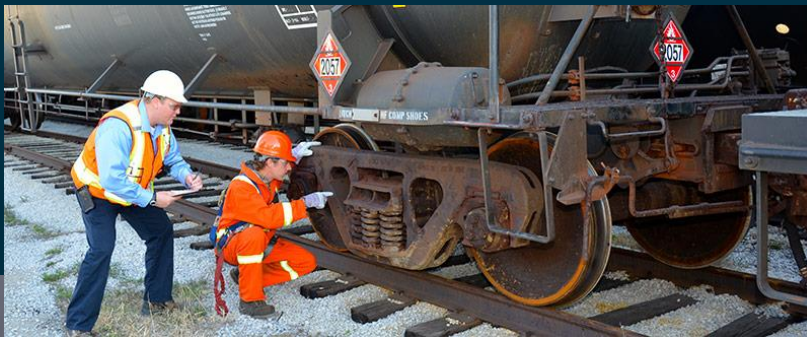
ESA Co-funded activities: Freight / Infra Monitoring



SaMoLoop



Satellite Monitoring for Logistics safety Platform



<https://youtu.be/NV56GVr7n0k>

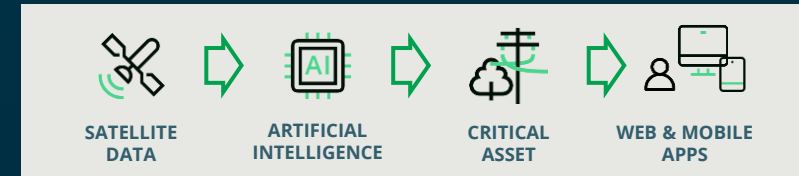
Service today used by 23 major chemical companies



LiveEC

SIM

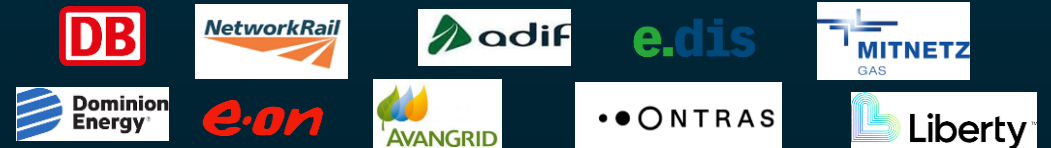
Space Enabled full-stack solution for Infrastructure Monitoring



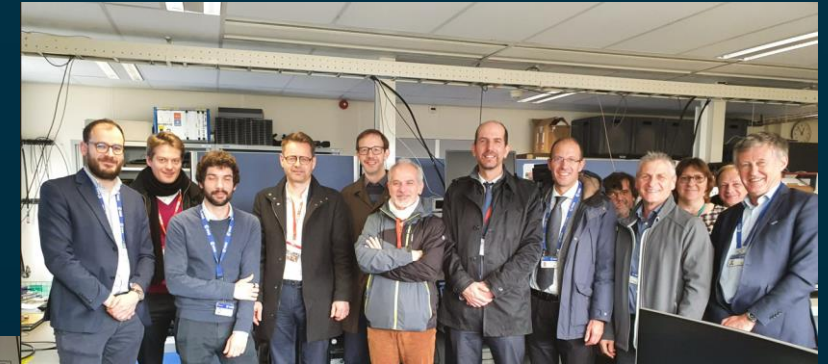
- Vegetation management
- Third-Party Interference
- Ground deformation



Deployed to leading Rail, Energy and Oil & Gas companies worldwide



Capabilities to Test PNT and Telecom technologies considering the specificity of the rail environment (e.g. complex rail channel)



[Navigation Laboratory \(esa.int\)](https://esa.int/navigation-laboratory)
[Communication and TT&C Laboratory \(esa.int\)](https://esa.int/communication-and-tt-c-laboratory)

ESA technical support to Rail community

Space and Rail collaboration regarding the use of EGNOS in rail for signalling



ESA support overall rail standardisation activities (e.g. EUG, ETSI RT)

Coordination with key rail and institutional stakeholders (e.g. ERJU, EUSPA, ERA, IMs, RUs) and inside ESA (IWG-R)

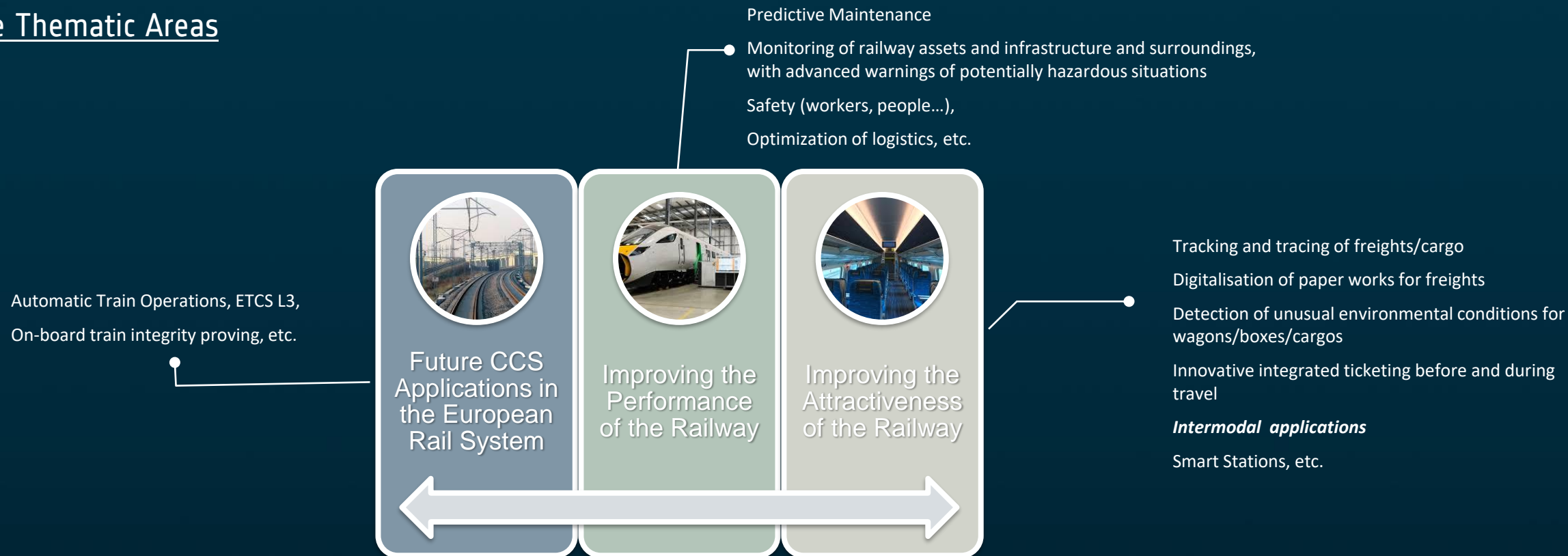


Space4Rail Downstream Applications call for proposals



Call for innovative and sustainable Applications/Services based on any space asset (e.g. SatEO, SatNav, SatCom), supported by potential users/customers - *permanently open!*

Three Thematic Areas



<https://space4rail.esa.int/opportunities/ba-s4r>

ESA BASS Programme

Upcoming opportunities for Rail



ENABLING TECHNOLOGIES FOR INTEROPERABLE GNSS AUGMENTATION FOR RAILWAY - EXPRO PLUS

Tender Action Number: 1-12019 (INTENDED)

<https://esastar-publication-ext.sso.esa.int/ESATenderActions/details/68627>

END-TO-END DEMONSTRATION OF 5G NEW RADIO (NR) FOR FUTURE RAILWAY

Tender Action Number: 1-11817 (INTEDED)

<https://esastar-publication-ext.sso.esa.int/ESATenderActions/details/61255>

Thank you!

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