



**Vertical Innovations in Transport And Logistics over  
5G experimentation facilities**

# Dissemination, Communication & Outreach

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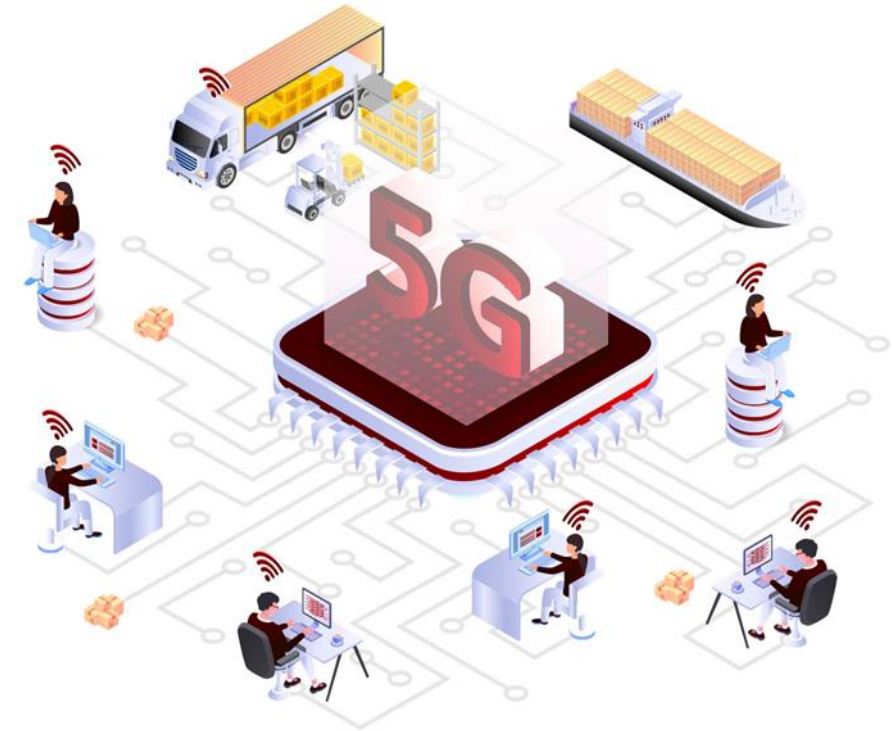
This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 101016567.



- WP6 Dissemination, Communication & Standardization objectives:
  - To develop and implement the dissemination strategy and plan, communication plan and related activities.
  - To make impactful contributions towards standardization bodies and open source communities
  - To prepare and implement a capacity building program supported by relevant trainings.
  - To engage with collaboration activities with the 5G PPP, its Working Groups and other 5G PPP consortia.

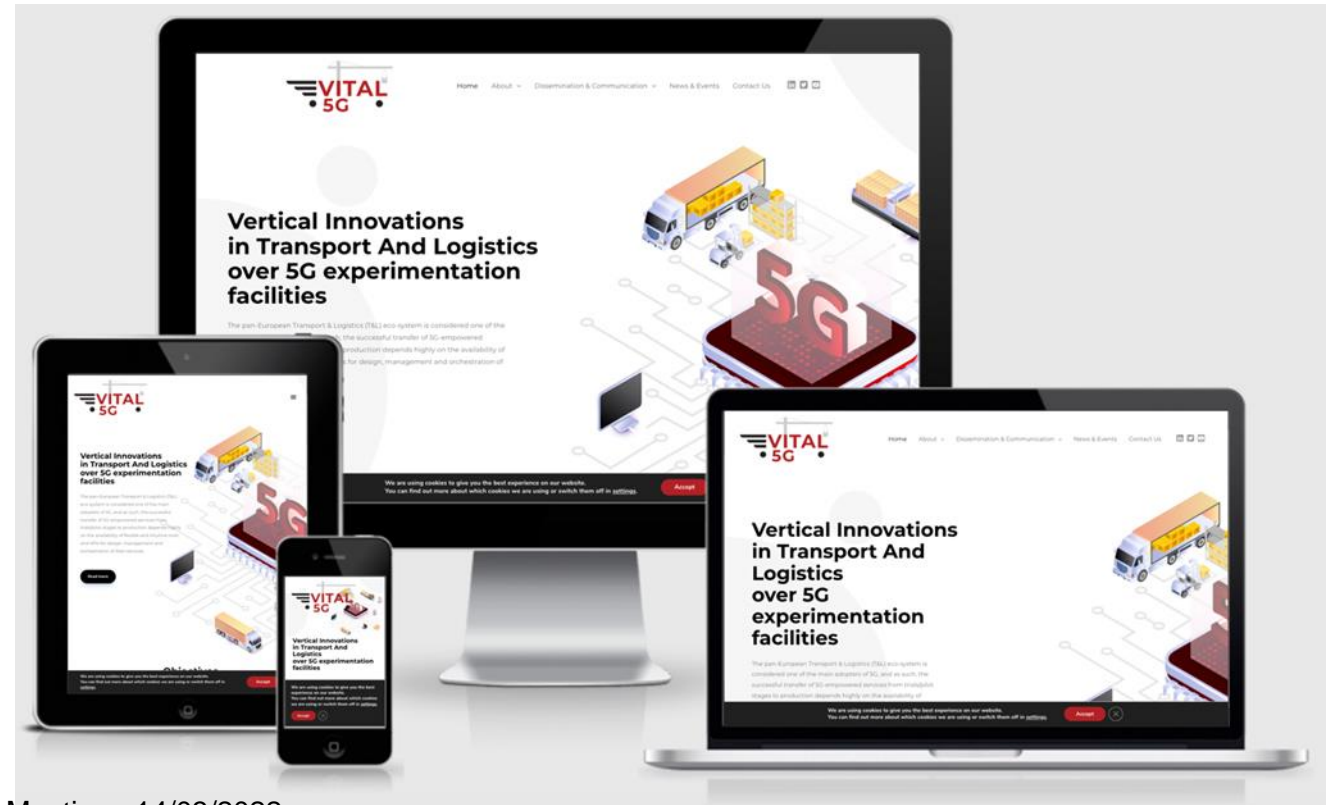
Target Group	Description
End-Users	<p>T&amp;L industry: Sea and river port authorities, logistics, air freight, road operators, warehouse/hub logistic operators</p> <p>ICT Industry: Mobile Network Operators, Innovative SMEs and entrepreneurs, operating in the 5G and T&amp;L domains (e.g., OTT providers, NetApps developers, T&amp;L service providers)</p> <p>Academia: Universities and research centers</p>
Entrepreneurial	European startup initiatives and ecosystems (e.g., EIT Digital, Climate-KIC, AIOTI, DIH), private business accelerators and investors
Knowledge Providers	Scientific community and Standards Developing Organizations (e.g., 5G PPP, ETSI, ETP-ALICE, IMO, UN Centre for Trade Facilitation and E-Business)
General Public	General public, civil society (e.g., NGOs and environmental protection movements)

Target Group	D&C Channels and Activities
End-Users	<p>T&amp;L industry: Newsletters, Press releases in specialized T&amp;L magazines (e.g., MarineLink, Air Cargo World), Participation in T&amp;L Expos (e.g., Hypermotion) and ALICE events (e.g., TRA-2022)</p> <p>ICT Industry and Academia: Publications (IEEE journals), Conferences (e.g., EUCnC, IEEE) and 5G expos (e.g., 5G Expo Global, MCW Barcelona), Newsletters, Press releases (e.g., IEEE Spectrum), Collaborating with other Horizon projects (e.g., PLANET)</p>
Entrepreneurial	Participation in the events of the important entrepreneurial stakeholders (e.g., EIT Digital, Climate-KIC, AIOTI), and organize D&C events with business accelerators and DIH
Knowledge Providers	Participation in several 5G PPP working groups and contributions to white papers for 5G technology standards, mapping of all the T&L SDOs
General Public	Newsletters, Press releases in media and organization of public events



## Dissemination & communication work

- Logo and webpage designed to help the external audience easily identify VITAL-5G project and to increase the visibility by providing a corporate identity from the very beginning of the project.





## Dissemination & communication work

### • Communication material

### Vertical Innovations in Transport And Logistics over 5G experimentation facilities

www.vital5g.eu | #Vital5G | vital-5g-project | 5G PPP

#### About VITAL-5G Project

The VITAL-5G project has the vision to advance the offered transport & logistics (T&L) services by engaging significant logistics stakeholders (Sea and River port authorities, road logistics operators, warehouse/hub logistic operators, etc.) as well as innovative SMEs and offering them an open and secure virtualised 5G environment to test, validate and verify their T&L related cutting-edge Network Applications (NetApps).

#### Objectives

- 01 Foster the development and sharing of novel vertical-specific and vertical-agnostic NetApps for the T&L sector
- 02 Deliver a testing and validation experimentation facility that will allow T&L stakeholders to deploy and benchmark the performance of their NetApps
- 03 Showcase the added value of 5G connectivity for multi-modal logistics services across European roads, seas and rivers
- 04 Provide customized and virtualized access to network and T&L infrastructure resources, enabling service provisioning to 3rd parties
- 05 Enable novel business models development for open, integrated and cooperative services across multiple domains
- 06 Foster the development and advancement of a T&L centred ecosystem by bringing together key vertical stakeholders with SMEs

#### Project Start: 01/01/2021

#### EU Budget: € 4,777,525

#### Instrument: ICT-41-2020 - 5G PPP - 5G Innovations for verticals with third party services

#### Duration: 36 Months

#### Coordinator: WINGS ICT Solutions

#### Consortium: 16 partners from 6 countries

#### Use Cases

**Use Case 1**  
Automated vessel transport (Antwerp Port)

**Use Case 2**  
Data enabled assisted navigation & customs operations for ships (Galati Danube river port)

**Use Case 3**  
Automation & remote operation of freight logistics (Warehouse logistics)

#### Consortium

Project Coordinator: WINGS ICT Solutions

Partners: Beia, DHL, DAKENIS, DIGITTRANS, BOS, TEHNOPOL, imec, localigent, inlecom, XAVRON, NEXTWORKS, OTE, SEAFAR

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### Vertical Innovations in Transport and Logistics over 5G experimentation facilities

www.vital5g.eu | #Vital5G | vital-5g-project

#### About

The VITAL-5G Project has the vision to enable the creation of 5G-enhanced services for the Transport & Logistics (T&L) industry by bridging the knowledge/expertise gap between the T&L sector, telecommunication experts and application developers. VITAL-5G will engage key logistics stakeholders (sea and river port authorities, road logistics operators, warehouse/hub logistic operators, etc.) and innovative SMEs, offering them an open and secure virtualised 5G environment to test and validate their T&L-related, cutting-edge Network Applications (NetApps).

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#### USE CASES

**Use Case 1**  
Port Digital Twin - Automated Vessel Transport (Antwerp Port)

**Use Case 2**  
Data enabled assisted navigation & customs operations for ships (Galati Danube river port)

**Use Case 3**  
Automation & remote operation of freight logistics (Warehouse logistics)

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### Vertical Innovations in Transport And Logistics over 5G experimentation facilities

#### UC1: Automated Vessel Transport

##### Enabling Automated Vessel Transport through a Port Digital Twin and 5G technologies

#### UC Description

This use case deals with the application of 5G technology in a smart port context. It will be performed using a vessel provided by Seafor at the Port of Antwerp. The main goal is to showcase the automation and remote control of vessel-based logistics transport leveraging 5G communications technologies. Vessels will be running in a normal operational schedule, but for this use case, it will also be outfitted with additional 5G connectivity which will support high-bandwidth camera feeds, real-time sensor data, and real-time steering.

We aim to build up a real-time digital twin around the vessel to support the remotely controlled and autonomous vessels. In parallel, real-time route planning will be foreseen to optimize the port operations and to avoid idle times, based on berthing time slots provided by the port authorities and terminal operators, while the optimization will be performed based on Machine Learning/Artificial Intelligence (ML/AI) methodologies. The applications developed in this use case, make use of the following types of data: vessel location, schedule, perception data including camera streams, LIDAR point cloud, and slot data to calculate the optimal navigation speed that needs to be held by vessels to meet their slot at terminals/docks etc.

#### Trial Facilities

**Vessel:** Seafor will provide the Terciofin, an inland-container vessel which usually sails between Port of Antwerp and Liège.

**Control center:** Seafor will also provide its Shore Control Centre (SCC). It aggregates information about navigation, emergency steps and communication devices. Equipped with video wall desks and joysticks, it will be used for teleoperation of the vessel.

#### 5G-Testbed

- Various types of 5G UE from different vendors, including phones, CPEs and customized 5G modems.
- 5G NR site with 700MHz and 3.5GHz radio support URLLC and eMBB, together with a MEC system. The RAN equipment is planned to support 3GPP Rel. 16 via upgrade during the project (also support for 5G NSA).
- Virtualized 5G Common Core with support both NSA/SA architectures to provide network

#### Vital 5G Antwerp Trial Set

### 5G connectivity and data-enabled assisted navigation using IoT sensing and video cameras.

#### UC Description

The objective of Use Case 2 is focused on the implementation of a data-enabled assisted navigation application using IoT sensing system and video cameras installed in Galati port and on ships and barges (on-rs).

Use case 2 targets the following achievements:

- Reduced number of dangerous navigation events occurrences (vessel collisions, ships stuck in the river because of sandbanks or shallow waters etc.) by collecting and transmitting the sensors and video data through Data Stream Organization NetApp V&S.
- Reduced logistic costs due to proper decisions based on on-board diagnosis and monitoring functions, therefore limiting the impact of the human factor to take potentially wrong decisions. This can be achieved through on-board data collection & interfacing for vessels NetApp V&S.
- A more accurate electronic navigation map using Distributed sensor data ingestion, fusion & post-processing NetApp V&S.
- Graphical representation of difficult navigation areas, see figure.

#### Trial Facilities

**Vertical Facilities**  
The facility is architecturally composed of 5G network components that will evolve during the life cycle of the project to an EZE 5G infrastructure, able to cope with the projects NetApps needs. The main integration and development activities will take place in Orange Bucharest 5G LAB (5G Orange Lab in Bucharest), following several phases of implementation and later the same service infrastructure will be extended to Galati.

**5G-Testbed**  
5G private standalone network, PMR, that is integrated with the Bucharest testbed and is 3GPP Release 16, running on dedicated virtualized infrastructure, 5G SA option 2 implementation. The 5G PMR provides 5G SA connectivity, service network slice implementation for the eMBB/URLLC use case's communication needs.

#### UC Service Level Key Performance Indicators (KPIs)

SLA	Availability (%)	Latency (ms)	Throughput (Mbps)	Reliability (%)
1	99.999	10	100	99.999
2	99.999	10	100	99.999
3	99.999	10	100	99.999
4	99.999	10	100	99.999
5	99.999	10	100	99.999

### Vertical Innovations in Transport And Logistics over 5G experimentation facilities

#### Athens (GR) Trial

##### Automation & remote operation of freight logistics (Warehouse logistics)

#### UC Description

The Athens use case (Figure 1) intends to demonstrate the feasibility of applying the 5G technology in an overall Logistics context, for optimizing warehousing operations through an integrated state-of-the-art operational system based on Automated Guided Vehicles (AGVs). This system will make use of the OTE SG-EVE Athens testbed which will be upgraded to stand-alone and extended at the DIAMINIS warehouse premises (Figure 2). The operation of AGVs can be automated and remotely assisted using HD video streaming functionality to enable human interaction, while additional AI/ML techniques will be introduced for post-processing operational data in order to improve the end-to-end functionality of the warehouse ecosystem. The Athens use case, targets to demonstrate the "smart warehouse" concept, through the implementation of the following functions:

- Lean warehousing: Elimination of time "wastes" through the replacement of non-value labour and equipment (e.g., manual forklifts) with AGVs.
- Route optimisation for order picking considering historical, seasonal and real-time order data.
- Remote surveillance and monitoring of processes as well as capability for remote override and control.
- Advanced AGV operations enabled by 5G connectivity, allowing obstacle / human avoidance, cooperation with human operators ("Follow-me Function") and collaboration with other automated moving.
- Storage location and resources (workers, forklifts, delivery trucks) utilization optimization based on AI/ML and predictive analytics functionality including forecast demand prediction.
- Intelligent inspection / Insurance platform for monitoring and cross-checking of packaged and shipped goods to be used for backtracking of shipments, cargo insurance, easier customs inspection, etc.

#### Trial Facilities

**Vertical Facilities**  
• DIAMINIS warehouse at Aspropyrgos, Athens, with storage capacity of 18.270m<sup>2</sup>

• WINGS Chariot T&L platform for AGV control and end-to-end logistics process monitoring.

• AGV with payload capacity > 150 Kg.

• Connected sensors, cameras, equipment (e.g., scanner) and smartphones.

• Edge servers & IT infrastructure.

**5G-Testbed**  
• OTE SG-EVE testbed at Psalidi, Athens, to be upgraded to 3GPP Rel.16 Stand Alone (SA).

• Fibre connectivity for ~25 km between the 5G testbed core (Psalidi) and the DIAMINIS warehouse (Aspropyrgos).

• Deployment of indoor cells to provide 5G coverage within the warehouse demo area.

## Dissemination & communication work

- Communication material

 <p>The trial experiment will be supported by a 5G network deployed by Orange in collaboration with the partners in Galati port.</p> <p>3:04</p>	 <p>2 - Vital 5G approach: Digital Twin</p> <p>Shared Situational Awareness</p> <p>5:12</p>	 <p>Warehouse Automation</p> <p>Warehouse smartification</p> <p>Simulation based optimization</p> <p>WINGS</p> <p>5:46</p>
<b>VITAL-5G Project: Galati (RO)</b> <b>Trial Site - 5G connectivity...</b>	<b>VITAL-5G Project: Antwerp (BE)</b> <b>Trial Site - Automation...</b>	<b>VITAL-5G Project: Athens (GR)</b> <b>Trial Site - Automation ...</b>

## Achieved contributions & KPIs for Y1 (scientific, 5G PPP, T&L vertical, etc.)

#	Publication title	Publication venue	Involved partners	Publication date
1	Advanced 5G Architectures for Future NetApps and Verticals	IEEE International Black Sea Conference on Communications and Networking 26-29 May 2021	BEIA, ORO	May 2021
2	VITAL-5G: Innovative Network Applications (NetApps) Support over 5G Connectivity for the Transport & Logistics Vertical	IEEE 5G FOR CONNECTED AND AUTOMATED MOBILITY (CAM)	WINGS, NXW, IMEC, INLE, ORO, EBOS	May 2021
3	VITAL-5G: Automated Onboarding Testing Validation NetApps	IEEE International Symposium on Signal, Circuits and Systems	ORO	May 2021
4	Evaluation of electromagnetic field exposure in indoor spaces where there are located base stations with distributed antenna system	International Symposium on Signals, Circuits and Systems - ISSCS Iasi, 2021	ORO	May 2021
5	Evaluation of electromagnetic field exposure in the vicinity of mobile phone base stations	IEEE International Black Sea Conference on Communications and Networking 26-29 May 2021	ORO	May 2021
6	VITAL-5G: Innovative Network Applications (NetApps) Support over 5G Connectivity for the Transport & Logistics Vertical	EuCnC/6G Summit 2021	WINGS, NXW, IMEC, INLE, ORO	June 2021



### Achieved contributions & KPIs for Y1 (scientific, 5G PPP, T&L vertical, etc.)

5G PPP WG name	VITAL-5G partner participating	Contact person (name)
Steering Board (SB)	WINGS	Kostas Trichias
	ICP	Ronan Frizzell
Technology Board (TB)	NXW	Giada Landi
	WINGS	Kostas Trichias
Test, Measurement and KPIs Validation (TMV)	WINGS	Vangelis Kosmatos
Vision and Societal Challenges WG	ICP	Patrick Durkin, Ronan Frizzell
	BEIA	Alexandru Vulpe
Software Network WG	Orange Romania	Marius Iordache
	IMEC	Johann Marquez-Barja
5G Architecture WG	Orange Romania	Marius Iordache
	OTE	Christina Lessi
5G Security WG	Orange Romania	Ioan Constantin
	BEIA	George Suci
Trials WG	BEIA	Alexandru Vulpe
	EBOS	Andreas Kartakoullis
5G for CAM WG	WINGS	Kostas Trichias
	BEIA	George Suci
5G-PPP SME WG	EBOS	Andreas Kartakoullis
	ICP	Patrick Durkin
	BEIA	George Suci

## *5G Open Testbeds and Infrastructure extensions for NetApps advanced experiments*

*Marius Iordache\**, *Oana Badita\**, *Bogdan Rusti\**, *Cristian Patachia\**, *Konstantinos Trichias<sup>β</sup>*, *Juan Brenes<sup>θ</sup>*

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## Network Applications (NetApps) as a 5G booster for Transport & Logistics (T&L) Services: The VITAL-5G approach

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<sup>¶</sup> WINGS ICT Solutions, Greece

<sup>||</sup> i2CAT - The Internet Research Center, Spain

<sup>\*\*</sup> Incelligent PC, Greece

*9th Transport Research Arena TRA Lisbon 2022, Portugal*

## VITAL-5G: A novel 5G-enabled platform for Vertical Innovations in Transport And Logistics

Andreas Kartakoullis<sup>a\*</sup>, George Guirgis<sup>a</sup>, Nina Slamnik-Kriještorac<sup>b</sup>, George Suciu<sup>c</sup>, Giada Landi<sup>d</sup>, Kostas Trichias<sup>e</sup>

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<sup>b</sup> IMEC-University of Antwerp, Antwerp, Belgium

<sup>c</sup> BELA, Bucharest, Romania

<sup>d</sup> Nextwroks, Pisa, Italy

<sup>e</sup> WINGS ICT Solutions, Athens, Greece

Activity	Target
Project Website	Online by: month 1; Unique visitors at M12: 1000; M36: 2000
Social media	LinkedIn >200 followers; Twitter > 200 followers; Re-Tweets >200 Banners >30
Press Releases	Press releases >6 2 Press releases per year
Newsletters	Newsletters: >6 2 Newsletters per year
Video Clips	Number of online video clips: >3; Number of video views: > 1000
Factsheets/ Brochures	Technical factsheets: 6; Non-technical factsheets: 3; Hardcopies: > 1000
Flyers/ Posters & roll-ups	Project flyers: >3; Posters & roll-up banners: >3

Activity	Target
Industrial exhibitions	Participation in industrial exhibitions, trade fairs: >10
Scientific publications	Journals/magazines >10; Conferences >30; Conference demonstrations: >6
Workshop Organization & Participation	Workshop (co)organization: 6 Workshop participation: 12
5G PPP programme	Number of WGs to contribute: 7 Interactions with initiatives: > 4
Training	Online training tutorials: 3 Number of PhD schools: 2; Webinars: 10
Online Repository	Number of publicly available deliverables: > 19

Activity	Time Frame/Achieved
Project Website	M14: <u>1014</u>
Social media	M14: Twitter: <u>195 followers</u> , Re-tweets: <b>171</b> , LinkedIn: <u>115 followers</u>
Newsletters	<b>#1 issued August 2021, #2 to be issued March 2022</b>
Video Clips	<b>3 UC clips published 2021</b>
Factsheets/ Brochures	<b>-European 5G Annual Journal 2021: issued</b> <b>-Non-Technical Factsheet #1: issued</b> <b>-3x UC 2-pagers: published on web+social</b>
Flyers/ Posters & roll-ups	<b>Project Flyer + Poster #1 2021</b>
Scientific Publications Phase 2 (+M12)	<b>2021: 6 conference publications (EuCnC, 2x IEEE 5G for CAM, IEEE International Black Sea Conference, 2x IEEE ISSCS)</b> <b>2022: 2x EUCnC and 1 TRA 2022 conference publications</b>
5G-PPP	<b>Participation in 10 Working Groups</b>
Training	<b>2 webinar participations (5G-PPP Innovations for Verticals, BlackSeaCom)</b> <b>3 Project Workshops and 2 EUCnC Workshops in 2022</b>



- One of the **key aspects** of VITAL-5G: involvement of **third party experimenters**
- The scope of this task is to organize workshops and dissemination events for the third-party experimenters
  - to organize **events**
  - to create **target groups** for third party experimenters
- Main activities:
  - To define available assets
  - To prepare advertising material and roadmap of availability
  - To make a list of potentially interested companies (SMEs, research institutes, etc.)
  - To organize workshops for the identified interested parties

# T6.3 Capacity building program



- Early view of assets
  - NetApps, 5G testbed, end equipment, blueprints, descriptors, and results

Facility equipment	NetApps	Data	5G testbed	Results	Selling points
	On-board data collection and interfacing for vessels (VS8)	real-time vessel data: speed, location, heading			VS8 output as input for new NetApps to predict vessel trajectories, or recommend alternative paths
	Remote vessel monitoring (VS5)	historical vessel data: speed, location, heading			VS5 to provide examples for creating monitoring dashboards for remotely monitored cars, vessels, drones
	Remote digital twin (VA5)	sensor data from vessels			VA5 to enable creating path prediction and environment visualization
		camera feeds from vessels			VA5 to enable creating real-time maps of environment for other use cases (e.g., autonomous driving, navigation in warehouses)
					VS7 to enable calculating optimal speed of remote or autonomous equipment

- Advertising material: website, tutorials, demos
- Events: webinars, hackathons, workshops
- Engagement to start in the second half of 2022
- Participation of 3<sup>rd</sup> party experimenters planned for 2023

- Key outcomes / achievements:
  - D6.1 Project website and social media presence,
  - D6.2 Dissemination and Communication activities v1.0
  - MS1 Communication tools & Website ready
- Update the D&C KPIs and organize a series of workshops, industrial events, 3<sup>rd</sup> party engagement events (e.g., Hackathon)



Thank you for you attention!



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