WP2: Identify and report what test bed activities are happening in each region and which degree of autonomy is predominantly used

Project	Purpose	Web site	Mass degree
Sea4Value-Fairway	To help in creating safer, more efficient, sustainable, and reliable service chains to meet the requirements for a better quality of life and global prosperity.	https://www.dimecc.com/dimecc-services/s4v/	1-4
Smarter	SMART terminals will continue the fairway digitalization process by digitalizing ports, terminals, and port operations.	https://www.dimecc.com/dimecc-services/smart-terminals-smarter/	1-4
Applied Research Platform for Autonomous Systems	To create an ambitious new platform for applied research on autonomous systems.	https://arpa-project.turkuamk.fi/	1 & 2
STM Baltsafe	Contribute to increased safety of navigation in the Baltic Sea by providing Sea Traffic Management enabled maritime services to the tanker traffic in the Baltic.	https://www.seatrafficmanagement.info/projects/stm-balt-safe/	1 & 2
Callboats	To offer autonomous, silent and clean Callboat for commuting or just enjoying the sea with your friends.	https://callboats.com/#1	4
IstLab	To create a smart joint-use Intelligent Shipping Technology test Laboratory	https://istlab.samk.fi/	1-3
AutoMare EduNet	To ensure high quality education in the era of autonomous shipping.	https://www.aboamare.fi/AutoMare-EduNet-Project	1-4
Port Oulu Smarter	To develop and promote utilisation of modern port digitalisation between Port of Oulu customers and actors.	https://ouluport.com/en/harbours/harbour-digitalisation-port-oulu-smarter-2/	2
5GFINLOG	To create a new type of 5G based testing and innovation platform for port logistics.	https://www.xamk.fi/tutkimus-ja-kehitys/5g-finlog-5g-future-innovation-platform-for-logistics/	2
Intelligent sea	To improve the safety and efficiency of maritime fairways through digitalization.	https://www.arctia.fi/en/arctia-ltd./intelligent-sea-project.html	1 & 2
ECAMARIS	ECAMARIS focuses on autonomous ship technologies and concepts which serve as enablers for three use cases: relocation of ship bridge, conditionally and periodically less-manned bridge, and conditionally and periodically unmanned bridge.	https://cris.vtt.fi/en/projects/enablers-and-concepts-for-automated-maritime-solutions	2-4

WP3: Report on what data MASS operators and MASS navigation systems are using today – all PT member states.

MASS Degree	MASS operators	MASS navigation systems
1	Conventional navigation systems known today are used, such as:	Current navigation systems include but are not limited to following data sources:

Ship is controlled locally using data originating to systems that can, at times, function unsupervised but humans being on board ready to take control at tall times	ARPA radar, speed log, DP system, ECDIS, compass, AIS, GNSS, motion sensors, GMDSS and communication systems and other integrated bridge navigation support systems known to date.	Bathymetric, AIS, GMDSS, GNSS position, differential correction data, engine status, propulsion status, ice conditions, weather condition data, ship movements in six degrees of freedom, speed log, echo sounder.
2 Ship is controlled from remote location with seafarers on board ready to take control.	See, 1-degree Data transmission from vessel and fairway infrastructure enables situational awareness for remote operator. Situational awareness tools comprise of static and dynamic data from the vessel, fairway imaging, VTS data, fairway radar imaging, digital twin of the fairway and vessel, ECDIS chart and shared route data with the vessel.	See, 1-degree Data transmission tool is on board and situational awareness is based on data collection from the vessel navigation systems, such as Bathymetric, AIS, GNSS position, differential correction data, engine status, propulsion status, ice conditions, weather condition data, ship movements in six degrees of freedom, speed log, echo sounder. ARPA radar, DP system, ECDIS, compass, motion sensors, GMDSS and communication systems.
3	No current applications	No current applications
4	No current applications	No current applications

WP4: Report what navigational data each PT member states' regulators are specifying should be used for MASS navigation in either trials or operations of MASS - all PT member states.

MASS Degree	MASS operators	MASS navigation systems
1	See, WP 3	See, WP 3
2	See, WP 3	See, WP 3
3. ***Ship is controlled from remote location with no seafarers on board.***	Operators are able to use and monitor remotely all the current navigation systems, including their input data. For this purpose, new kind of user interfaces and data transmitting options are required to facilitate novel construction of situational awareness. Sufficient situational awareness enables decision-making and vessel control. There is also a need for resiliency, redundancy and independent systems to ensure the safety and security of the operation. Moreover, new procedures and training requirements are necessary for e.g. shore-based crew and maritime inspectors.	In MASS 3-degree, all the vessel and fairway data are transmitted into Remote Operation Centre (ROC) with minimal latency. There is also need, for example, to online video connection, high-resolution image, and robust command/control interface between the ROC and MASS vessel. Additionally, the following new data sources are likely needed: - ENC data of fairway landscape, digital twins of MASS ships, port areas, canal locks, etc, exchange of route information and vessel-status between different ships, VTS, MRCC and ROC.
4	It has been argued that operators are no longer needed in MASS 4-degree. However, this argument has also received a lot of criticism, as some people see this stage unrealistic.	It has been argued that in MASS 4-degree AI will analyse all the input data and makes the decisions accordingly through e.g. Bayesian, Naural networks and Non-linear velocity obstacles approaches. Therefore, all the earlier noted input data for navigation systems will be still needed. Yet, there will be no longer a need to facilitate ROC operations.

WP5: To what degree are PT member states involved in MASS trials or operations and what data are they currently providing – all PT member states.

Finland has been active in MASS related projects and trials, including international cooperation merging technology providers and research. The role of administration has been mainly focused on the regulatory

and financial matters. This comprises, for example, an active participation in the IMO, EU and IALA work addressed to MASS evolution and providing financial support for project initiatives.

For the time being, the administration has not opened up new significant data sources for private sector to support MASS evolution. However, this work is still in progress in both international and national regulatory bodies.

In Finland, research efforts with MASS solutions have focused into solutions with near future potential for commercial use and upscaled usability for a variety of fairway users. Fairway infrastructure is the one element unifying all fairway users as shared operational environment. Therefore, we see the development of fairways and their potential of contributing to the situational awareness of fairway users, as integral element of the MASS development.

WP6: Report on what trailing has been done with new navigation standards (e.g. S100) for MASS, or what research into machine readable data has been carried out in each region? – all PT member states.

Not so much information about this matter. Yet, it has been noted that there is need for 3D applications, including dynamic data on currents, ice conditions, winds, waves, sea level and so on.