From AV Skills Identification to AV training: The Drive2theFuture approach

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Zoe Agiasophit , WEGEMT
Introduction

Automated vehicles
- Vehicles of the future
- Various systems and sensors
- Driver assistance, partially or fully substitution

Impact on the labor sector
- Jobs alleviation and creation
- Reskilled and upskilled needs
- Additional skills and knowledge

Impact on the driver’s role
- Abstain from the driving task
- Remote vehicle control and operation
- Additional skills and knowledge

New skills and knowledge
- New training needs, tools and programs
Objectives

- Identification of skills and knowledge for AV operation

- Identification of training needs to cope with the new challenges in AV operation

- Development of training programs fulfilling the training needs
Approach

User Clusters

Skills and Knowledge

Training Needs

Training tools and Programs

Pilot Tests

Clustering

Identification

Development

Testing
Skills and Knowledge
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NTUA
Skills and Knowledge - Methodology

- Projects Outputs/Deliverables
- Report
- Scientific Papers
- Studies
- Official Websites
- Experts interview
## Skills and Knowledge - Methodology

<table>
<thead>
<tr>
<th>Operator</th>
<th>User Type</th>
<th>Transport Mode</th>
<th>Level of Automation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Professional</td>
<td>• Driver</td>
<td>• Private Passenger Car</td>
<td>• Level 1</td>
</tr>
<tr>
<td>• Private</td>
<td>• Passenger</td>
<td>• Taxi</td>
<td>• Level 2</td>
</tr>
<tr>
<td></td>
<td>• Remote operator</td>
<td>• Bus</td>
<td>• Level 3</td>
</tr>
<tr>
<td></td>
<td>• AV Driver</td>
<td>• Truck</td>
<td>• Level 4</td>
</tr>
<tr>
<td></td>
<td>• Other (rail signaler, TMC operator, etc)</td>
<td>• Train</td>
<td>• Level 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Tram</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ship</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Drone</td>
<td></td>
</tr>
</tbody>
</table>
Results - Road Sector (1/2)

- Social Skills
- Programming/Computer Skills
- Engineering/Technical Skills
- Driver Skills/Knowledge
- Remote Operator
- Communication Skills
- Traffic Management Skills
- Law Skills
### Results – Road Sector (2/2)

<table>
<thead>
<tr>
<th>Skills</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Skills</strong></td>
<td>Communication, Team working, organization, problem-solving</td>
</tr>
</tbody>
</table>
| **Programming and Computer Skills** | Artificial Intelligence, Algorithms, software development, backend/frontend skills, machine learning, higher-order skills in big data analysis  
Cybersecurity and encryption protection, security systems for protecting external communication for AVs, data protection |
| **Engineering/Technical Skills** | Sensors and systems development, hardware development, Robotics, electrical engineering, automotive engineering, digital road map database access, firmware, Smart Traffic Light controller system, smart signs, advisory road marking, etc  
Simulation Skills |
| **Driver Skills and Knowledge** | Cooperation and collaboration with the vehicle, efficiently monitoring and supervising the system, concentration maintenance  
Familiarity with all electronic devices and sensors on and inside the vehicle, limitations and capabilities  
Awareness of the location of the sensors and the systems  
Awareness of the decisions taken by the systems, operational readiness of the system  
Understand the information and warnings from the systems based on the surroundings  
Knowledge of differences among different levels of automation  
Situational awareness and transition of control skills  
Capability of recognizing errors and malfunctions and act properly |
| **Communication skills**      | V2I and V2V communication model  
Wireless communication, ad hoc network, DSRC Multi-Channel Test Tool |
| **Traffic management center** | Collection and processing skills from the data transmitted from the infrastructure and the vehicles                                                                                                                                 |
| **Law skills**                | Legal framework and standards for the autonomous vehicle operation, liability issues in case of incident occurrence, data generated by V2X infrastructures to be compliant with national or international law |
Results – Rail Sector (1/2)

- Social Skills
- Programming/Computer Skills
- Engineering/Technical Skills
- Driver Skills/Knowledge
- Remote Control
- Communication Skills
- Safety Management Skills
- Law Skills
- Signaler
- Track Maintenance
- Front Line, Train Driving and Network Control
## Main Results – Rail Sector (2/2)

<table>
<thead>
<tr>
<th>Skills</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Skills</strong></td>
<td>Communication, Team working, organization, skills in timetable management, problem-solving, slit-second decision making, Knowledge in human factors for passengers and workers safety</td>
</tr>
<tr>
<td><strong>Programming and Computer Skills</strong></td>
<td>Artificial Intelligence, Algorithms, software development, backend/frontend skills, machine learning, higher-order skills in big data analysis</td>
</tr>
<tr>
<td></td>
<td>Cybersecurity and encryption protection, security systems for protecting external communication for AVs, data protection</td>
</tr>
<tr>
<td><strong>Engineering Skills</strong></td>
<td>Sensors and systems development, hardware development, electrical engineering, systems for driverless and unattended train operation, automatic train protection and automatic train operation, train operation in event in disruption, obstacle, people and animal detection for collision avoidance, existence of other trains on the route or lineside signaling observation, diagnostics, Signaling technologies, Simulation Skills</td>
</tr>
<tr>
<td><strong>Technical Knowledge</strong></td>
<td>Knowledge in new signaling and position technologies, Knowledge of the European Train Control System (ETCS) and wireless delivery of mission-critical rail communications, digital interlocking system</td>
</tr>
<tr>
<td><strong>Driver/Crew Skills and Knowledge</strong></td>
<td>Same as in road sector</td>
</tr>
<tr>
<td></td>
<td>Maintenance of on route driving skills, knowledge of new on board systems</td>
</tr>
<tr>
<td></td>
<td>Monitoring of the the passenger exchange, detection and accomplishment of emergency conditions, supervision of the train’s state.</td>
</tr>
<tr>
<td><strong>Communication Skills</strong></td>
<td>Wireless interface/connection and components, data transmission systems</td>
</tr>
<tr>
<td><strong>Law skills</strong></td>
<td>Legal framework and standards for the autonomous vehicle operation, liability issues in case of incident occurrence, data generated by V2X infrastructures to be compliant with national or international law</td>
</tr>
<tr>
<td><strong>Skills for workers in front line control, train driving and network control</strong></td>
<td>Rail vehicle setup and deconstruction skills and knowledge for a safe and efficient pre-journey, in journey and post journey autonomous train operation, Skilled rail network controllers</td>
</tr>
<tr>
<td><strong>Safety management skills</strong></td>
<td>Preparing for emergencies related to both safety and environmental protection, fatigue management</td>
</tr>
<tr>
<td><strong>Remote Control Skills</strong></td>
<td>Off site and remote fault support skills, skills and knowledge for Incident recovery procedures for autonomous trains and rail vehicles, including fault identification and rectification, remote operations</td>
</tr>
</tbody>
</table>
Results – Maritime Sector (1/2)

- Social Skills
- Programming/Computer Skills
- Engineering/Technical Skills
- Driver/Crew Skills/Knowledge
- Remote Control
- Communication Skills
- Safety Management Skills
- Law Skills
## Results - Maritime Sector (2/2)

<table>
<thead>
<tr>
<th>Skills</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Skills</strong></td>
<td>Communication, Team working, organization, onboard and shore-based personnel, problem-solving</td>
</tr>
<tr>
<td><strong>Programming and Computer Skills</strong></td>
<td>Artificial Intelligence, Algorithms, software development, backend/frontend skills, machine learning, higher-order skills in big data analysis, augmented and virtual reality skills and knowledge</td>
</tr>
<tr>
<td><strong>Cybersecurity and encryption protection, security systems for protecting external communication for AVs, data protection</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Engineering/Technical Skills</strong></td>
<td>Sensors and systems development, hardware development, Robotics (able of performing maintenance work that cannot be handled by humans), electrical engineering, automotive engineering, obstacle detection, surroundings mapping, mooring and unmooring systems, HD Maps of the relevant port transport infrastructure, naval engineer.</td>
</tr>
<tr>
<td></td>
<td>Modelling and Simulation Skills</td>
</tr>
<tr>
<td></td>
<td>Airborne or underwater drones can perform potentially hazardous inspection and maintenance tasks, either by remote control or autonomously (in cooperation with programming and computer skills).</td>
</tr>
<tr>
<td><strong>Driver/Crew Skills and Knowledge</strong></td>
<td>Same as road sector</td>
</tr>
<tr>
<td><strong>Interoperability Skills, Docking skills, Coast water crews inner-port navigation the mooring skills</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Law skills</strong></td>
<td>Legal framework and standards for the autonomous vehicle operation, liability issues in case of incident occurrence, data generated by V2X infrastructures to be compliant with national or international law</td>
</tr>
<tr>
<td><strong>Remote control and assistance skills</strong></td>
<td>Understand and interpret the pertinent data transmitted from the vessel to the shore-based facility in case of a machinery/equipment/hull damage event and any other case concerning safety</td>
</tr>
<tr>
<td><strong>Distinguish the different principles governing each type -Interoperability skills</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Mooring and unmooring operation skills</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Complex engines and machinery aboard monitoring</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Communication Skills</strong></td>
<td>Satellite communication capacity and the bandwidth, advanced data transmission technology systems, communication network</td>
</tr>
<tr>
<td><strong>Safety management skills</strong></td>
<td>Preparing for emergencies related to both safety and environmental protection</td>
</tr>
</tbody>
</table>
Main Results – Aviation (1/2)

- Social Skills
- Programming/Computer Skills
- Engineering/Technical Skills
- Driver/Crew Skills/Knowledge
- Remote Control
- Communication Skills
- Safety Management Skills
- Law Skills
- Personal Resilience and Critical Thinking
- Urban Environment Operation
## Results – Aviation (2/2)

<table>
<thead>
<tr>
<th>Skills</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Communication, Team working, organization, problem-solving</td>
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</tbody>
</table>
| **Programming and Computer Skills** | Artificial Intelligence, Algorithms, software development, backend/frontend skills, machine learning, higher-order skills in big data analysis  
Cybersecurity and encryption protection, security systems for protecting external communication for AVs, data protection                                                                                                                                                                                                                                                                                                      |
| **Engineering/ Technical Skills** | Sensors and systems development, hardware development, **Robotics (able of performing maintenance work that cannot be handled by humans)**, electrical engineering, **aeronautics**, automotive engineering, safe navigation systems development  
Modelling and Simulation Skills  
**Airborne or underwater drones** can perform potentially hazardous inspection and maintenance tasks, either by remote control or autonomously (in cooperation with programming and computer skills).                                                                                                                                                                                                                                            |
| **Driver Skills and Knowledge** | Same as road sector  
Interoperability Skills                                                                                                                                                                                                                                                                                                                                                                                                                              |
| **Law skills**                 | Legal framework, regulation and operational rules, standards for the autonomous vehicle operation, liability issues in case of incident occurrence                                                                                                                                                                                                                                                                                                                                  |
| **Remote control and assistance skills and knowledge** | More difficult and demanding than the on board control and supervision  
**Detection of suspicious activities or abnormal behavior of the plane**  
Simultaneously monitoring and supervision of more than one unmanned airplanes  
Knowledge of characteristics of different types of aircraft, the routes they follow  
Preflight Check                                                                                                                                                                                                                                                                                                                                                   |
| **Safety management skills**  | Preparing for emergencies related to both safety and environmental protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| **Communication skills**       | Data transmission system                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| **Urban Environment Operation** | Engineering/Technical/Programming Skills (Landing and take off without a runway, obstacle detection and avoidance)                                                                                                                                                                                                                                                                                                                                                     |
Training needs - Scope of the Task

- Skillful project
- Literature Review
- Taxonomy A1.6
- Partners’ knowledge
Training needs - Literature Review

- Projects Outputs/Deliverables
  e.g. SKILLFUL, FutureDRV, AIMESC Projects etc
- Reports, incl. conferences and roundtable reports
- Papers
- Studies
- Official Websites from Universities, vocational Training Institutes and Institutional Bodies programmes, such as NOVIA University; Maritime UK; JAA – Training Organisation etc.
- Training courses provided by Institutions such as UITP, VTI, Easy Mile and VEDECOM
- Experts’ interview
- Taxonomy A1.6
- User clusters D1.1
Training needs - Literature Review

- Overall, 24 sources provided 30 cases.

<table>
<thead>
<tr>
<th>MODE</th>
<th>CASES</th>
<th>SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Rail</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Maritime</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Air (Drones)</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Cross-modal</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>24</td>
</tr>
</tbody>
</table>
Training needs for operators

- Familiarization of drivers with automation levels and operational functions of each vehicle.
- Training regarding the hardware and software of the vehicle.
- Training in trouble-shooting, in having enhanced decision making and problem solving skills.
- HMI adaptation: vigilance, driver-readiness in transitions between manual and automated driving, reaction, in-vehicle HMI strategies
- Training on the take-over behavior after a take-over request or after a critical event taking place, requiring the driver to intervene in order to avoid an accident.
- Hands-on training for operators using an automated vehicle in order to gain experience is essential. the interaction between av and other users will lead towards acceptance and HMI adaptation.
Training needs for operators

- Training with multi-platform tools for VR simulation to increase acceptance, safety, improve performance, HMI adaptation, enhance users’ perception of the AV’s operation.

Bus drivers and passengers
Training to increase acceptance after hands-on experience of all levels of automation in urban, rural, highway and specific applications, such as tunnels, constructions and bridges, and environmental conditions (i.e. co-pilot for adverse weather, unknown environments, unknown type of vehicle, etc.).

- Training for behaviour adaptation (“mimicking”, “flocking”) of non-equipped vehicles.

- Training for the impact of mixed and automated flows to traffic flow (micro/macro) simulation, incl. big data analytics for scaling.

- Training to understand liability and operational issues per automation level and user cluster.
Results - Road Sector (4/4)

- The basic technical characteristics of automation, i.e. levels of automation; architecture.
- AV driving skills and knowledge remote operation skills
- Customized training considering age, gender, IT literacy, socioeconomic factors and understanding of automation in order to increase levels of acceptance and capacity.
- Understanding new mobility services and business models arising with automated transport.
- Recognizing the implications for mobility in cities that autonomous and connected vehicles will bring.
- Social skills: communication, team-working, organisation, problem-solving
- Legislation and Liability training
- Life-long learning schemes.
Training with of Regina type simulators that will lead to a better understanding, enhance performance, increase safety and HMI adaptation.

Training that will enhance their awareness, performance and acceptance; ensure safety in automated operations supervision, incl. operator’s HMI & strategies for rail transport.

Continuous monitoring, operational skills, as well as assessing risks and decision making.

HMI adaptation

European Rail Traffic Management System (ERTMS)

European Train Control System (ETCS)
Traffic controllers operators

- European Rail Traffic Management System (ERTMS)
- Upskilling and to a point re-composition of their profession that will resemble that of air traffic controllers, in terms of task complexity, autonomy, managing operative procedures, decision making, cognitive and communication skills (for ERTMS).
- European Train Control System (ETCS)
- HMI intervention in case of failure with focus on the take-over procedure, to ensure safety.
- Reaction time response training (incl. vigilance and attention) for managing circulation.
Results - Rail Sector (3/5)

- European Rail Traffic Management System (ERTMS)
- Focus on acquiring technical knowledge and e-skills, emphasizing interdisciplinary abilities.
- Specialization in equipment's design and technological content with appropriate training when new equipment arrives is essential.
- Team-working and communication skills require a careful and extensive training curriculum that will equip staff accordingly.
Results - Rail Sector (4/5)

- European Train Control System (ETCS)
- Existing staff will need updated knowledge of the different modules and the interaction between old systems and ETCS, as well as acquire knowledge on the related software.
As harmonization is a long and complex process, the different versions of the systems’ application should be considered in the training process.

Rolling stock inspection staff
Results - Rail Sector (5/5)

- Technical and engineering skills
- Global System for Mobile Communication-Railway (GSM-R) training
- Artificial intelligence, Satellite Based Augmentation Systems (SBAS), Galileo GNSS satellite navigation system
- ICT skills, handling big data, Cybersecurity.
- Training in legislation
- Communication skills incl. problem-solving and decision-making skills
- Perceptual and cognitive skills, such as selective attention and situational awareness.
- Lifelong training
Results – Maritime Sector (1/4)

Passengers, pilots and operators

- Training to increase awareness and acceptance by passengers, pilots, and operators.
- Training to increase the users understanding of systems operation and deskillng issues.
- Increase of vigilance, perception and situation awareness in transition from operator to systems monitor.
- Cost efficiency of automated vs non-automated operation.
Training needs for AV-operators

- Technical and Engineering training needs specifically adapted for on- and off-board personnel
- Operational training needs
- HMI (incl. AI)
- Interoperability training
- Cybersecurity
- Data analysis skills and data handling.
- Training on efficient planning, watchkeeping, scheduling, equipment dispatching, monitoring and remote control of ship handling for the shore control center.
Results – Maritime Sector (2/4)

- Development of cognitive abilities is essential in order to ensure safety with the enforcement of decision making, and risk-assessment skills.
- Training tailored according to qualifications and experience.
Port workers, i.e. crane operators, gate entrance controllers, dockers

- Upskilling and further training and/or retraining is necessary, such as quay cranes operators, gate entrance controllers and dockers.
- In the case of dockers, training would have to be customized according to the subject port or terminal and the operational processes used.
Results – Maritime Sector (4/4)

- Programming/ Computer Skills
- Social Skills
- Training in Legislation and Liability issues.
- Safety Management
- Customised Training
- Lifelong Learning Training

All users
Results – Aviation Sector (1/2)

- Training on operators HMI and strategies for air transport
- Simulated behaviour training in non-standard situations.
- Impact of adaptive HMI on drone flight planning and execution.
- Drone purpose of use correlation to its HMI.
- Risk of drone accidents.
- Situational awareness for the drone operator and the supervising controllers.
- Liability and operational issues, incl. safety, security and cybersecurity.
Results – Aviation Sector (2/2)

- Training on the regulatory framework that will establish categories based on the taxonomy, operations and technical aspects of each system, as it is provided by different international authorities (e.g. ICAO, JARUS, EASA) to date.
- Training for operator’s certification
- Training for UAS airworthiness
- Social skills, i.e. communication, team working, problem solving skills.
- ICT training on AI, algorithms, AV and AR skills, data protection
Findings-Training Needs

- Automation is not achieved in the same levels across all modes.

- Some training needs or approaches seem to be horizontal across modes:
  - need for a lifelong strategy, because of continuous developments and evolution of the systems.
  - constant level of awareness and functionality of the HMI
  - understanding and handling big amount of data, e.g. of data transmitted from the sensors.
  - awareness of new mobility services, business models and implications arising through automation.
  - cybersecurity and emergency management
  - acquire skills in transport legislation, in order to ensure safety.
Training Tools

- Combine traditional learning with e-learning, self-paced learning etc.
- Use case scenarios
- Hands-on training
- Customized training (i.e. targeted to age group).
- Wizard of Oz
- Interactive training programs: Use of on-board video tutorials, Virtual Reality (VR) simulators and Augmented Reality (AR).
Modes covered

- Road
- Rail
- Maritime
- Air
<table>
<thead>
<tr>
<th>Road</th>
<th>Rail</th>
<th>Maritime</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>• AV bus drivers</td>
<td>• Rail drivers, signallers and dispatchers</td>
<td>• Automated workboat pilots</td>
<td>• Drone operators</td>
</tr>
<tr>
<td>• AV truck drivers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hired car/taxi drivers</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Types of tools used

- **VR/AR**
- **Curricula**
  - Classroom teaching
- **Movies**

<table>
<thead>
<tr>
<th>Mode of transportation</th>
<th>Role</th>
<th>Scenario - benefit of using</th>
<th>Tool to use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger car</td>
<td>Driver</td>
<td>Safe operation and awareness of how to interact with an automated car</td>
<td>VR / playback movie</td>
</tr>
<tr>
<td>Passenger car</td>
<td>Pedestrian</td>
<td>Safe behavior at zebra crossings</td>
<td>VR / playback movie</td>
</tr>
<tr>
<td>Partly AV bus</td>
<td>Driver</td>
<td>Safe and efficient docking at bus stop</td>
<td>VR / playback movie</td>
</tr>
<tr>
<td>Partly AV bus</td>
<td>Pedestrians</td>
<td>Safe and efficient interactions while waiting at bus stop</td>
<td>VR / playback movie</td>
</tr>
<tr>
<td>AV shuttle</td>
<td>Pedestrian</td>
<td>Safe interaction with shuttles when passing its path</td>
<td>Movie – real world</td>
</tr>
<tr>
<td>AV shuttle</td>
<td>Cyclist</td>
<td>Safe interaction with shuttles when passing its path</td>
<td>Movie – real world</td>
</tr>
<tr>
<td>AV shuttle</td>
<td>Passenger</td>
<td>Awareness of how to use and behave in an autonomous shuttle</td>
<td>VR / playback movie</td>
</tr>
<tr>
<td>Drone</td>
<td>Pilot</td>
<td>Safe operation and awareness of how to interact in an efficient way with a drone</td>
<td>VR / playback movie</td>
</tr>
</tbody>
</table>

Automation at docking at bus stop. Hand/Take over in amber, automation mode in blue.
E-learning

Human-Machine Interface (HMI)
The vehicle's dashboard

The dashboard in the vehicle gives an overview of the most important information you need to know, e.g. that the vehicle is in autopilot mode and drives automatically – You are not responsible for the driving task.

Additionally, the blue lightstripe alongside the windscreen indicates that the vehicle is driving automated.

You may roll over image areas for information.

Human-Machine Interface (HMI)
Information during the drive

The dashboard also gives you information on the current driving speed (blue) and the speed limit (red).

The information text boxes on the left and right provide you with additional information on the current options and how to give input to the vehicle.

You may roll over image areas for information.
Titles of training programmes (1/2)

» Development of AV training programmes is ongoing:
  ❑ Road:
    ✔ Introduction to Autonomous Trucks
    ✔ Introduction to Autonomous Public Transport
    ✔ Evolution of Traffic Management towards CCAM
    ✔ Driving a highly automated car of the future
    ✔ Riding in a future autonomous shuttle
    ✔ How to safely overtake an autonomous shuttle
    ✔ Pedestrian interaction with an autonomous shuttle
    ✔ Train pedestrians regarding automated vehicles on the road
Choose your destination

- On the screen, you can choose your destination
- You are always up-to-date during the ride:
  - You see the route of the vehicle on the screen,
  - your destination,
  - the remaining time until you reach your destination,
  - and the current speed.
Titles of training programmes (2/2)

- **Rail:**
  - ✔ Train drivers and signalers as remote operators
  - ✔ Train driving exercise for train dispatchers

- **Maritime:**
  - ✔ Introduction to Autonomous Workboats

- **Air**
  - ✔ Introduction to Autonomous Drones
For the analysis and description of the different training programmes that will be used in the project, a dedicated template has been developed:

- Introducing the trainings and describing its main objectives and expected learning outcomes.
- Correlating each training to the project’s:
  - target users and stakeholders groups;
  - use cases;
  - identified training needs and training tools and methodologies.
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