



*Needs, wants and behaviour of “Drivers” and automated vehicles users today and into the future*

**Contract No: 815001**

**D8.4: Exploitations Plans**

*Version 1.0*

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## D8.4: Exploitations Plans

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### Abbreviations List

Abbreviation	Definition
AR	Augmented Reality
AV	Autonomous Vehicle
B2B	Business-to-Business
B2C	Business-to-Consumer
CAGR	Compound Annual Growth Rate
HMI	Human Machine Interface
ITS	Intelligent Transportation Systems
OEM	Original Equipment Manufacturers
PT	Public Transport
R&D	Research and Development <sup>1</sup>
SME	Small and Medium-Sized Enterprise
SORA	Specific Operations Risk Assessment
S/W	Software
TMC	Traffic Management Centre
UAS	Unmanned Aerial System
VR	Virtual Reality
WP	Work Package
WTP	Willingness To Pay

## D8.4: Exploitations Plans

### 1. Introduction

#### 1.1. Purpose of this document

Drive2theFuture project aims at both enhancing drivers’ and commuters’ acceptance, and promoting the use of connected, cooperative and automated transport modes, while assisting the automotive and communication industry to address people’s needs and priorities. In order to achieve these results, a series of initiatives, technologies and training programmes have been acquired. In this document, which is the first in a series of two, a preliminary business framework is being proposed for the commercial exploitation of the Drive2theFuture products. The exploitable outcomes consist of both training programmes and software tools, since the target audience comprises of professional drivers (taxi and truck), users of public transport, driving instructors, rail, automated ship and drone operators and typical drivers and road users.

#### 1.2. Intended audience

This Deliverable is public; thus, it addresses, apart from the Drive2theFuture Consortium members and Commission services, all interested stakeholders and the general public. It provides information to all interested parties on the exploitable products of the project and the plans for their subsequent commercialisation after the project finalisation.

#### 1.3. Interrelations

As the Drive2theFuture exploitable results derive from different project Activities, the work of A8.4 – thus also the contents of this Deliverable, relate to several other Activities, such as A2.3: Simulation platform suite creation and scenarios realization, A2.4: Behavioural models, A2.5: Sentiment analysis on social media, A3.6: HMI development , A4.2: VR/AR and multimedia training and awareness tools, A4.3: Training programmes pew user cluster and sentiment analysis.

### 2. Exploitation plans of Drive2theFuture project

#### 2.1. Exploitation strategy

A preliminary list of the exploitable products of the project has been constructed already in the proposal phase. This has been updated during the project 18 months and shall be further updated until the end of the project in case any new exploitable product is identified. The updated table with the exploitation outcomes up to M18 can be found below (Table 1). In this table, a preliminary view of the expected outcomes is presented, since there is room for more products to be added throughout the duration of the project.

*Table 1: Drive2theFuture Exploitation outcomes (as planned at M18 of the project)*

No	Exploitation Outcome	Type	Exploitation type	Relevant Deliverable	Lead/Involved Partners	Time to market after project end
1	AV acceptance simulation platform and tools	S/W platform & tools	PI/B2B	D2.1	NTUA	Immediately after
2	Sentiment analysis and social media	S/W tool	B2B	D2.2	INF	12 months
3	AV driver behavioural model	Models with accompanying S/W	P	D2.3	TOI - TUM	Immediately after

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No	Exploitation Outcome	Type	Exploitation type	Relevant Deliverable	Lead/Involved Partners	Time to market after project end
4	HMI development toolkit for AVs	S/W platform & tools	B2B	D3.2	FhG/IAO	6 months
5	Traffic management services	Services know how	B2B	D6.2	SWM	24 months
6	Multimedia training s/w for AVs	S/w for PC environment	B2B/B2C	D4.1 (part)	CERTH/HIT - VTI	12 months
7	AV Training programme for PT drivers'	Training package of services	B2C	D4.2 (part)	UITP	6 months
8	AV Training programme for truck and taxi drivers	Training package of services	B2B	D4.2 (part)	IRU	6 months
9	AV Training programme for driving instructors	Training package of services	B2B/B2C	D4.2 (part)	IAM	3 months
10	AV Training programme for rail operators and signallers	Training package of services	B2B	D4.2 (part)	VTI, EURNEX, TUB	3 months
11	AV Training programme for automated ship operators	Training package of services	B2B/B2C	D4.2 (part)	TUCO	Immediately after
12	AV Training programme for drone operators	Training package of services	B2B	D4.2 (part)	DBL	Immediately after

The platforms and training programmes that will be developed during the project, aiming at familiarizing users with AVs and AV functions, were framed into four exploitation schemes, as they were described and used at the SKILLFUL<sup>1</sup> project deliverable D6.4 “Dissemination activities and Exploitation Plans” (Table 2).

**Table 2: Exploitation schemes**

Exploitation Scheme	Description
I. Public (P)	Public courses that are open to the public (and free).
II. Private Internal (PI)	Courses for training the personnel of the Organisation that developed the course.
III. Private – Sales B2C	<ul style="list-style-type: none"> <li>The developer of the course will sell training hours of vocational training.</li> <li>The training will be provided by members of the owner organisation (course developer).</li> </ul>

<sup>1</sup> <https://skillfulproject.eu/>

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Exploitation Scheme		Description
IV.	Private – Sales B2B	The developer of the course will sell the content of its course to other centres/organisations/Universities or offer it with some fee for specific period of time (i.e. per year).

The exploitation plan consists of the business model, the business cases and the market study (market potential and risks). A relevant template has been designed and has been distributed to the related partners, in order to collect specific information on each of the exploitable products.

The template includes the following sections:

- WP/Activity/Pilot: Indication of the WP, the Activity(-ies) and/or Pilots to which this product is linked or derives from
- Partner: the name of the Beneficiary(-ies) involved in the development and/or exploitation of each product
- Exploitable outcome: the name of the product
- Type of product: indication of the nature of the product, i.e. whether it is a software or a service, if its and new product or an extension of an existing one, etc.)
- Short description of the product: A brief, textual description (approx. 2 paragraphs) of the product, highlighting its main features.
- Background as know-how: Indication of the background of the developer, the existing know-how and previous relevant products
- Estimated price (€): An estimation of the expected market price of the product.
- Estimated time to market: An estimation of the time (after the project end) when the product is expected to be available in the market.
- Type of exploitation (only for training services): According to table 2 exploitation schemes.
- Exploitation route: Description of foreseen cooperation and/or partnerships, either with Consortium members or beyond regarding the production/development and/or selling of the product/service.
- Business proposition: Indication of the industry in which the product will be used and how it will be integrated in it.
- Market Potential: Description of the existing market addressed by the product, indication of the need that the product is expected to cover and description of the competition in the area.
- Market Risks: Indication of the possible obstacles to be confronted and the issues that could negatively affect the implementation and introduction of the product.

This Template can be found in Annex I. Overall, the exploitation outcomes have been refined by each corresponding partner to the possible level at the time of the preparation of this Deliverable, as the relevant Activities are still active and the final products are still not at hand. The descriptions of these products, as derived from the analysis of the collected templates, are included in the following section.

## 2.2. Description of Exploitation products

### 2.2.1. AV acceptance simulation platform and tools

#### 2.2.1.1. Introduction – Description of the product

NTUA is developing a simulation platform for modelling the behaviour of automated vehicles and assessing their impacts on various areas. The Department of Transportation Planning and Engineering of the School of Civil Engineers of NTUA, is one of the leading institutions in Greece conducting transportation research with emphasis on traffic & safety analysis and forecasting, ITS, socio-economic impacts. The simulation platform that will be developed within Activity A2.3, aims to assess the impact of automated vehicles under various scenarios and penetration rates. It will consist of three main components:

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1. Data driven models: data collected from automated vehicles (real or in VR) will be analysed using data driven algorithms in order to train and validate the microscopic model that will govern the behaviour of the automated vehicles in the simulation.
2. Scenario generation tool: Various scenarios will be automatically generated and imported in the simulation platform for testing and investigating the behavioural model and its impacts on different impact areas.
3. Simulation tool: an open source simulation software (SUMO) will be used for the simulation test runs. The microscopic behavioural model for the AVs will be formulated using the data driven models, will be coded and integrated in the simulation tool. Using the different scenarios from step 2, the impact assessment of the AVs will be evaluated under different conditions and circumstances.

The expected simulation platform and the tools are a new service, NTUA will offer, since the tools that were used so far ignored human and vehicle behaviours.

### **2.2.1.2. Estimated price and time to the market**

The simulation platform cannot have a price, since it will not be sold directly, but it will be used to provide services to the Industry. As the platform will be completed by the end of the project, its exploitation may start immediately after. .

### **2.2.1.3. Type of exploitation – exploitation route**

Based on what has been stated in the previous paragraph and according to Table 2, the type of exploitation for NTUA's service is primarily Private Internal. However, NTUA will strongly cooperate with Consortium partners for the development of the simulation platform and its tools. FZI will assist in the data collection and processing from its pilot and provide NTUA with the relevant data for the training and validation of the model integrated in the platform. FZI will also cooperate with NTUA concerning the integration of the model in the simulation tool. TUM, due to its expertise, may assist NTUA in the scenario generation tool development while CERTH will conduct some simulation runs in test networks already existing from the TRANSAID project. After the complete development of the service, NTUA aims to perform various actions for its exploitation. First of all, a workshop can be organized for demonstrating how the simulation platform works, which are its features, capabilities and characteristics. Additionally, the simulation platform and its components will be presented by NTUA at various national, European and international conferences, in order to invite more potential users and therefore enabling future project synergies with other academic and research organizations as well as industries. This research synergies will support the further development of the simulation platform and its components after the project end. The simulation platform will be fully developed within the duration of the project, but further improvements will be always possible for assessing the impacts of automated vehicles. NTUA will continue carrying research on enhancing the platform and enrich it with more advanced tools. This continuous and advanced research will lead to PhD and Post-doctoral theses, as well as to many and high-quality scientific publications and presentations in journals and conferences for presenting the importance of such a tool and its reinforced capabilities. All these aspects will increase the scientific impact and contribution towards the modelling and impact assessment of automated vehicles and enable knowledge transferability within the scientific community and the industry. Finally, consultation services will be built in a B2B manner, based upon this s/w platform. Their price will depend upon the extend of its relevant "turnkey" project.

### **2.2.1.4. Business proposition and Market potential**

The platform and the tools that will be developed as a service, will be used within project synergies between NTUA and the industry. The existing market has place for new solutions concerning the acceptance of AVs by the users, while research organisations and industry need a platform to test these new solutions. Moreover, there is also a need to integrate similar platforms to traffic management solutions. The global traffic management market size is expected to grow from 26.29 bn € in 2019 to 49.74bn € by 2024, at a Compound Annual Growth Rate (CAGR) of 13.6%<sup>2</sup>. The possible market risks concern platform's lack of extensive tests in

<sup>2</sup> <https://www.marketsandmarkets.com/Market-Reports/traffic-management-market-1036.html>



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various settings and recurrent conditions. For a market implementation, an extensive sensitivity analysis and evaluation would be required.

### **2.2.2. Sentiment analysis and social media**

#### **2.2.2.1. Introduction – Description of the product**

INFILI will use their software for sentiment analysis over social media to estimate the acceptance of autonomous mobility solutions. INFILI is a research-intensive SME. The company's main competences are focused on machine learning algorithms. As a company they have developed in the past similar deep learning algorithms and have worked extensively in the digestion of information from data intensive applications in order to extract additional semantic information. Their system is composed by scrapers of social media channels, mechanisms for collecting and pre-processing the mined textual information, as well as sentiment analysis tools over text. The system is able to run continuously, mine relevant social media content, analyse it and identify patterns, fears, and overarching sentiments relevant to the acceptance of autonomous mobility solutions.

#### **2.2.2.2. Estimated price and time to the market**

The price cannot be estimated yet; it requires a WTP analysis of stakeholders; to be performed during the Pilots. The time to market is expected to be around 12 months after the project finalisation.

#### **2.2.2.3. Type of exploitation – exploitation route**

The exploitation of the software will be Private – Sales B2B, since INFILI plans to offer use of the tool with a fee. The software can provide insight for all relevant stakeholders. They aim at relying on the consortium's networking capabilities to identify potential clients.

#### **2.2.2.4. Business proposition and Market potential**

The Sentiment Analysis tools and software are addressed to all relevant stakeholders, from OEMs, to public authorities and academia. Although the actual need for the product is not easily calculated, the tool can provide significant assistance to policy makers as well as to the transportation industry, by assessing the acceptability of solutions and adapt their marketing campaigns. Possible risks that could halt the development of autonomous solutions will negatively affect this product as well.

### **2.2.3. AV behavioural model**

TOI is a national transport research centre for Norway and a non-profit research foundation carrying out commissioned research for the Ministry of Transport and Communications, The Public Roads Administration, Local and Regional Administrations, The National Research Council of Norway, and various bodies of the European Commission. In A2.4 TOI will produce new knowledge based on driver, behaviour theories to be reported in D2.3. The driver behavioural model that will be developed is not a product that is exploitable as such. It will rather contain some groundwork and first results and it will be open to the public, accessible at no cost.

### **2.2.4. HMI development toolkit for AVs**

#### **2.2.4.1. Introduction – Description of the product**

FhG/IAO will develop a software platform for HMI development and training, providing end users with the possibility to experience human-machine interaction with automated vehicles and, at the same time, providing researchers with a holistic platform for testing tools used in HMI development. FhG/IAO Fraunhofer Gesellschaft is the leading organization of applied research institutes in Europe, undertaking contract research on behalf of industry, the service sector and governmental institutions, while IAO, the Fraunhofer-Institute for Industrial Engineering, is a leading institution in the fields of technology management and industrial engineering. The HMI development toolkit is a new comprehensive software platform aiming at testing HMI concepts user acceptance, considering the needs and characteristics of different users, modes and automation levels. The toolkit consists of different components: a menu interface (editor) where different

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parameters for the scenario (e.g. user, vehicle and environment) can be chosen and a VR-environment, which starts as configured in the editor. Furthermore, there is a library with optimized HMI elements, allowing for HMI interaction per mode, user cluster and automation level. The software also contains HMI personalisation strategies and tools (including wearables) and different input devices. The goal of the HMI development toolkit is to provide users affective and persuasive HMI for AV functions, taking into account also conspicuity and interaction with non-autonomous traffic participants. In light of dissemination, the HMI toolkit contributes in raising public acceptance and creating an educated expectation of AV's HMI. So far, HMI testing with users during the development process involved the development of a real HMI prototype, e.g. for the driving simulator, which can be very complex and time-consuming but is very immersive for user testing. Meanwhile, low-fidelity prototypes, such as paper-based prototypes can also be used as a more instant solution but do not provide the users with a high degree of immersion. However, in the early steps of HMI development paper prototyping is a very useful tool.

### 2.2.4.2. *Estimated price and time to the market*

The software is offered as part of research services by Fraunhofer IAO. The use of the software makes evaluation studies of automated functions,

- better, so Fraunhofer expects 2 new projects/year of 100k€
- faster and hence cheaper – so Fraunhofer clients can save around 20k€/study
- easier to use – so Fraunhofer plans to sell licenses of the software for 5k€/year.

The estimated time to market is six months, after the project concludes.

### 2.2.4.3. *Type of exploitation – exploitation route*

The exploitation will be Private – Sales B2B according to Table 2, since IAO plans to offer the software under a certain fee. During the development of the product, input from partners in WP3 that are involved in HMI development is collected regarding the elements for the library and the use cases. Furthermore, selected partners will be involved in testing the initial versions of the software for their pilot sites.

### 2.2.4.4. *Business proposition and Market potential*

The product will be mainly used in automotive and transport-related industries, where new HMI concepts are developed, tested and optimized. With this software, concepts can be made accessible for testing user acceptance in very early stages of the development cycle. Also, the product can be used for awareness creation in the public, e.g. at conferences, expo days and fairs.

Tools for prototyping in VR for the automotive domain already exist, focusing on the user group of drivers. However, they are not dedicated tools for comprehensive HMI development over different modes and for different user clusters. Additionally, existing software does not aim at end users. Existing tools, such as VREXPERIENCE by the company Ansys or CARVR by Athena, aim rather at expert-users. The HMI development toolkit developed in Drive2theFuture shall be interactive and easy to use in order to raise acceptance for new HMI solutions among end-users. Given that VR systems' availability on the consumer market and at end users' homes is still limited, using the software platform might at the moment still be bound to the lab with a dedicated setup, e.g. specific input devices. However, until the launch of the product, availability of consumer VR devices might be more widely spread. Possibilities to make the platform available to users at home without VR goggles, e.g. by interactive 3D-videos for training is also considered. Apart from that, motion sickness is still a problem that many users experience when they use VR goggles, which is a general issue inherent to interactive simulations.

## 2.2.5. *Traffic management services*

### 2.2.5.1. *Introduction – Description of the product*

Swarco (SWM) points to additional traffic management services for infrastructure evolution towards autonomous driving. SWM is a leader company in the field of Intelligent Transport Systems (ITS) of the multinational group SWARCO Holding AG in which it now fulfils the role of ITS specialist and software producer

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for the whole Group. Therefore, SWARCO Mizar addressed the deployment in a real-life environment of the traffic management services preparing the infrastructure towards autonomous driving and relative training of TMC operators and foresees 2 lines of Exploitation:

- In a short term, through Drive2TheFuture to contribute to the specification of ITS infrastructure evolution towards autonomous driving, serve as a basis for the improvements of the internal R&D developments of SWARCO Mizar systems.
- In a long term, address the ITS products evolution in a cost-efficient manner by using the feedback received throughout the project life in terms of evolution of urban traffic control, acceptance of TMC operators and the extension of traffic management offer.

The company offers technologically advanced solutions for transport management and info-mobility, through research, design, development and the implementation of integrated telematics systems and services for the supervision, monitoring and control of traffic and mobility.

### **2.2.5.2. Estimated price and time to the market**

The estimated price depends on the services, software and/or components required by the customer, in a B2B fashion. The estimated time to market though, is two years after the project end.

### **2.2.5.3. Type of exploitation – exploitation route**

The traffic management service for infrastructure evolution towards autonomous driving service is entirely developed by Swarco. However, TMC operators contribute to the deployment of the real tests.

### **2.2.5.4. Business proposition and Market potential**

Swarco Mizar operates in the market offering ITS integrated systems and services for Traffic monitoring and control in the Urban Areas and Public Transport management to the customer and supplying software and components to companies of the SWARCO group and international OEMs. The market around this product seems to have a potential especially for small installations and Proof of Concept. However, an undeniable risk is market's viability dependence on the evolution of AVs.

## **2.2.6. Multimedia training s/w for AVs**

### **2.2.6.1. Introduction – Description of the product**

VTI proceeds to establishing a VR based training for AV and Pedestrian interaction at bus stops and during operation. VTI is the Swedish National Road and Transport Research Institute, conducting research for all modes of transport, with special laboratories for safety testing, including advanced simulators for road and rail drivers. The specific software VTI will be developing, includes two level of AV solutions; automated docking at bus stop and shuttle service operation. The aim is to make the driver and pedestrian/cyclist aware of the status of the AV in order to increase acceptance and trust. The AV docking at a bus stop is a low TRL solutions, where the bus drivers' perspective is looked at before; however, the knowledge of the forthcoming passengers' needs are not explored. As far as AV shuttles are concerned, according to relevant research that has been done, a solution for improved awareness for cyclists and pedestrians did not appear. CERTH/HIT, which is one of the leading institutions in Greece conducting road safety research and evaluation and impact assessment studies for ITS innovation, on the same time, will develop a multimedia e-learning based training tool as a software platform that entails content required for the operation of AVs (of all modes), covering the needs of the industry, the users, AV drivers, etc. The platform will also be compatible with the needs of training during the COVID-19 crisis as it provides remote training in a healthy, secure and accessible way. Similar multimedia trainings already exist for transportation, such as for dangerous goods transportation. A multimedia educational platform has also been developed by CERTH/HIT on traffic education and road safety for the Greek Ministry of Transport and Infrastructure, called e-Drive academy (<http://edrive.yme.gov.gr/>).

### **2.2.6.2. Estimated price and time to the market**

VTI proposed a price of 100€, for B2C use, while it is expected that the time to market will be less than a year after the project's end, while the price for the e-learning platform cannot be estimated yet, as the content to

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be included has not been defined yet and various versions are under consideration, in cooperation with the content providers. The estimated time to market, though, is immediately after the end of the project.

### **2.2.6.3. Type of exploitation – exploitation route**

The type of exploitation for the multimedia training is characterized both public and private internal, according to Table 2, while the exploitation of the e-learning platform will be Private – Sales B2C or B2B (through collaborating training centres). The exploitation route is yet to be defined for both products.

### **2.2.6.4. Business proposition and Market potential**

VTI suggests that public transport and landowners will benefit from using the AV bus stop and shuttle services accordingly. However, the market potential is roughly in need of such a service, thus the market risks are narrowed to none, with investment cost being low. CERTH/HIT focuses the business proposition on AV/PT fleet operators and trainers of drivers/operators, without excluding anyone else. Also, within the project aggregated data are being collected on user acceptance, behaviour, accident/incident types and other estimated risks that also lead to the identification of the users training needs. The effort that is mainly undertaken currently focuses on training programmes and protocol guidelines that could be used by advanced driver-assistance system trainers, in order to optimize driving safety. However, the Drive2theFuture multimedia e-learning is going to include training for operators of all modes, tailored –modes for their needs, as they have been also defined with the project. The main barrier towards the exploitation and market penetration of this multimedia e-learning platform deals with the fact that automation products are mostly still in experimental phases, so their training cannot be mature either. This may lead to dynamic changes after the end of the project, while differences are expected among different automation levers. Additionally, due to the fact that this training can be considered to deal with long-term problems, this could affect the interest of the relevant stakeholders. Another project to bridge this “valley of death” could be useful.

## **2.2.7. AV training programme for PT drivers’**

### **2.2.7.1. Introduction – Description of the product**

UITP will enrich the existing training modules for PT drivers. UITP is active in all aspects of public transport and mobility at urban and regional level, promoting public transport worldwide. In particular, selected training material developed within WP4 (T4.2 and T4.3) will be used to enrich the training modules offered by the UITP Academy on autonomous driving in PT. Tools developed in the frame of the same WP (e.g. videos, VR/AG equipment and scenarios) will be considered to complement the traditional trainings (mainly based on paper material and slides presentation) and review the methodology applied today by the Academy. The Academy has already experience in the trainings on Autonomous Mobility and Automated Metros, the latter one being regularly organised. The UITP Academy delivers a wide range of training programmes for all public transport and urban mobility stakeholders worldwide. More than 60 urban mobility topics are covered by the current portfolio. The training programmes are exclusively based on international expertise and practice. Participants from more 1.000 companies have already joined a UITP training programme. Trainings are organised in the form of classroom, digital and in-house courses.

### **2.2.7.2. Estimated price and time to the market**

The training modules will serve as an extension of the existing training Academy and the commercialisation of the product is still under discussion. An estimated price set would be around 6000€ (per professional client). The time to market can be roughly set for six months after the project concludes.

### **2.2.7.3. Type of exploitation – exploitation route**

The exploitation will be Private – Sales B2C, meaning the developer will sell the training hours of vocational training, according to Table 2. The exploitation route suggests members of the consortium, both involved in the execution of the pilots or in the training-related activities, to be involved as trainers to share their knowledge and experience. Many of them are already UTIP members and they are aware of the training activities delivered by the academy. The possibility to develop collaborations between some of them and the

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UITP Academy will be explored, also for what concern the possibility to organise technical visits to showcase some of the equipment (e.g. HMI) investigated within Drive2theFuture.

### **2.2.7.4. Business proposition and Market potential**

Business proposition mainly focuses on the PT sector. The target audience will consist of professionals involved in automation projects, public transport operators and authorities which run, build or plan to build autonomous PT services, staff from the industry involved in the design and manufacturing of infrastructures, vehicles and technologies. The interest for the topic is considered very high in the PT sector. A proof is the involvement of UITP in many activities and research initiatives (funded by third parties or UITP projects) on connected and autonomous vehicles. The market potential will be evaluated by the Academy when the material is ready. The market risks cannot be evaluated at this stage, since the training material and tools are at an early stage of development. The Academy will evaluate the market risk when the work is more advanced.

### **2.2.8. AV training programme for truck and taxi drivers**

#### **2.2.8.1. Introduction – Description of the product**

Apart from PT drivers' training, IRU will develop an AV training programme for truck and taxi drivers by collecting existing AV training programmes applicable for those drivers. IRU Projects is a Belgian not-for-profit legal entity established to support the road transport industry to reach the goals of sustainable road transport, increased road safety and security. They will start by listing existing AV training programmes for truck and taxi drivers. Then, these will be served as inspiration for relevant transport companies to train or retrain their drivers to use automated functions in the vehicle. In some cases, some AV training programmes that already exist from the pilot sites will be modified to consider the objectives of the project. More specifically, the AV training programmes will look out for the acceptance and awareness of the different target groups.

#### **2.2.8.2. Estimated price and time to the market**

The estimated price will be estimated through stakeholder WTP studies during project Pilots. Time to market is set to 6 months after project end.

#### **2.2.8.3. Type of exploitation – exploitation route**

The type of exploitation is yet to be finalised, while IRU is working together with partners in the Consortium that are in A4.3 AV training programmes and in WP5. Pilot site leaders are also providing material of existing training programmes that are publicly available. The exploitation type will be B2B, to the relevant operator companies.

#### **2.2.8.4. Business proposition and Market potential**

The commercial road transport sector is expected to benefit from these training programmes since they will provide insight on how trainings can be organized and which entity to contact to be trained accordingly. There is a profound need for AV training programmes since technology is rapidly evolving and becoming an integral part of vehicles. Several OEMs have their own training programmes which are usually confidential. This makes it difficult to collaborate and increases competition. There are risks that AV training programmes will not result as being useful for the commercial road transport sector. This is because the technology is still not mature and there is a very low penetration currently on the market. There is also a risk that companies will not see the added value of this technology and the clear benefits for their operations.

### **2.2.9. AV training programme for driving instructors**

#### **2.2.9.1. Introduction – Description of the product**

IAM RoadSmart will develop an AV Training programme for driving instructors, which consists of a new software based on an existing service. IAM aims at improving driver and rider skills through coaching and education. They provide a range of risk management and training services, including e-learning, on-road coaching and seminars. In the context of Drive2theFuture, training products for those involved in the driver training industry will be developed, to raise awareness of autonomous vehicles and prepare drivers to use



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them safely in the future. IAM RoadSmart are producing a multilingual questionnaire designed to map out the state of knowledge of autonomy among those active in the driver training industry in Europe. This will be used to identify potential exploitation opportunities for common learning products. The survey also asks which format driving instructors in each country would like to use to disseminate information about autonomous vehicles. The survey is delayed due to Co-Vid but is due to have preliminary results in December 2020. The basic standards for driver training are set at EU level to allow harmonization of driving licenses but actual practice varies from country to country. This project will look at the potential to provide common materials or to highlight content that needs to be included in future national programmes.

### **2.2.9.2. Estimated price and time to the market**

The price will be estimated through WTP stakeholder surveys during project Pilots. Estimated time to market is set to 3 months after project end.

### **2.2.9.3. Type of exploitation – exploitation route**

The exploitation type will be Private, both for Sales B2C and B2B, according to Table 2. A data file of national driver training organisations has been identified, as well as members of the Drive2TheFuture consortium have agreed to disseminate the programme to their own or other driver training organisations in their countries. These links will be captured and used for future exploitation plans and communication of findings. A speaking engagement has been secured in May 2021 at the CIECA Congress in Porto. CIECA is the European level body representational body for driver training and the event will allow the Drive2theFuture project to be disseminated to CIECA members across Europe.

### **2.2.9.4. Business proposition and Market potential**

The delivered product aims to the Driver Training industry, both for novice drivers and refresher course for qualified drivers. There may also be potential for links to car manufacturers to encourage them to deliver training on autonomous features. A perception of the market around this product is expected to come from the survey and further investigations. The survey will identify if an app, printed materials or on-line learning are the preferred modes of training in each country. Figures for tests are hard to find for all EU countries but in the UK alone 1.5 million driving tests are conducted every year. The market potential at a European level runs into several million tests per year so the market potential is substantial. There are no EU wide rules on driver training, driving schools or driving instructors. There are, however, minimum EU standards for:

- the driving test: the examinee needs to pass both a practical test and a theory test;
- the driving examiners: they must successfully complete a training program and be subject to periodic quality assurance and training.

This means that market conditions will vary from country to country. In addition, many countries have applied controls to in car training due to the ongoing Covid-19 restrictions. Car makers may decide to improve their own awareness programmes for the purchasers of their vehicles. Consumers may believe that such short handover programmes are sufficient to enhance their knowledge of autonomous features.

## **2.2.10. AV Training programme for rail operators and signallers**

### **2.2.10.1. Introduction – Description of the product**

This product is an outcome of the cooperation of three different Drive2theFuture partners: EURNEX, TUB and VTI. EURNEX is the European rail Research Network of Excellence, comprising over 40 scientific institutions of the transport and mobility sector from all over Europe. EURNEX is the first research cluster of excellence to support the European Research Area in the rail and air transport sectors. TUB is participating with its railway sector, which teaches and researches in the three fields of Track (track life cycle costs, superstructure dynamics including noise abatement and maintenance optimization), Operation (resource conservation and the application of new technologies) and Strategy (sustainable forms of offer and production in passenger and freight transport), and VTI as mentioned before, is the Swedish National Road and Transport Research Institute. EURNEX will develop either a new training programme or an existing one to be used for supporting the pilots RA-1 and RA-2. The format and the content of the products are still to be defined in function of the

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needs. They have previous experience from their participation in the H2020 project SKILLFUL, where some training programmes for specific needs of the rail sector were developed. TUB will develop a prototypical HMI providing an example for the development of future automation systems and providing researchers a testing and training tool for use in the areas of rail human factors and railway operation, since RA-2 pilot examines the possibility of using a simplified HMI for remote train driving as a fallback system for highly automated train operation. The tool includes haptic and tactile control devices and information interfaces. The goal of the pilot is to investigate the needs and preferences of future operators and to increase the acceptance amongst users via a training programme. TUB contacts research and training activities in human factors and railway operation area involving rail traffic controllers and train drivers with simulators and a railway operation laboratory. VTI will develop a video-based training tool for rail transportation, by extending an existing one. The video-based training will aim at the cooperation between train drivers and dispatchers providing improved interaction based on understanding of each other roles.

### **2.2.10.2. Estimated price and time to the market**

The estimated price of training courses will depend on the type of material developed. The estimated time to market though, is planned immediately after the project's end, or, if an adaptation of the material is needed, 2-3 months after the end of the project. The prototypical HMI developed by TUB will not be marketed, therefore a price cannot be estimated, while the estimated price of the video-based training tool is 1000€.

### **2.2.10.3. Type of exploitation – exploitation route**

The exploitation will follow both B2C and B2B routes (for courses and HMI respectively). The exploitation route will be discussed among the participating partners. The HMI will be used for training of the personnel of the organisation, thus belongs to Private Internal exploitation type. TUB will cooperate with project partners for the development and dissemination of the product. The iterative user testing will involve students, train drivers and dispatchers. After the development of the HMI, TUB aims to several actions for the exploitation. The HMI and the strategy will be demonstrated in workshops or related events. Additionally, the project and the pilot will be presented in several national and international conferences enabling future research efforts and project cooperation. As long as the video-based tool is concerned, the type of exploitation will be Private – Sales B2B, since VTI plans to sell the content of the course to other organisation/universities or offer it with a fee for a specific time.

### **2.2.10.4. Business proposition and Market potential**

The training programme is educational oriented. The tendency towards an increase of automation seems clear so it is expected that the demand for this type of services rises. The main competition comes from rail operators which have implemented some type of automation in the operation of lines (typically underground lines) or from industry which have developed this kind of technology for the rail operators. However, these materials are usually hard to reach for the public not directly involved in the rail operation. A more interesting field of development would be the development of material for universities instead of vocational training, whose goal is more focused on offering a high-level picture. The main obstacles may be related to the specific needs of each automation system that may affect the usefulness of the material developed. Meanwhile, the HMI to be developed will be used within the research domain. The pilot product finds itself in an emerging R&D area with a need for a technological and a human centric solution, therefore the market size cannot be easily quantified. The pilot test focuses on several use cases and will not be conducted for various settings and situations. The prototypical HMI needs to be further improved technically for the market adaptation. Additionally, field tests and extensive analysis are needed. VTI's video-based training tool will address the train operation industry. There seems to be a lack of this kind of training for rail drivers and dispatchers. Implementation risks are not foreseen, however there is always a risk for over trust of the effect of training.

## **2.2.11. AV Training programme for automated ship operators**

### **2.2.11.1. Introduction – Description of the product**

TUCO will develop their products towards automated technology. TUCO is a shipyard specializing in workboats, composite materials technology and implementation of new technologies. They aim at delivering

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a boat with autonomous operation, to enhance and improve especially decision making under operation and safety for the crew. Improving decision making in regards of operation, is a highly sought for ability, as the correct decisions can drive down cost and improve the quality of the work carried out at sea dramatically, further it will also greatly improve maritime transport, and autonomy will also open the door for on-demand transport in smaller ferries across harbours and other short distance sailing. TUCO Yacht has a long background of delivering fast and lightweight boats for professional users. They deliver boats to mainly 3 segments: Offshore boats, Workboats and defence boats. However, their ProZero platform is highly modular, so they can deliver boats to basically any needs of the customer, including customizing all on board equipment.

### **2.2.11.2. Estimated price and time to the market**

A price has not yet been established, while the estimated time to market depends on the maturity of the technology and user acceptance. TUCO plans a time to market as immediately for the first iterations and up to 5 years after the project is finished for the 2<sup>nd</sup> Gen. iterations. They estimate that immediately after, survey boats will be the market to enter, as they will see great immediate improvement in their operation by using autonomous boats.

### **2.2.11.3. Type of exploitation – exploitation route**

The exploitation will be Private, both for Sales B2C and B2B. To begin with, TUCO will need assistance in the fields of software development and legislation and certification services, while other issues may arise during the project in different scientific areas.

### **2.2.11.4. Business proposition and Market potential**

The product will be used on the following, but not limited too, as the technology and acceptance grow:

- Professional workboats
- Professional survey boats
- Improved decision making for all maritime operations
- Improved Passenger transport
- On-demand call for maritime transport and services

As of today, the first and foremost immediate demand is seen in survey operations, as these often cannot perform surveys in long distances at a time, because they have to carry crew. Further down the line, it is expected that the market potential for autonomy will increase drastically, for decision supporting purposes. Perhaps even using a combination of AI and machine learning. The market risks detected so far are:

- Legislation
- Infrastructure support
- Price
- Technology acceptance

## **2.2.12. AV Training programme for drone operators**

### **2.2.12.1. Introduction – Description of the product**

Another exploitation outcome comes from Deep Blue. The training programme they will develop consists of some new training modules and the enhancement of an existing one, Deep Blue already provides. DBL - Deep Blue is an Italian research and consultancy SME specialised in safety, human factors, security and validation. The company operates in the domain of Transportation dealing with the design, analysis and evaluation of interactive systems, especially in Aviation, UAS/Drones and Air Traffic Control. The AV training programme for drone operators they will develop within A4.3 product, consists of 3 modules, focusing respectively on:

- current drones' regulation, with a specific focus on the authorization processes associated to the different categories of drones (open, specific, certified)



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- the SORA Methodology for safety assessment of drones' operations, explaining in detail all the steps of the methodology and the authorization process deriving from the calculated risk.
- the operator supporting tool developed in the framework of Drive2the future to smooth the authorization and safety assessment process of drones' operations.

So far, separate modules on drones; regulation and SORA methodology are not integrated into a unique programme.

### **2.2.12.2. Estimated price and time to the market**

The price is expected to be defined through stakeholder WTP assessment during project Pilots; yet the time to market is expected immediately after the end of the project.

### **2.2.12.3. Type of exploitation – exploitation route**

The type of exploitation is both for training of the personnel of the organization, and for selling to other organisations/universities (Private Internal and Private – Sales B2B according to Table 2). The training programme will be developed by Deep Blue in the framework of A4.3. For the moment no other consortium member is expected to be involved in the design and development of the training programme.

### **2.2.12.4. Business proposition and Market potential**

The training programme is directed to the aeronautical business, with a particular focus on drone operators. An idea for the market around this product has come up from the research conducted so far in Drive2theFuture. There seems to be a big need for a tool to simplify the authorization process of drone operations. The training programme is expected to raise the interest of the market, intended as the drone operators. There is no awareness about possible competing initiative which may be currently ongoing. The training programme will be subject to periodic updates in order to present a trustworthy and complete picture of drones' regulation. Possible changes in the SORA methodology and improvements in the operator tools must be reflected in the training programme.

## **2.3. Next steps**

The geographical scope of the business and exploitation plan is worldwide. Thus, the commercialization potentials for the Drive2theFuture products will be set and updated as needed, according to the European and worldwide market trends throughout the project duration. A Business Model Canvas will be formed with the final outcomes. A similar template is attached below (Figure 1).

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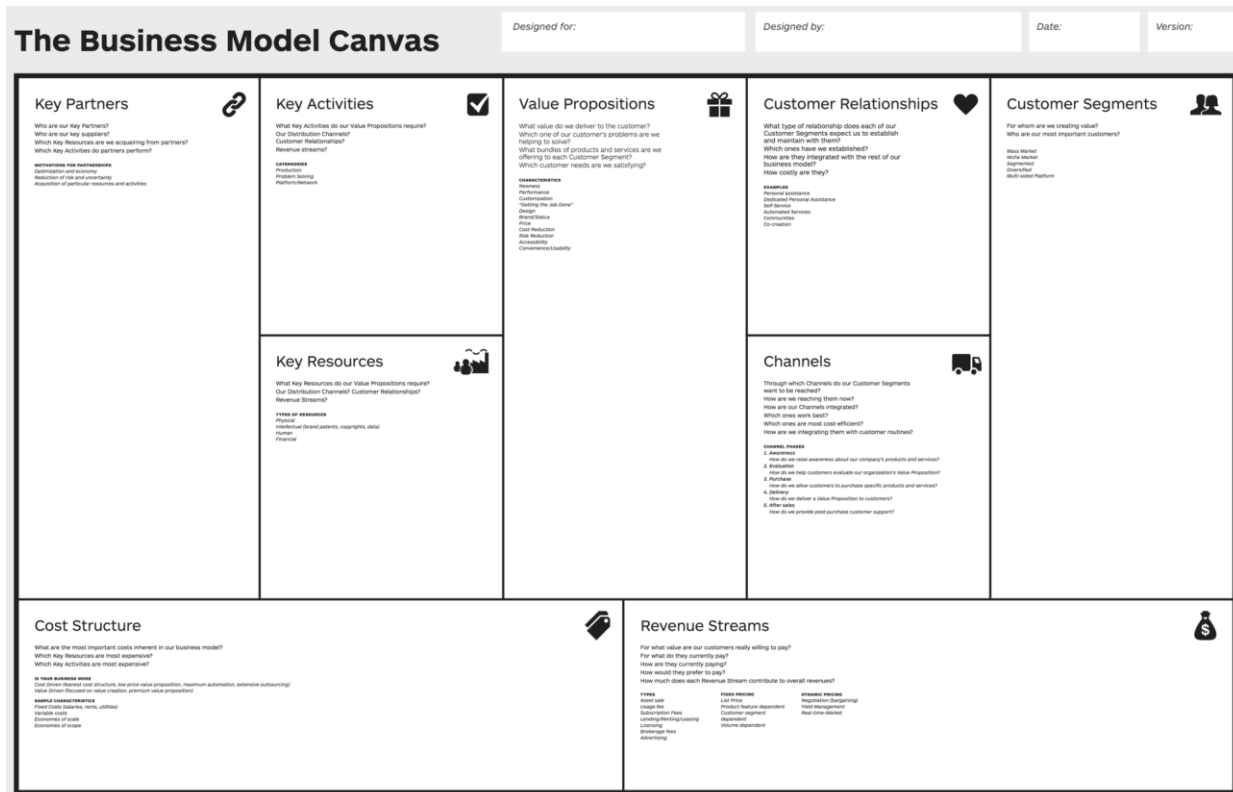


Figure 1: Business Model Canvas (to be formulated for each project exploitable results during the Pilots phase).

## 3. Conclusions

Since this is the first deliverable of the exploitation plans, most of the exploitable outcomes will be updated when the final products are ready. Until then, an exploitation strategy has been developed that will be revised by the end.

So far, twelve exploitation outcomes are presented in this deliverable. Their development stage varies, since some of them are services that were further developed over existing ones, while the rest are new services/software that are now being developed. Hence, their readiness pertaining their price or time to market may still be unknown.

As per the content, half of the products are training programmes, referring to all driver's type, particularly PT drivers, professional drivers and also driving instructors, as well as rail, automated ship and drone operators. All training programmes are part of A4.3 "Training programmes per user cluster and sentiment analysis". Apart from the training programmes, other software tools and platforms will be developed, pertaining to AV technologies, AV acceptance and modelling of drivers' behaviour. These products are included on WP2, and particularly in Activities A2.3: Simulation platform suite creation and scenarios realization, A2.4: Behavioural models, A2.5: Sentiment analysis on social media, but also in A3.6: HMI development, A4.2: VR/AR and multimedia training and awareness tools.

The market around AVs and their applications is competitive, while at the same time there are a lot to be researched and tested before establishing AVs. Drive2theFuture exploitable outcomes address all transport modes, and thus are challenged by a variety of markets.

## D8.4: Exploitations Plans

### Annex I: Drive2theFuture Exploitation Plan template

<b>WP/Activity/Pilot</b>	
<b>Partner</b>	
<b>Exploitable outcome</b>	
<b>Type of product</b> <i>(software/service – new/extension of existing, choose from drop down menu)</i>	<input type="checkbox"/> Software Choose an item. <input type="checkbox"/> Service Choose an item. <input type="checkbox"/> Other (please specify): Choose an item.
<b>Short description of the product</b> <i>(approx. 2 paragraphs)</i>	
<b>Background as know-how</b> <i>(What were you doing/selling before?)</i>	
<b>Estimated price (€)</b>	
<b>Estimated time to market</b> <i>(after the project end)</i>	

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WP/Activity/Pilot	
<b>Type of exploitation (only for training services)</b>	<input type="checkbox"/> Public ( <i>open to the public and free</i> ) <input type="checkbox"/> Private Internal ( <i>for training of the personnel of the organization that developed the course</i> ) <input type="checkbox"/> Private – Sales B2C ( <i>developer to sell training hours of vocational training or training to be provided by members of the owner organization</i> ) <input type="checkbox"/> Private – Sales B2B ( <i>developer to sell the content of the course to other organization/universities or offer it with a fee for a specific time</i> )
<b>Exploitation route</b> <i>(Describe cooperation/partnerships with members of the Consortium and/or outside the Consortium regarding the production/development and/or selling of the product/service)</i>	
<b>Business proposition</b> <i>(In which industry will the product/ service be used? How?)</i>	
<b>Market Potential</b> <i>(How is the market formed around this product? How big of a need is there for the product? Description of competition?)</i>	
<b>Market Risks</b> <i>(What are the possible obstacles? What could negatively affect the implementation and introduction of the product?)</i>	