HARMONY
SPATIAL & TRANSPORT PLANNING FOR A NEW MOBILITY ERA

Holistic Approach for Providing Spatial & Transport Planning Tools and Evidence to Metropolitan and Regional Authorities to Lead a Sustainable Transition to a New Mobility Era

D 10.13 Brief final Exploitation plan

Submission date: 30/12/2022

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This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement Nº815269.n HARMONY is a project under the CIVITAS Initiative, an EU-funded programme working to make sustainable and smart mobility a reality for all. Read more - civitas.eu. "

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SUMMARY SHEET

PROJECT

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
CA	Consortium Agreement
D	Deliverable
DEIC	Dissemination, Exploitation and Innovation Committee
EC	European Commission
ER	Exploitable Result
GA	Grant Agreement
GR	Greece
IP	Intellectual Property
IPR	Intellectual Property Rights
IT	Italy
KPI	Key Performance Indicator
MS	Model Suit
NL	Netherlands
NUTS	Nomenclature of Territorial Units for Statistics or Nomenclature des Unités Territoriales Statistiques
PL	Poland
SUMP	Sustainable Urban Mobility Planning
SWOT	Strengths, Weaknesses, Opportunities, Threats
T	Task
TRL	Technology Readiness Level
UK	United Kingdom
WP	Work Package
CA	Consortium Agreement

EXECUTIVE SUMMARY

The HARMONY aims to develop a new generation of harmonised spatial and multimodal transport planning tools that fully model the dynamics of changing transportation sectors and spatial organization, allowing metropolitan area authorities to lead the transition to a low-carbon new mobility era in a sustainable way.

The objective of WP10 is to effectively spread knowledge and information about the project research and innovation outcomes and results (O9). Within WP10, T10.5 ¨Exploitation Management & IPR Strategy¨ aims to ensure the sustainability of the project's results beyond the project lifetime. The key objectives of innovation management are:

- analyse and follow relevant market developments, assessing the market potential for the HARMONY solutions.
- develop and validate new business models based on the HARMONY outcomes.
- drive technical developments towards business-relevant solutions, by providing coordinated feedback on business models viability and market take-up strategies to the other WP.
- develop and support implementation of the Exploitation Plans for the HARMONY solutions and technologies.
- support the exploitation of knowledge assets developed in the project by the interested scientific and industry communities.

In line with WP10 and T10.5 activities, the aim of D10.13 ¨Brief final exploitation plan¨ is to provide a summary of the Final Exploitation plan (D10.12). The report provides a summary of the methodology used as to manage and exploit the project results. The aim of the deliverable is to provide high level information about the individual and joint results of the project, both commercial (Assets) and non-commercial (Knowledge) as well as the maturity level and target users or clients of assets.

The first chapter of the report covers the problem, the solution HARMONY offers, purpose and scope of the deliverable, and the relationship of the report with other WPs and deliverables. The second chapter provides more details on the exploitation plan. It explains the six-step methodology used in the HARMONY project to manage innovation. The exploitation strategy of the HARMONY covers both commercial and non-commercial exploitation and identifies the exploitable assets under each group. In total 25 commercial results and 24 non-commercial results are identified during the life span of the project. Detailed information type of results, maturity level and target customer are provided in section three. The joint commercial exploitable assets are further classified in three groups of software tools, services, and the HARMONY brand in section four. Since all these assets are commercialized by MobyX under the umbrella of the HARMONY MS, a business plan has been elaborated which is confidential, but some sections of this business plan as problem, solution, product, benefits, and features is included in this report. The complete version of the business plan will be included in D10.12. In section five, some conclusions are presented to rap-up the report.

1. Introduction

1.1 HARMONY Value Proposition

1.1.1 Problem Statement

With the advent of emerging technology and mobility services aimed at a sustainable transition to a low-carbon and new age of mobility, the authorities are confronted with the task of harmonizing their integration with the existing plans for space and transport. At the proposal stage, we identified that in regional and urban policy making, the value of integrated spatial and transport planning arises from the profoundly interdependent relationship between land-use, transport demand and transport supply. Through the interviews conducted with cities and modelers in Task1.3 (the results will be part of D1.4), it is confirmed that most planners use standalone models at different levels (if accessible) to get the evidence required to do transport and spatial planning. The implementation of an integrated approach gives authorities the opportunity to direct urban growth towards economic competitiveness, social stability, mobility, and environmental sustainability at the same time.

1.1.2 Solution: The Harmony Framework

HARMONY aims to build a new generation of harmonized spatial and multimodal transport planning tools that comprehensively model the evolving dynamics of the transport and spatial organizations, enabling the authorities of the metropolitan area to sustainably lead the transition to a new age of low-carbon mobility. HARMONY consists of many exploitable results, one of which is the HARMONY MS, which enables the integration of different simulation models that can enable the users to analyse the impact of emerging mobility systems. The HARMONY model suite is a multi-scale, software-agnostic, integrated activity-based model framework. This platform enables end-users to link independent models and analyse a portfolio of regional and urban interventions for both passenger and freight mobility by integrating land-use models (strategic/long-term), people and freight activity-based models (tactical/mid-term), and multimodal network (operational/short-term) models allowing for vertical planning. Policies and capital investments, land-use configurations, economic and sociodemographic assumptions, travel demand management techniques, and emerging mobility service models are all examples of interventions. The key aim of the model system's architecture is to allow for the assessment of such initiatives in terms of their effect on land use, economic development, transportation networks, electricity, vehicular noise, and pollution, while also presenting guidelines for new mobility era of Sustainable Urban Mobility Plans (SUMPs). Furthermore, some other activities as co-creation labs, demonstrations, and trainings are planned to achieve this project objectives. Through pilots in six metropolitan areas of Rotterdam (NL), Oxfordshire (UK), Turin (IT), Athens (GR), Trikala (GR), Upper Silesian-Zaglebie Metropolis (PL), the HARMONY evaluates the impact of different modelling exercises on spatial and transport planning scenarios and will also define the needs and requirements of potential customers for such an integrated platform (D1.4) and will elaborate a commercial strategy to ensure the usability of the results during and after the project life-cycle.

1.2 Purpose and Scope of the Deliverable

The aim of the deliverable D10.13 "Brief final exploitation Plan" is to present a brief public version of the Final Exploitation plan to be disseminated at the HARMONY final project conference planned for M45. The complete and final version of the exploitation plan (D10.12) is confidential and thus only targets the project partners and EC. To give an overview of the results to other stakeholders, D10.13 provides a brief summary of both commercial and non-commercial exploitable results of the project.

To this achievement, all consortium members contributed by declaring their exploitation objectives according to the strategic interests of their organizations. In order to grasp the HARMONY's exploitation strategy, it is important to emphasize that exploitation applies to the overall use of project results. Meaning that both commercial and non-commercial exploitation have been taken into consideration; thus, opening the scope of application of results at different levels and in different domains. While commercial exploitation is more related to taking results to the market, non-commercial exploitation (the exploitation of knowledge assets) is more related to the effective use of knowledge, know-how, methodologies, or standards.

1.3 Relationship to other WPs and Deliverable Roadmap

This deliverable is produced as part of the activities of work package 10 – "Dissemination, Exploitation and Innovation Management", under Task 10.5. As mentioned before, this report is based on the final exploitation plan, D10.12, which is a confidential report and can only be accessed by consortium members and commission services. D10.13 provides a summary of the HARMONY's exploitable results and the envisioned routes for their exploitation.

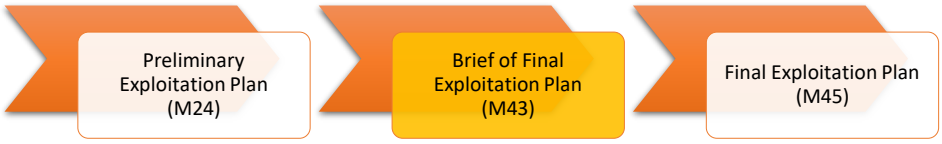

Figure 1 Roadmap of the deliverable

2. Exploitation Methodology

According to the European Commission (EC), exploitation is defined as the utilisation of results in further research activities other than those covered by the action concerned, or in developing, creating, and marketing a product or process, or in creating and providing a service, or in standardisation activities [1]. The goal of exploitation in the HARMONY is to ensure the sustainability of the project's results beyond the project end and to demonstrate how the HARMONY has influenced the EU landscape.

Based on exploitation guide of the EC, exploitation can be commercial, societal, political, or for improving public knowledge and action.[2] Project partners can exploit the results themselves or facilitate exploitation by others as it will be explained in the following subsections.

The HARMONY employs a 6-step exploitation methodology as described in D10.7 over the lifespan of the project.

Commented [GU1]: Have these steps (1-5) been reported in a previous deliverable? if yes, then we should at least add some references.

Step 1: Investigation of all relevant market segments, considering marketing studies and socio-economic research and carrying out complementary primary research where required.

Step 2: Analysis of related, complementary, and competing products and services in the market and wider community.

Step 3: Setting up of deployment scenarios, market and business models for individual exploitation as well as for joint exploitation, specifying collaboration roles, costs and revenue flows, thus enabling calculation of the net return over time for each type of market player, being commercial or public.

Step 4: Validation of business models and deployment scenarios within the consortium.

Step 5: Organization, planning and execution of wide impact communication activities to create full awareness of the HARMONY goals, approach and results within various target groups: public transport operators, logistics companies, road authorities, regional and city authorities, mobility product vendors, engineering tools developers, associations citizens and transportation, research community, and other public entities related to mobility and transport; establishing contact with key European and international third parties for exploitation.

Step 6: Regular review, revision and refinement of partner-specific exploitation plans and joint collaborative business plans in the light of interim project results (under the supervision of DEIC); as well as formalization of service level and other appropriate agreements for joint exploitation among

[1] http://ec.europa.eu/research/participants/portal/desktop/en/support/reference_terms.html
[2] https://ec.europa.eu/research/participants/data/ref/h2020/other/events/2017-03-01/8_result-dissemination-exploitation.pdf

partners and third parties, including possible creation of new legal entities (joint ventures), licencing, and open source, both direct and indirect commercialization.

As a result of implementing this methodology, we have been able to effectively identify, manage and take the first steps towards the exploitation of the results of the project.

3. HARMONY Individual Exploitable Results

To update the exploitable results of the project, a questionnaire as well as an excel sheet “Exploitation Results Inventory” was distributed among partners. Based on the inputs received from the partners, the results were categorized in commercial and non/commercial results. The list was updated periodically partners and new assets were added. In the following subsections, table 1 and table 5 provide the updated list of both commercial and non-commercial results of as well as information about the leading organization and a brief description.

3.1 Commercial Exploitable Results

Commercial exploitation is the exploitation of products and services developed throughout the project that have commercial potential and can generate revenues to partner(s) involved. The results can be independent outputs/innovations/products/technologies, as well as part of the product/service that can be exploited as standalone exploitable result. [3]

In total, 26 commercial exploitable results that have been identified during the lifetime of the project. Table 1 provides information about the partner developing the technology as well as a short description.

[3] ESRIUM Exploitation Handbook

Commercial Exploitable Results			
ID	**ER title**	**Entity**	**Description**
ER_01	Aimsun Ride platform for agent-based simulation of new mobility systems	Aimsun	The Aimsun Ride simulation platform (a plug-in of the Aimsun Next simulator) for new (on-demand and shared) mobility and logistics systems is an advanced tool aiming to enable cities to deploy and test various scenarios related to new shared mobility applications (such as Demand Responsive Transport (DRT), car-sharing, bike-sharing and car-pooling, microhubs, cargo bikes). Scenarios can be defined and evaluated in order to explore different aspects of the provision of a mobility/logistics service. The investigated aspects relate to both the fleet operators as well as the users of the system. At the fleet operator´s level the platform provides the possibility for assessing alternative trip plans. At the user´s level, different preferences and expectations on the services performance can be investigated. The simulation platform is enhanced with the integration and interoperability of the new models developed within the HARMONY project to enable the modelling and simulation of the agent-based demand for new mobility and freight transport systems. A suitable interface between Aimsun Ride and external operational models is implemented to make the interaction between the models feasible and simulate the service demand according to the optimized trip plans.
ER_02	City Traffic & Transport System evolvement to the 3rd dimension	Airbus	The Fortion®1Sky UTM software application has been configured and enriched with new interfaces to the drone and mission planning software from GRIFF aviation. The software Fortion®1Sky UTM is part of the Airbus Defence and Space software product family Fortion®1Sky.
ER_03	Urban Drone Flight Planning & Coordination Services	Airbus	Urgent needed initial services for very low-level air traffic coordination are: Aeronautical Data Handling (City) Airspace Planning and Management Drone/Flight Trajectory Management & Coordination. These Services can be supported by Airbus` software application Fortion®1Sky UTM. Re-using standardised aviation data formats will ease any data exchange and coordination with ATM/ATC.
ER_04	Planning & Simulation supporting green environment	Airbus	Opening a perspective for the Harmony modelling suite and simulation tools. (Building upon global aviation related standards.) Smart coordination of ground and airborne transport, avoiding traffic congestion and allowing for direct flight routing, to enable green(er) transportation services.
ER_05	Drone Transport Services	Airbus	Transfer heavy load in a widely automated process as a delivery service
ER_06	Setting European Standard for 3d traffic and transport in cities	Airbus/all	Harmony can/could relay concept about the integration of vll (very low level) air traffic into (smart) city traffic and transport system planning and management to EC (DG-Move) and in that way bridge between DG-Move and Aviation (EASA, Eurocontrol). Shaping U-Space regulation in the sense of the cities.

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ER_07	Evolve on Ship aerial delivery service(s)	Airbus/all	Harmony can/could open opportunities for aerial delivery service development to ships and vessels for example at Rotterdam harbour.
ER_08	Training Material	ENIDE	Audio-visual and electronic-based guidelines for applying and using the MS. The manual will present the state-of-the-art methodologies that have been developed for integrated regional spatial and transport planning and incorporation of new mobility services
ER_9	HARMONY MS	MobyX	The HARMONY MS product is a novel, multimodal, agent-based software solution that runs as a web-based application and has transport planners, consultants, researchers, modelers, decision makers, academics, etc. as its end-users.
ER_10	HARMONY MS Lite	MobyX	The HARMONY MS product is a novel, multimodal, agent-based software solution that runs as a web-based application and has transport planners, consultants, researchers, modelers, decision makers, academics, etc. as its end-users.
ER_11	Data Collection Tools/MobyX App	MobyX	MobyX App is an automated survey system and platform for collecting extensive multi-day data on travel and activity patterns (i.e., number of trips, locations visited, purpose of trip, arrival/departure time, mode used for each trip etc.) for use in urban and transportation planning, analysis, and modelling.
ER_12	Regional economic model	TRT	The objective of the model is to generate future employment (including services, health and educational activities) which structure the demand for physical travel.
ER_13	Tactical Freight Simulator (TFS)	TUD+Sig	A set of econometric choice models for logistic decision making
ER_14	Long term agent and household choice models	UAEGEAN	A set of econometric models exploring and quantifying long-term household and individual decisions such as vehicle ownership or residential choice
ER_15	Tactical Passenger Simulator sub-models	UAEGEAN	A set of econometric models which model, predict and codify everyday travel and activity-related behaviour of individuals. Include temporal models (time-of-day), spatial models (destination choice), mode choice, joint decisions and other sub-models
ER_16	Adaptive Scheduler: Software module of the TPS	UAEGEAN	A software component coded in R which performs the prediction and simulation part of the modelling conducted in TPS and schedules the detailed daily agent schedules based on rule-based input or specification interface open to the user.
ER_17	HARMONY MS - Strategic simulator: LUTI Model	UCL Casa	The model is composed of a set of spatial interaction sub-models each of which models the flow of one activity located at an origin to another type of activity at a destination. These are conceived of as demand at the origin moving to supply at the destination. The model is based on relating different sectors – workplaces, retail centres, schools and health centres – through coupled interaction models based on gravitational principles or their equivalent in terms of discrete choices, and these sectors are tied together through economic and demographic relationships. The LUTI model will measure aggregate interaction patterns that show the

			relative spatial dependence of any one zone on any other. A demographic model and land development model are also being built to link the various sectors of the LUTI model together and to the tactical level of the Harmony suite. The Land-Use Transport-Interaction model belongs to the Strategic Simulator of the HARMONY MS.
ER_18	Mobility Tool Ownership Model	UCL MaaSLab	The objective of this model is to predict the mobility tool ownership behaviour of individuals. It predicts if households are going to purchase or lease a private vehicle, or if they are going to buy any other mobility products such as subscriptions to car or bike sharing schemes, public transport cards, or if they are going to use Mobility as a Service products. The Mobility Tool Ownership model consists of a series of econometric models that are interrelated. It allows users to check what the impact on car ownership and mobility tool ownership will be under various scenarios. The Mobility Tool Ownership belongs to the long-term models of the Tactical Passenger Simulator of the HARMONY MS.
ER_19	Dynamic Travel Behaviour Model	UCL MaaSLab	The objective of this model is to predict how and if people change their travel behaviour within a day when they receive real time information. Nowadays several mobile apps offer real time information to travellers and events such as traffic jams or other delays may make travellers to change their initial travel decisions. This model predicts if individuals change their departure time and transport mode within a day given also the specific trip purpose (i.e., work, leisure etc.). The Dynamic Travel Behaviour model consists of a series of models that are based on behavioural economics and machine learning techniques. It allows users to check what the impact of several unexpected events and real time information on travel behaviour is. The Dynamic Travel Behaviour Model belongs to the Tactical Passenger Simulator of the HARMONY MS.
ER_20	Multimodal Controller	UCL MaaSLab	The Multimodal Controller simulates and integrates the operation of innovative mobility services, connected vehicles and telematics platforms. Offers capabilities for co-ordination and operation of different transport modes, while also testing several operational scenarios, such as fleet-size, waiting times etc. It also offers nowcasting capabilities regarding agents' behaviour and networks conditions. The Multimodal Controller belongs to the Operational Simulator of the HARMONY MS.
ER_21	Urban Air Mobility Public Acceptance Terrain	UCL MaaSLab	The UAM Public Acceptance Terrain is a platform that investigates citizens' acceptance of several UAM use cases/ services. The platform uses visualisation to communicate to citizens a series of UAM use cases and explores their level of acceptance. The visualisation includes several factors that may affect the acceptance level of citizens such as type of products

			delivered, landing place, licensed drone operators etc. The platform will be available in English, Polish, Greek and Chinese.
ER_22	Urban Air Mobility Readiness Index	UCL MaaSLab	The UAM Readiness Index supports authorities to identify what they should do to introduce UAM services. It provides an assessment of if cities/regions are prepared for the adoption and implementation of Urban Air Mobility. It consists of three sections: i. public acceptance terrain (as described above), ii. national policy, and iii. local context. The national policy section is aligned with the U Space Monitoring Reports of EASA and the Local Context is captured by stakeholder surveys.
ER_23	Freight controller for operational	UoW	The aim of the work is to develop a freight controller that will facilitate the modelling and simulation of innovative freight mobility services. This will be developed as a component that can be integrated to the overall Harmony MS.
ER_24	Nowcasting model	UoW	This component enables the integration of real-time data as part of a simulation model. The developed integration approach allows the on-the-fly modelling of events (i.e., accidents) and their simulation for operational level analysis. The developed component incorporates different machine learning models with classification functionality for distinguishing and processing different types of events.
ER_25	Demographic forecasting model Lite	TRT	The objective of the model is to estimate population and households' trend in the metropolitan area

Table 1 Commercial Exploitable Results Inventory

3.1.1 Types of Commercial Exploitable Results

In order to classify the commercial results, partners were asked to choose from a list of type of commercial results (Annex 1) and categorize their own technology. The main types of commercial results were commercial solution, prototype, demonstration, trainings, software, models and toolkit. Table 2 provides an overview of each ER with their respective classification.

ID	ER title	Type of ER
ER_01	Aimsun Ride platform for agent-based simulation of new mobility systems	Commercial solution
ER_02	City Traffic & Transport System evolvement to the 3rd dimension	Prototype
ER_03	Urban Drone Flight Planning & Coordination Services	Prototype
ER_04	Planning & Simulation supporting green environment	Prototype
ER_05	Drone Transport Services	Demonstrator
ER_06	Setting European Standard for 3d traffic and transport in cities	Prototype
ER_07	Evolve on Ship aerial delivery service(s)	Prototype
ER_08	Training Material	Trainings
ER_09	HARMONY MS	Software
ER_10	HARMONY MS Lite	Software
ER_11	Data Collection Tools/MobyX App	Software
ER_12	Regional economic model	Software
ER_13	Tactical Freight Simulator (TFS)	Tool/Tool kit/tool box
ER_14	Long term agent and household choice models	Model
ER_15	Tactical Passenger Simulator sub-models	Model
ER_16	Adaptive Scheduler: Software module of the TPS	Software
ER_17	HARMONY MS - Strategic simulator: LUTI Model	Model
ER_18	Mobility Tool Ownership Model	Model
ER_19	Dynamic Travel Behaviour Model	Model
ER_20	Multimodal Controller	Model
ER_21	Urban Air Mobility Public Acceptance Terrain	Model
ER_22	Urban Air Mobility Readiness Index	Model
ER_23	Freight controller for operational	Software
ER_24	Nowcasting model	Software
ER_25	Demographic forecasting model Lite	Software

Table 2 Classification of Commercial Exploitable Results

3.1.2 Technology Maturity

According to Technology Readiness Levels, there are 9 levels of technology readiness, from a research stage starting at 1, being a basic principles/ideas observation to a deployment and commercialization stage ending at 9, meaning that the system/product has been proven in an operational environment 4. All technologies developed within HARMONY, are expected to reach high levels of TRLs, between 6 to 9, as it can be seen in table 3 (only ER_23 expects to reach a level of 5).

ID	ER title	TRL (M1)	TRL (M45)
ER_01	Aimsun Ride platform for agent-based simulation of new mobility systems	9	9
ER_02	City Traffic & Transport System evolvement to the 3rd dimension	4	7
ER_03	Urban Drone Flight Planning & Coordination Services	4	7
ER_04	Planning & Simulation supporting green environment	4	Tbd
ER_05	Drone Transport Services	4	7
ER_06	Setting European Standard for 3d traffic and transport in cities	N/A	N/A
ER_07	Evolve on Ship aerial delivery service(s)	4	7

[4] https://www.twi-global.com/technical-knowledge/faqs/technology-readiness-levels

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ER_08	Training Material	2	7
ER_09	HARMONY MS	2	7
ER_10	HARMONY MS Lite	1	7
ER_11	Data Collection Tools/MobyX App	7	9
ER_12	Regional economic model	3	7
ER_13	Tactical Freight Simulator (TFS)	6	7-8
ER_14	Long term agent and household choice models	4	7
ER_15	Tactical Passenger Simulator sub-models	4	7
ER_16	Adaptive Scheduler: Software module of the TPS	4	6
ER_17	HARMONY MS - Strategic simulator: LUTI Model	5	7
ER_18	Mobility Tool Ownership Model	0	7
ER_19	Dynamic Travel Behaviour Model	0	7
ER_20	Multimodal Controller	3	7
ER_21	Urban Air Mobility Public Acceptance Terrain	0	7
ER_22	Urban Air Mobility Readiness Index	0	5
ER_23	Freight controller for operational	4	7
ER_24	Nowcasting model	4	7
ER_25	Demographic forecasting model Lite	3	7

Table 3 Technology Maturity

3.1.3 Target User/Client

In table 4, the targeted clients or end users are described. Given the essence of the project, the most important potential clients consider cities and public authorities, but also modellers, research centres, universities, and consultancy firms.

ID	ER title	Target User/Client
ER_01	Aimsun Ride platform for agent-based simulation of new mobility systems	• Transport agencies, including metropolitan and local transport authorities, operators, as well as municipalities that have as a goal to ensure the viability of their city through a resilient and accessible mobility system. • Non-mobility investors, such as technology and financial companies, wishing to get into urban mobility
ER_02	City Traffic & Transport System evolvement to the 3rd dimension	U-Space Coordinators, U-Space Service Providers, City councils, Aerial Transport Coordinators, Airports, Harbours, (Responsible) Airspace Managers, Freight Terminals.
ER_03	Urban Drone Flight Planning & Coordination Services	
ER_04	Planning & Simulation supporting green environment	
ER_05	Drone Transport Services	
ER_06	Setting European Standard for 3d traffic and transport in cities	
ER_07	Evolve on Ship aerial delivery service(s)	
ER_08	Training Material	Modelers, traffic planners, Public Authorities
ER_09	HARMONY MS	• Metropolitan / Public Authorities • Consultancy firms • Researchers: University researchers teaching or investigating topics related to spatial and transport planning and traffic management
ER_10	HARMONY MS Lite	
ER_11	Data Collection Tools/MobyX App	• City halls and traffic and transportation public administrative • Universities and research centres

ER_12	Regional economic model	Urban and transport planning authorities; Transport operators; Mobility service providers
ER_13	Tactical Freight Simulator (TFS)	Researchers, Consultants
ER_14	Long term agent and household choice models	
ER_15	Tactical Passenger Simulator sub-models	
ER_16	Adaptive Scheduler: Software module of the TPS	
ER_17	HARMONY MS - Strategic simulator: LUTI Model	Academics, researchers, urban planners, transport planners.
ER_18	Mobility Tool Ownership Model	
ER_19	Dynamic Travel Behaviour Model	Urban and transport planning authorities; Transport operators; Mobility service providers
ER_20	Multimodal Controller	
ER_21	Urban Air Mobility Public Acceptance Terrain	
ER_22	Urban Air Mobility Readiness Index	The UAM Readiness Index will target national and regional/metropolitan authorities worldwide.
ER_23	Freight controller for operational	Target market is transport simulation/modelling solution providers and the potential of the developed controller to be integrated in their existing software suites will be explored.
ER_24	Nowcasting model	
ER_25	Demographic forecasting model Lite	Urban and transport planning authorities; Transport operators; Mobility service providers

Table 4 Target User/Client

3.2 Non-commercial Exploitable Results

The non-commercial/knowledge assets identified includes know-how, methodologies, design, and primitives (primarily found in deliverables and papers), privacy metrices, open-source data, publications, lessons learnt and experiences. There are 24 results that are included in this category, which are detailed in table 5:

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Non-commercial exploitable results			
ID	KR title	Entity	Description
KR_01	knowledge, experience, training, and consultancy	UCL	UCL has gained further knowledge on: 1. developing land use and transport models that can be applied in any context; 2. developing mobility tool ownership models that take into account a sequence of choices (i.e. own or dispose cars; purchase subscription services etc.); 3. developing dynamic travel demand models; 4. vehicle stock and emission models; 5. developing passenger multimodal operational controllers. In addition, UCL acquired further knowledge on: 1. project management under crisis; 2. dissemination approaches; 3. organising training courses for students and professionals; 4. organising co-creation activities; and 5. setting up drone demonstrations. Finally, UCL's knowledge was advanced in terms of: 1. using state of the are tools tools to collect travel demand data; 2. designing surveys on smartphone travel survey platforms; and 3. working with software developers and stakeholders to develop a software (the HARMONY MS platform).
KR_02	Knowledge, experience, and training	TUD	TUD has further developed its knowledge and expertise on the development of multi-agent simulation systems for city logistics. Also, relevant experience was gathered in the simulation use-cases (zero emission zones, urban micro hubs, crowd-shipping, logistic facilities planning) and demonstration with autonomous delivery robots.
KR_03	Knowledge, experience and training	UAEGEAN	UAEGEAN leads WP5, which develops the Tactical Passenger Simulator and all travel and activity models, as well as a series of long-term models. The models developed under WP5 advanced significantly the knowledge and experience of the UAEGEAN team in a) understanding and transforming location data to utilize in the context of building an ABM; b) realizing the barriers and opportunities of developing an adapted scheduler for an ABM, tailored to city-specific needs and c) developing innovative discrete choice and other similar methodological models for future modes and concepts
KR_04	Knowledge, experience and training	UOW	UoW leads WP7 which deals with the development of the operational layer of the HARMONY MS platform. As part of our work, we developed knowledge in the following (a) models and approaches for simulating freight demand at operational level, (b) integration of modelling tools targeting different levels of analysis (ie. tactical vs operational), (c) integration of real-time data into operational simulations as part of nowcasting modelling.
KR_05	Knowledge, experiences and consultancy services	ICCS	ICCS is leading WP3 on Data collection tools, data fusion and warehousing. The knowledge we gained from this work is knowledge on input and output interfaces for data to be used at any spatial and transport context (not only specific to the HARMONY model suite)

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KR_06	Knowledge, experiences and consultancy services	AIMS	Aimsun has gained knowledge on agent-based solutions for operational and traffic simulations for new mobility ecosystems (MaaS, UAM, on demand and shared services), as well as flexible interoperability designs to accommodate integration of our solutions with a wide range of models and simulators for multi-scale planning.
KR_07	Training material, Knowledge, Methodology, Toolkit	TRT	TRT is involved in different WPs of the Harmony project: the development of the regional economy model, the support for the implementation of Harmony Model Suite in the Turin case pilot and the preparation of the policy recommendations for SUMPs in urban and metropolitan areas. Following the variety of tasks there are different fields where we refined our previous (or acquired new) knowledge: 1) state-of-the-art urban transport modelling techniques; 2) data collection methodologies ofr eliciting passenger transport behaviour; 3) GIS methods for presenting transport model results; 4) software programming competences for integrating different tools; 5) policy measures for sustainable urban transport with specific focus on new mobility services.
KR_08	Training material, Knowledge, experience, Toolkit	ENIDE	ENIDE is leading the HARMONY exploitation, communication, and dissemination activities in as well as the user requirement and business model development. Thus, we have acquired - new knowledge on SUMPs, smart cities, MaaS, transport planning related technologies and business models, needs and requirements of stakeholders regarding different moods for transport, tools for planning and decision making. - more expertise in leading and management of EU funded projects - new contacts: we have been able to widen our network and get connected to different ITS stakeholders
KR_09	Knowledge, experiences, and consultancy services	SIGNIF	Significance TUD has further developed its knowledge and expertise on the implementation of multi-agent simulation systems for city logistics. Also, relevant experience was gathered in the simulation use-cases (zero emission zones, urban micro hubs, crowd-shipping, logistic facilities planning).
KR_10	Knowledge, experiences and consultancy services	AIRBUS	Airbus is working on SESAR and U-Space topics. Expertise gained from collaboration with GRIFF Aviation and from Oxford drone trials will be used in drone and low-level airspace related working environments. Main learning from the HARMONY: • Cities (in terms of data structure, protocols, processes and ways of coordination need time for further development of a combined approach for integrated solution(s).

KR_11	Knowledge, experiences and consultancy services	TNO	TNO is leading WP9 about the demonstrations and task lead of task 8.5. The knowledge we gained from this work is knowledge on the outcomes of the pilots and knowledge on the roadmap to support authorities in the transition to the new mobility services era.
KR_12	Knowledge and experience	Moby X	MobyX is responsible for the HARMONY MS software. Through the HARMONY, MobyX developed knowledge on: 1. collaborating with actors from different sectors and setting up workshops with them to derive requirements for the software design and the UX aspects of it.; 2. working with survey companies that utilised the MobyX app to collect travel demand data.; 3. working with transport modellers and supporting them on how their models can be hosted on the platform.; 4. improving the software documentation and quality to be accessible to more users.; 5. providing teaching for students and practitioners to learn how to use the software we developed. In addition, as a start-up company, we developed valuable knowledge in project management, business administration, and exploitation of our assets.
KR_13	Knowledge and experience	AUCM	Short-term (Project lifespan+2years) exploitation vision Integration of the open platform Geografie Metropolitane. It's a platform describing Torino and its metropolitan area, interlinking physical and socioeconomic dimensions. Through a series of maps, urban phenomena are geo referenced, traced back to the areas they're related to. It's an open access, dynamic, transversal and updated tool focusing on six thematic domains: people, services, culture, mobility, environment and economics and at the moment the mobility part is "under construction", still needing more contents.
KR_14	Knowledge and experience	GRIFF	GRIFF Aviation develops, designs and manufacture heavy lifting UAVs for the industrial market. GRIFF Aviation main job in the HARMONY is to work alongside Airbus to deliver a flying platform for the HARMONY project. We deliver the expertise around using a UAV in areas where it is needed to fly cargo from A to B. So far in the HARMONY project we have learned: • New knowledge on smart cities • New knowledge on EU funded projects like the HARMONY • How these projects might and will benefit society • How we in the future might join other EU funded projects
KR_15	Knowledge, experience, regulatory processes, policy planning	OCC	Oxfordshire County Council will use the HARMONY MS to help focus on land use and transport interaction at a strategic, tactical, and operational level. These models will work in sync with the comprehensive model that is being built at OCC. The trial of new mobility technologies (drones, EVs) will provide a framework for future use cases on a broader scale. It will also help local authorities understand the regulatory processes and protocols needed to follow to conduct these trials smoothly.

KR_16	Training services, consultant services	ETRIK	knowledge, services training services or consulting services on organising urban mobility pilots for medical or other reasons. The purpose will be to modernise the existing mobility systems and services and provide air mobility possibilities, mainly for freight. The innovation components are the participatory process of co-creating the mobility path as well as the integration of air and ground means on urban mobility.
KR_17	Model, Knowledge, experience	CDT	The City of Turin and the traffic and traffic offices expect to use the innovative integrated transport model also for other urban changes that will affect the city. This is the most replicable result of the Harmony project for the City of Turin.
KR_18	Model, Knowledge, experience	GROT	The City of Rotterdam (i.e., the Mobility Department) will use the HARMONY MS (specifically the TFS and OFS modules) to develop and evaluate urban freight policy measures.
KR_19	Software (HARMONY MS platform)	OASA	OASA aims at exploiting the results of the HARMONY project and the HARMONY MS platform for transportation planning purposes. With this platform, OASA will have the chance to test different mobility solutions and make the necessary modifications of their parameters before actually proceeding with the implementation of the respective measures on the network.
KR_20	Models (Strategic- and operational-level models)		Through the HARMONY project, several strategic- and operational-level models have been developed for the city of Athens. These include the strategic-level Athens LUTI and regional economy models, as well as the operational-level models developed for public transport electrification, autonomous vehicles (AVs) and micro mobility schemes.
KR_21	Other (Use of the HARMONY MS platform in other research programs)		With its long-lived experience in public transport operation, its extensive service network and its well-trained employees, OASA can provide added value to a research project and gain insights on transportation-related issues from the respective conclusions reached.
KR_22	Other (Use of the HARMONY MS platform for the development of a MaaS system)		The HARMONY MS platform can possibly be used as a testbed for the planning and analysis of the operation of a MaaS system in Athens. Since such a system has not yet been realized, planning and testing its operation on a virtual environment could prove useful, given the absence of experience on this type of service.

KR_23	Policy changes		Since transportation is involved in all aspects of human activities, it can be used as an instrument to promote policy changes. Apart from its role in environmental protection, transportation has an equally important in terms of promoting social equity (e.g., through measures such as DRT, extensive public transport network, appropriately formulated fare system). This type of initiatives would be useful to first be simulated in a virtual environment and then be realized on the network.
KR_24	Knowledge and experience, policy changes, SUMP input	GZM	GZM, as a T9.7. leader - follower city, gained knowledge in the areas of 1. sustainable urban transport solutions, 2. best practices from Athens, Turin, Rotterdam, Oxfordshire, Trikala in implementing the use of autonomous vehicles (including UAVs) in the urban ecosystem. 3. Through the project, GZM gained further knowledge how to engages urban experts in the areas of sustainable transport planning, urban planning, blue-green infrastructure. 4. GZM developed new skills in organising co-creation activities (especially the hybrid workshops).

Table 5 Non-commercial Exploitable Results

4. HARMONY Joint Exploitable results

In this section we firstly explain the HARMONY Joint Exploitable results and then the initial commercialization plan for the HARMONY MS, followed by a description of the technology to be commercialized, considering the problem that it solves, the solution that we offer, the product description and the benefits /features of the platform.

4.1 HARMONY Joint Exploitable Results

There are three main commercial joint exploitable results in the HARMONY:

1. Software tools including:
    a. HARMONY Model Suite
    b. Some Models/simulators
2. Services (training and consultancy)
3. HARMONY brand.

Even though they are identified as three different results, the three results will be commercialized inside the HARMONY MS, as part of the platform.

We have excluded Data collection Tools and Air Traffic Network Controller as they are individual exploitable results owned by MobyX and Airbus respectively. Models and simulators are part of the HARMONY Model Suite and are commercialized a single solution, as we previously stated; however, there will not be IP problems since models and simulators can be exploited by the partners independently that have developed and contributed to the development of each one of the models. As mentioned before, services and the HARMONY brand will be commercialized with the HARMONY Model Suite (consultancy and trainings will be offered as extra services).

After several discussions on the exploitation plans, the decision has been that MobyX will be the one in charge of commercializing the HARMONY MS as a whole solution, including software tools, services (training and consultancy) and the HARMONY brand. Below, we explain the commercialization strategy for the HARMONY MS.

4.2 Preliminary commercialization plan of the HARMONY MS

There are different ways of commercializing the HARMONY MS. It is usually suggested that the project's findings be commercialized by the project's partners. If no partner is willing to take on the obligation, or if the consortium is unable to reach an agreement, commercialization by or via third parties should be considered. To find out the best strategy, we started with the question ¨Is there any partner interested in the commercialization of the HARMONY MS? ¨. The partners evaluated the options of joint commercialization, but due to its complexity and high risk of failure, it was discarded. As mentioned before, since the platform is developed by MobyX, a natural option was to nominate MobyX as the entity to commercialize the platform, taking into consideration other partners' interest. MobyX accepted the responsibility and will be the entity that will commercialize the platform during and after the project lifecycle.

A brief business plan is developed as the initial step towards commercialization of the HARMONY MS. The strategy describes the technology, the problem it addresses, the solution, and a brief description of the product and its features.

4.3 Technology Description

4.3.1 Problem

The first step towards developing a successful business model and commercialization is understanding the problem and finding the gap in the market. In parallel to the development of the software, under Task 1.3 (specification of stakeholders' needs), some interviews have been conducted with potential customers to find out the problems that they are faced with while using simulation models for planning

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and the demand for platforms such as the HARMONY MS. The results of these interviews are included D1.4. Moreover, desktop research and literature review have been done to find out the gap in the market. The identified existing problems in the market are:

- Current approaches (tools) for Spatial and Transport planning rely on simplistic macroscopic land use-transport interaction models.
  - ✓ Limited model sensitivity for transportation policies' impacts due to aggregation.
  - ✓ Limited range of scenario analysis capability in the face on new disruptive mobility concepts (AVs, UAM, MaaS) or emergencies like COVID-19
  - ✓ Weak linkages between land-use, transport demand and transport supply and representation of model dependencies
  - ✓ Existing open-source integrated tools (e.g., OPUS, SimMobility) are some first integrated attempts; but they
    - have restrictive built-in functions for plugging-in different transport (or other) models.
    - are not widely used
    - have very limited evidence for their operationalization.
    - are fully micro models with data requirements that most public agencies cannot have access to
    - there is no integration between micro (transport) and more widely-used macro (land-use) models
- Current widely used transport models have limited capabilities with regards to predicting travel demand patterns for either traditional or new transport systems (multimodal, new mobility concepts)
  - ✓ Trip-based demand models – standard modelling approach offered by most traffic simulation tools
  - ✓ They come with limitations.
    - statistical and non-behavioural prediction mechanisms.
    - limited sensitivity to transport policies.
    - cannot capture daily travel pattern interdependencies and within-households (trip chains).
    - poor spatial and temporal demand resolution and representation
  - ✓ Alternative: Activity-based demand models.
    - They are behaviourally rigid.
    - They are not an available option in mainstream transport models.
    - They have better and more accurate prediction capabilities.
    - But not widely spread in the EU
- Lock-in effect of existing transport planning tools (investment, training, License costs and technical burden for model integration)
  - ✓ Existing traffic tools have no built-in methods for linking land-use, activity-based demand, traffic, and energy/emission models.
  - ✓ Difficult to customize on ad-hoc basis (for scenario and application case)

- ✓ Integrating different models have scientific and technical challenges: Issues with consistency of I/O models' data interactions (mostly error-prone manual approach) and storage, different model scope, scale, and resolution.
- ✓ Requiring different software tools is associated with high monetary and resource costs for either training, licensing, or hiring new personnel.

➢ Last, but the most important challenge is that most of the current models are just for cities leaving outside all the suburban/rural areas with limited access to data.

4.3.2 Solution

It has been identified that there is a need for:

- A new generation of harmonised integrated tools for linking existing and new models for spatial and transport planning.
- Complementary platforms to mainstream (widely used) transport models with enhancements for activity-based, new mobility systems, land-use and regional economy modelling.
- A standardised data management framework that facilitates the integration of independently developed models in different programming languages and scales.
- MS supports regional/metropolitan wide modelling

As a solution, we propose the HARMONY MS which **integrates** simulators for: 1. Strategic, 2. Tactical, and 3. Operational planning allowing for an in-depth **incorporation of new mobility services** and multiscale regional spatial and transport planning. The MS also offers **adaptors** to link existing spatial or transport models to the MS making it a **software-neutral platform**. Each of the simulators can also operate on each own.

4.3.3 Product

The HARMONY MS product is a novel, multimodal, agent-based software solution that runs as a web-based application and has transport planners, consultants, researchers, modelers, decision makers, academics, etc. as its end-users. End-users can access the HARMONY MS via a browser. Before accessing it, the product needs to be installed on infrastructure (i.e., server) that belongs to the client – this makes it on-premises software. Subsequent versions will allow for deployment of the product on the Cloud and offering it as a ready-to-use Cloud service to its clients. The HARMONY MS integrates three simulators (strategic, tactical, and operational) for both passengers and freight to support regional/metropolitan wide modelling which most of the current simulation models fail to capture. These simulators can explore scenarios that existing simulation tools cannot. In addition, an important component of the HARMONY MS are the adaptors developed for integrating in the best possible way existing simulation models/tools (such as AIMSUN, VISUM) that the end users may already have in place which can then be combined with other of the HARMONY MS components. The simulators hosted in the HARMONY MS could be used simultaneously, sequentially, or independently - as stand-alone simulators, while new models developed by the end-user can be also added. The independent nature of the HARMONY MS sub modules allows for a modular deployment of the MS, providing the end-users with several versions of the product, based on their specific needs and data availability. The modular versions of the HARMONY MS are customizable and can be tailored to specific requests of the end-users.

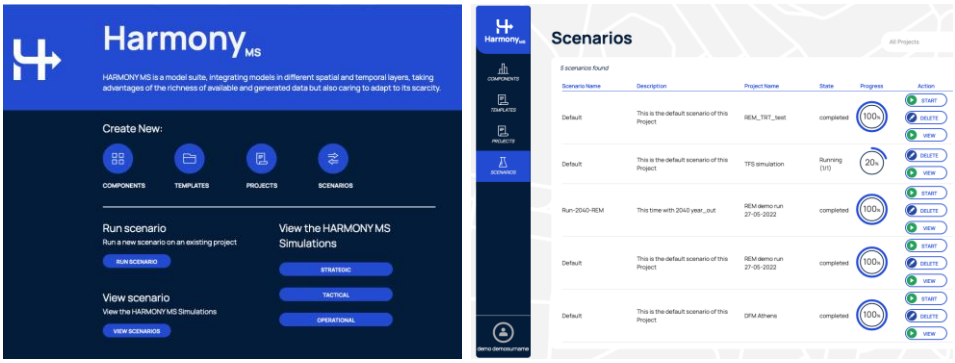

Figure 2 Screenshots of HARMONY MS interface

At this stage of the project, we estimate that an end-user can perform the following functionalities with the HARMONY MS:

- **Create a spatial, land-use and transport analysis scenario** by selecting a scenario template out of a list of provided templates. Through this process, the HARMONY MS will activate the respective simulator(s) for running the desired scenario and will request from the user to provide all the necessary inputs.
- **Provide** the capability to end users to add their own models, call in external to the HARMONY MS simulators (e.g., VISUM, AIMSUN Next) and **modify the parameters used in the existing strategic, tactical, and operational simulators.**
- **Manage the lifecycle of a spatial and transport analysis scenario**, by starting, pausing, stopping, and observing the progress of a scenario that is being executed.
- **Acquire the results of transport analysis scenarios** that have been executed via the platform, using a flexible visualization dashboard that allows for tracking KPIs (Key Performance Indicators) corresponding to each scenario. These KPIs will provide useful insight to the end-users while assessing different scenarios and may include transportation system performance indexes (such as vehicle-km, passenger-km, modal split, etc.), environmental indexes (such as noise levels, emissions, etc.), land use indexes (accessibility via different transport modes, density of opportunities and activities within specific range, etc.)
- **Compare the results of different transport analysis scenarios**, via an interactive GUI which includes charts, maps and other screens that visualize the values of KPIs from different scenarios and performing statistical tests.

Figure 3 and Figure 4 showcase the first functionality (first bullet point) in the list above in our current prototype.

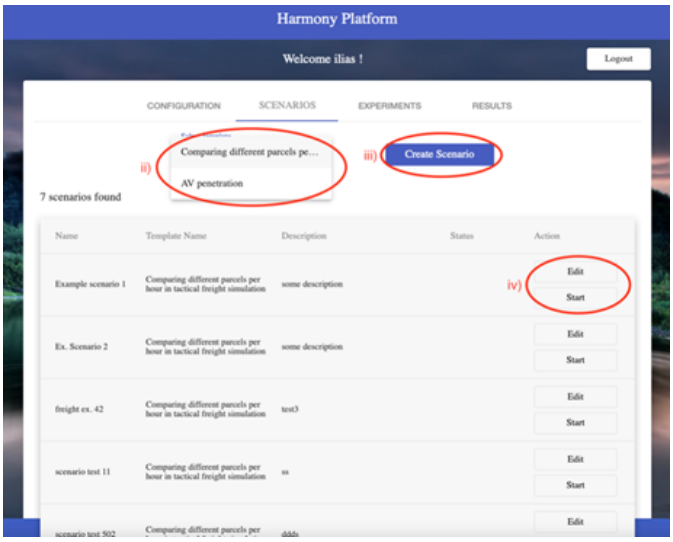

Figure 3 After clicking on (i), a dropdown list with the available template appears (ii). Users can select which template they want and by pressing "Create Scenario" (iii) they can create this scenario with the template they have selected. Also, they can manage their existing scenarios and see information about them or start an already existing scenario (iv).

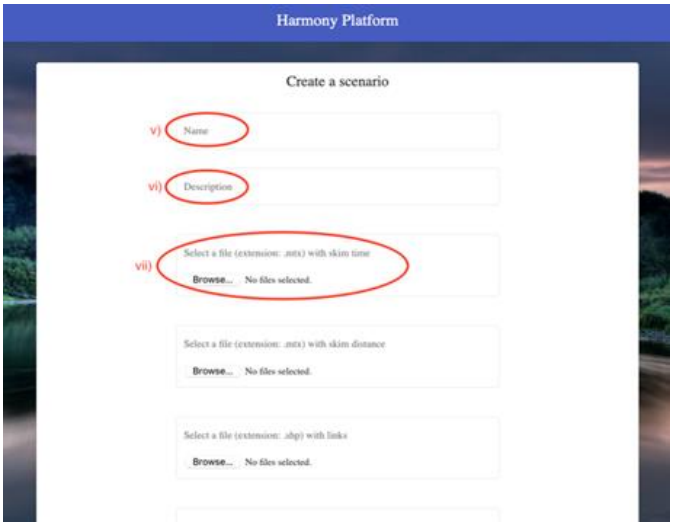

Figure 4 After selecting the template they want for their scenario, users can add the name they want (v) for this scenario and a short description (vi) about this. Then, they have to add the files/data (vii) they want to use in the scenario they have selected by clicking on the Browse buttons.

We note that the user interfaces of the HARMONY MS are currently under development by a dedicated UI/UX team to make it more visually appealing, intuitive, and user friendly.

From the perspective of the end-user, a great deal of complexity of how the simulators communicate with each other at the same level, but also across levels (strategic, tactical, operational) is hidden. Instead, the end-user can work with the platform by providing the necessary input data and configurations for a scenario and select which KPIs should be calculated and shown in the dashboard. From the perspective of the platform development and integration, the choice of technologies and communication protocols (explained in D2.2) make it possible to create interfaces for different simulator and transportation models, making the HARMONY MS a *software-neutral platform*.

At this stage of the project, it is also considered to develop an extra product that will be based on the HARMONY MS. We have initiated procedures to develop the **HARMONY MS-Lite**. The HARMONY MS-Lite will be a version that will be less data hungry for developing spatial and transport scenario simulations. The aim is to use existing data sources (secondary data) or data from existing simulators and provide through the HARMONY MS Lite dashboard the estimated KPIs with the respective visualizations. Several innovative methods (such as nowcasting or existing indices) will be employed in order to provide rapid and accurate predictions and derive useful KPIs without the need for extensive data collection or access to detailed databases. During the co-creation activities with the HARMONY metropolitan areas, consultancy firms and other metropolitan areas across Europe, we identified that there are regions, cities and towns (even big European metropolitan areas or cities), that do not have the appropriate spatial or transport data (or expertise) to run the simulations they want and also in some cases (mostly in Eastern Europe) also lacking the required resources-in house expertise for running simulation models and extracting the results. As such, we will develop the HARMONY MS-Lite that will address the needs of such metropolitan areas.

4.3.4 Benefits and Features of the HARMONY MS

The HARMONY MS will have the following features:

- ✓ **Easy to Use - Intuitive:** The platform will have a simple, intuitive, and user-friendly interface which will make it easy even for non-technical people to use.
  - GUI for configuring model selection requirements on ad-hoc basis.
  - Generation, analysis, evaluation and management of different intervention scenarios and their outputs
  - Graphical outputs that enable the users to visualize the results (including thematic maps, interactive charts, and infographics)
- ✓ **Flexible and Customizable**:
  - It will allow the users to configure which components to use and requirements for each component
  - Users will be able to customize the scenario templates.
  - Users will be able to adjust model related parameters based on their needs and add components (models) that they have developed externally
- ✓ **Multi-scale framework:** Economic, demographic, land-use, transport, and environmental models
- ✓ **Multimodal**
  - Demand: agent-based multi-scale behaviourally rich models
  - Supply: enriched traffic simulations with new mobility concept's operational and infrastructural dynamics
- ✓ **Built-in methods and interfaces with commercial models/products** (e.g., Aimsun Next, PTV VISUM)
  All in one: Access to different models, simulations, and outputs in one interface

5. Conclusions

This deliverable aims to provide a short version of the final exploitation plan for both commercial and non-commercial assets of the HARMONY project. As mentioned before, D10.12 will be a in depth document of the plans and strategies of each partner, hence, the document will be confidential.

Nevertheless, D10.13 is a brief of the aforementioned deliverable, with valuable information that can be disclose to the public.

The plan defines strategic actions necessary to deliver business insight across a range of exploitation options, with specific focus on the sustainability of the HARMONY solution at the end of the project. This relies on the individual exploitation of results and joint exploitation of the following elements: software tools (HARMONY MS, Data collection Tools, Air Traffic Network Controller, and Simulations), service (consultancy and training), and the HARMONY brand.

The individual commercial exploitable results have been identified, summing up to a total of 25 ER, which are described in section 3. In order to analyse the results, we have taken into consideration the type of ER, their technology maturity and the targeted user/client. In general, all of the commercial ER are advanced technologies, that can be classify as software, models, trainings, toolkits, prototypes, demonstrations, etc. similarly, most of them aim to achieve a high level of technology readiness by the end of the project, focusing on level 7 to 9. Cities, public authorities, modellers, research centres, universities and consultancy firms are the targeted end user for these technologies.

Similarly, knowledge, experience, and trainings, are also a result that can have impact and lead to new commercialize products and services; therefore, sub-section 3.2 aims to gather al non-commercial exploitable results, from which a total of 24 have been identified.

Finally, the joint exploitable result of the project is described in section 4. As mentioned, MobyX has taken the responsibility of commercializing the HARMONY MS as a platform that involves the 3 main exploitable results of the project: software tools, services (trainings and consultancy) and the HARMONY brand itself. Nevertheless, as it has been previously clarified, partners can choose to commercialize their own ER by themselves outside the platform.

We believe that the final individual and joint exploitation plan (D10.12) will take partners to a successful commercialization of their technologies once the project ends. The objective of the upcoming deliverable is to provide a reference to ensure that the technical dimension is oriented to the future market opportunities and to prepare an effective launch upon completion of the project.

6. ANNEX: List of type of results

Blueprint
Commercial solution
Dataset/data pool
Demonstrator
Feasibility Study
Framework (e.g., software environment, policy document, legal framework)
Hardware (e.g., chip, appliance, drone, sensor)
Infrastructure (e.g., IT infrastructure, Energy infrastructure, transport infrastructure)
Methodology
Model (e.g, risk model, mathimatical model, phisical model, business model)
Patents (e.g., utility patent, design patent, plant patent)
Policy report
Prototype
Proxi/broker service
Research/virtual environment
Scientific publication (refereed
Scientific publication (non-refereed
Software (e.g., routine, plugin, integrated platform, library)
Standards (e.g., norms, policies)
Taxanomy/Ontology
Tool/Tool kit/tool box
Trainings (e.g., learning tool, models, services)
Whitepaper or similar publication
Other
Multiple nature