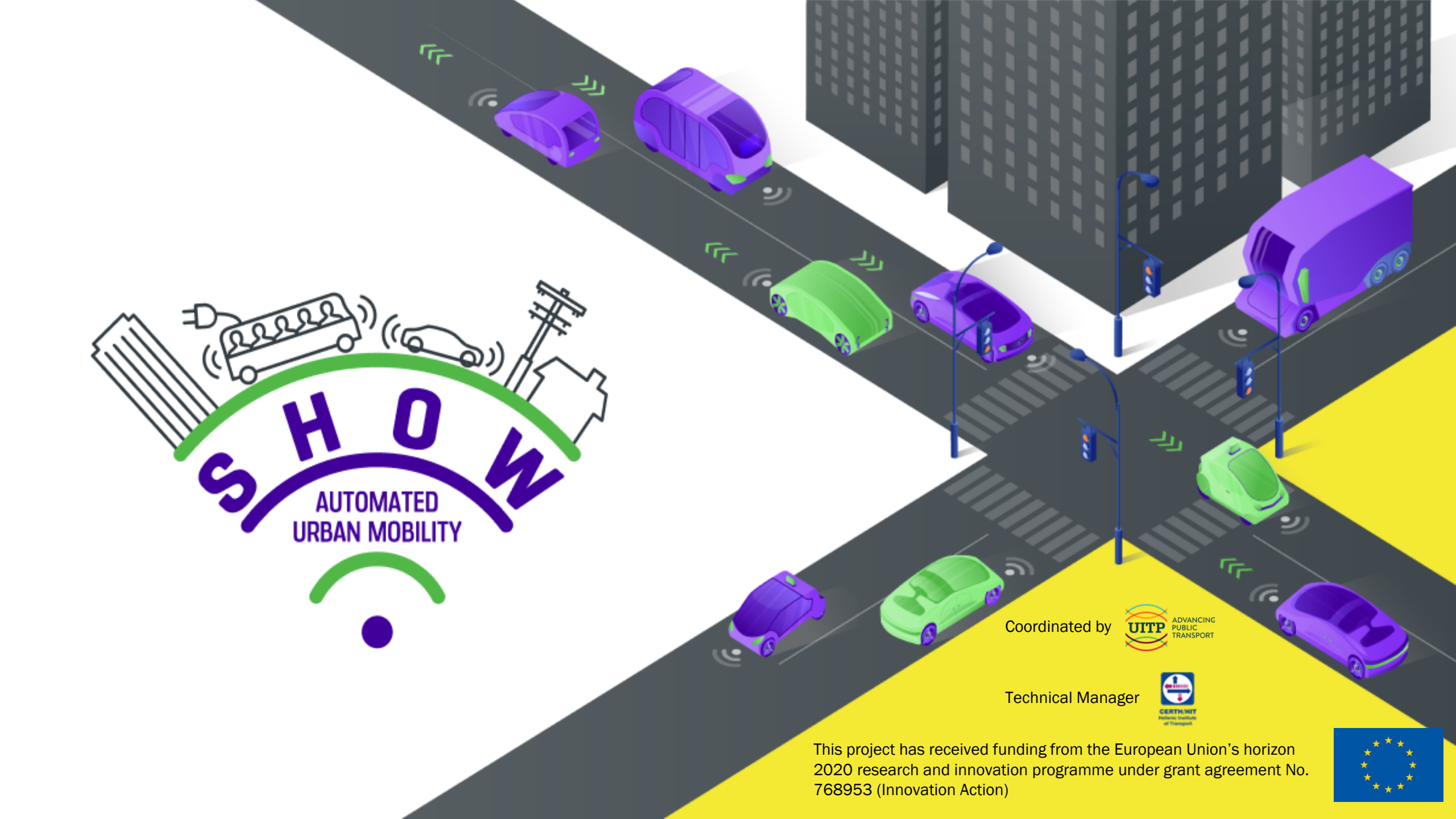

Coordinated by UITP ADVANCING PUBLIC TRANSPORT

Technical Manager CERTH/HIT

This project has received funding from the European Union's horizon 2020 research and innovation programme under grant agreement No. 768953 (Innovation Action)

SHared automation Operating models for Worldwide adoption

SHOW Use Cases

18 September 2020 | Virtual Meeting

Dr Evangelos Bekiaris| CERTH/HIT

SHOW Use Cases

- In **SHOW**, the different variety of services and use cases that will be tested in the different Pilot sites across Europe, with all relevant stakeholders at each site participating as project Partners or supporters, will allow:
  - the **emergence of several new business/operating models;**
  - the **improvement of relevant technologies of automated vehicles** with the aim to support automated PT lines (metros, buses, trams) with connected automated DRT and MaaS fleets; all operated in a coordinated service fashion.

- SHOW real-life demonstrations aim to satisfy **3 UCs families and 17 single UCs**; that together cover all urban automated mobility needs and wants of the stakeholders.

SHOW Use Cases

UC1: Automated mobility in cities
➢ ***UC1.1: Automated passengers/cargo mobility in Cities under normal traffic & environmental conditions,*** including normal speeds, normal/smooth traffic context, no traffic or other environmental complexity.
➢ ***UC1.2: Automated passengers/cargo mobility in Cities under complex traffic & environmental conditions***, including normal speeds, complex traffic or environmental context (e.g., curvatures in roundabouts, etc.).
➢ ***UC1.3: Interfacing with non automated vehicles and/or travellers*** (e.g., pedestrians, VRUs, etc.),
➢ ***UC1.4: Energy sustainable automated passengers/cargo mobility in Cities,*** including solutions (e.g., inductive dynamic or static charging, RES based charging, etc.) that make the service sustainable.
➢ ***UC1.5: Actual integration to city TMC***; integration of the AV (or fleet) operation/ supervision centre to a TMC (of the city or other); together with the overall traffic supervision.
➢ ***UC1.6: Mixed traffic flows***; AVs and non AVs mixed in the same traffic flows.

SHOW Use Cases

UC1: Automated mobility in cities
➢ ***UC1.7: Connection to Operation Centre for tele-operation and remote supervision***, considering the remote supervision and teleoperation of AV (or fleets) by a control centre.
➢ ***UC1.8: Platooning for higher speed connectors in people transport***
➢ ***UC1.9: Cargo platooning for efficiency***. "Efficiency" can be measured in different aspects – platooning is usually associated with lower fuel / energy consumption in highway scenarios due to reduced air drag at higher vehicle speeds. But efficiency in an urban scenario could mean consuming less space on roads
➢ ***UC1.10: Seamless autonomous transport chains of Automated PT, DRT, MaaS, LaaS;*** automated travel through multiple means (e.g., a traveller using an automated metro line, then boarding an automated bus, using DRT or MaaS for the last mile.

SHOW Use Cases

UC2: Automated mixed mobility in cities
➢ ***UC2.1: Automated mixed spatial mobility***; namely mixed mobility of cargo/passengers at the same time within the same vehicle, but at different parts of the vehicle or with towed vehicle.
➢ ***UC2.2: Automated mixed temporal mobility***; namely same vehicle used at different times for passenger and cargo transfer (e.g., in the morning for traveling people and in the night for goods supply to shops).

SHOW Use Cases

UC3: Added Value services for Cooperative and Connected Automated mobility in cities
➢ ***UC3.1: Self-learning Demand Response Passengers/Cargo mobility;*** Planning, routing, operation self-learning services for passengers and/or cargo; based upon AI enabled algorithms that optimise DRT operations (e.g., using historical and real time dynamic service data).
➢ ***UC3.2: Big data/AI based added value services for Passengers/ Cargo mobility;*** AI enabled smart services for passengers or goods; adapting the service to the customer needs and preferences.
➢ ***UC3.3: Automated parking applications***, namely AVs self-parking functions.
➢ ***UC3.4: Automated services at bus stops***: Automatically handling bus stop approach, leaving and then merging again with traffic.
➢ ***UC3.5: Depot management of automated buses***: Automated servicing, clearing, maintenance of AVs at depot areas.

SPACE Correspondence to SHOW Use Cases & Pilots

- SHOW Pilot site services cover in good balance **all current and future operational environments** identified within **S**hared **P**ersonalised **A**utomated **C**onnected v**E**hicles (**SPACE**) worldwide multi-stakeholder initiative of UITP (space.uitp.org), as presented below.

SPACE Correspondence to SHOW Use Cases & Pilots

SPACE Use Case	Indicative liaison to SHOW UCs	Liaison to SHOW Pilot sites
1 – First/last mile feeder to PT station	UC1.10, 3.2	**Graz**: Suburban train station to shopping centre; **Rouen**: Interface to bus line; **Tampere**: DRT between automated light rail of Tampere and hospital campus; **Brussels**: additional shuttle line integrated to existing PT station(s) and timetable; **Sweden**: DRT between trunk lines & AV pods in University and residential area.
2 – Area based service and feeder to PT station	UC1.1, 1.2, 1.3. 1.6, 3.1	**Salzburg**: Connection of peri-urban area to city centre; **Kista & Linkoping**: Area based on demand shuttles service; **Madrid**: Shuttles connecting new automated PT (bus) to metro station
3 – Premium shared point to-point service	UC1.1, 1.7, 3.1, 3.2	**Vienna**: Flexible downtown DRT; **Aachen**: Ring feeder service.
4 - Shared point-to-point service	UC 3.1, 3.2	**Mannheim**: Low traffic demand service between Franklin suburb and tram station of Mannheim; **Brno**: DRT service for areas currently partly served, with low volume of demand
5 - Local bus service	UC1.1, 1.2, 1.3. 1.6, 1,7, 1.10	**Madrid**: Created for the Villaverde area (previously lacking fixed PT); **Copenhagen**: Replacing normal PT by automated DRT (level 4); **Trikala**: Replace current downtown PT line (by automated shuttles)
6 - Special service (campus, business park, hospital)	UC1, 2,	**Rennes**: Connecting automated metro to hospital campus. Mixed passenger-cargo transport; **Aachen**: Ring feeder from main PT to Uni campus; **Karlsruhe**: Mixed passengercargo vehicles single day demo - (capsule exchange) (L4/5); **Turin**: Flexible special service with automated DRT & private cars serving hospital campus.

SPACE Correspondence to SHOW Use Cases & Pilots

SPACE Use Case	Indicative liaison to SHOW UCs	Liaison to SHOW Pilot sites
7 - Bus Rapid Transit (BRT)	UC1.1, 1.2, 1.3. 1.6	**Copenhagen**: Automated BRT at level 4 at a business district.
8 - School bus	UC3.4	**Linköping**: AV pods for last/ first miles for children between school and the PT.
9 - Premium - Robo-taxis	UC1.1, 1.2. 1.5, 1.6, 1,7, 3.1, 3.2	**Rouen**: 4 robo-taxis.; **Brno**: 1 robo-taxi for long distance commuting and interface to DRT. ; **Karlsruhe**: 1 Shuttle and 1 automated vehicle with remote supervision and remote control in case of critical situations.
10 - Car-sharing	UC1.1, 1.2, 1.3. 1.5, 1,6, 1.10 1.10	**Rouen**: Robo-taxis, used also as MaaS fleet for car-sharing.; Karlsruhe & Aachen: Connected MaaS fleets of 2 cars in each, linked to automated DRT; **Madrid**: 2 MaaS cars to supplement automated PT/DRT; **Trikala**: 2 MaaS car fleet, interfacing automated DRT services; **Turin**: Connected MaaS car interfacing DRT.
11 - Depot	UC3.5	**Madrid**: Carabanchel depot for all AV fleet of 5 vehicles.

SPACE Correspondence to SHOW Use Cases & Pilots

SPACE Use Case	Indicative liaison to SHOW UCs	Liaison to SHOW Pilot sites
12 -Intercity travel	UC1, 2, 3	**Austria, Germany and Sweden**: relevant corridors between different Cities of the Pilots as well as urban and peri-urban areas (i.e. Mannheim to Franklin) are supported.
13 - Pop-Up Shuttle transport	UC2.2. 3,2	4 relevant demos planned at major events, plus specific events based transportation in Graz.

SHOW Use Cases - Your Feedback is Important!

- In the interactive session that follows, we would ask for **your feedback!**
- Using the **Mentimeter tool** we like you to vote, in order to help us prioritize and –then- optimize the SHOW Use Cases!

https://www.menti.com/mzo972wsvp

www.menti.com

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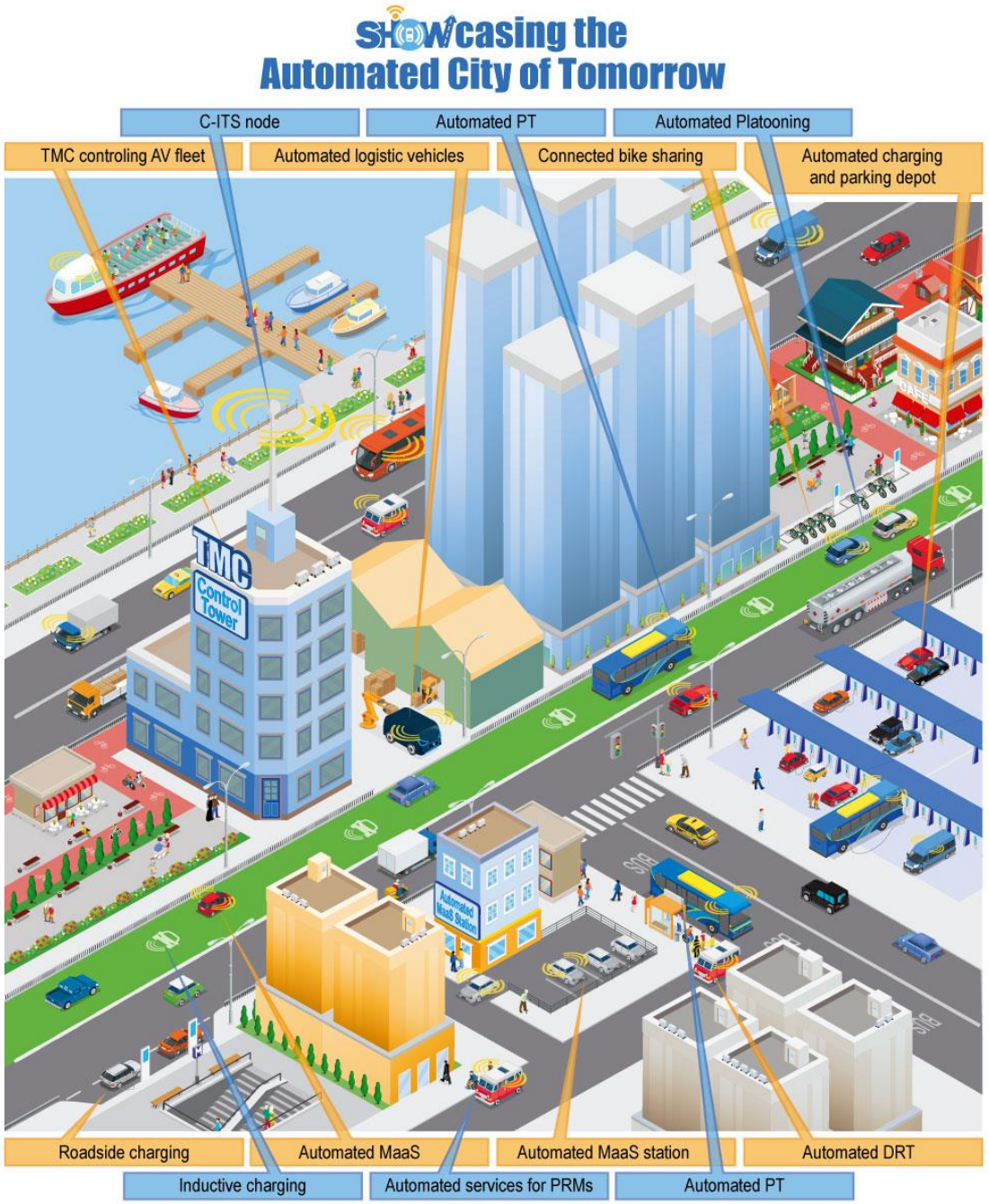

Thank you for your attention!

This project has received funding from the European Union's horizon 2020 research and innovation programme under grant agreement No. 875530