**Newsletter**

**Year 3**

January 2025

# AI4CSM

## Automotive Intelligence for Connected Shared Mobility


**Project Facts:**

Project Coordinator: Jochen Koszescha
INFINEON TECHNOLOGIES GERMANY AG
Project Start: 01-05-2021
Duration: 46M
Total investment: ~€M 41,7
EU contribution: ~€M 11,9
Participating organizations: 41
Number of countries: 10

The AI4CSM project has been developing advanced electronic components, systems and architectures for future mass-market ECAS vehicles. This fuels the digital transformation in the automotive sector to support the mobility trends and accelerate the transition towards a sustainable ecosystem.

AI4CSM is funded within the Electronic Components and Systems For European Leadership Joint Undertaking in collaboration with the European Union's H2020 Framework Programme (H2020/2014-2020) and National Authorities, under grant agreement n° 101007326.

## AI4CSM: Driving Europe's Automotive Innovation Forward

Over the course of AI4CSM implementation period, the project aimed to foster future mobility developments following the electrification, standardization, automatization and digitalization implementation strategy by providing new AI-enabled electronic components and systems for ECAS vehicles for advanced perception, efficient propulsion and batteries, advanced connectivity, new integration and platform concepts and intelligent components based on trustworthy AI.

The AI4CSM project has brought together an exceptional consortium of partners spanning industry, academia, and research institutions. This collaborative effort has culminated in the development of demonstrators that serve as tangible proofs of concept for the technologies and solutions envisaged by the project. The project's demonstrators underscore AI4CSM commitment to addressing critical challenges such as energy efficiency, scalability, and user-centric design in modern mobility. Explore some of demonstrators in the following pages.

**Vision:** Build Europe's intelligent electronic component and systems for ECAS 2030 vehicles supporting European mass market production, manufacturability and scalability based on the Green Deal principles.

**Mission**: Develop the functional architectures for next generation ECAS vehicles based on ECS, embedded intelligence and functional virtualization for connected and shared mobility using trustworthy AI.

By integrating sustainability with cutting-edge innovation, AI4CSM set a benchmark for European leadership in the global automotive landscape. The project not only supported the transition to greener and more connected mobility but also laid the groundwork for a competitive and resilient industry capable of meeting the evolving demands of the future. AI4CSM promoted a collaborative concept where the stakeholders of key domains of vehicles, HW/SW electronic components, systems and AI experts work together.

The AI4CSM project represented a bold and forward-looking vision to transform Europe's automotive industry by developing intelligent electronic components and systems tailored for the vehicles of 2030. With a focus on electric, connected, automated, and shared mobility solutions, AI4CSM aligns its objectives with the principles of the European Green Deal, fostering sustainable innovation.

AI4CSM is coordinated by Infineon Technologies Germany AG.

The overall consortium structure including 41 partners:

- ✓ 3 OEMs
- ✓ 4 Tier-1 suppliers
- ✓ 9 Tier-2 and semiconductor suppliers
- ✓ 8 Technology suppliers
- ✓ 6 Research institutes
- ✓ 11 Academic partners

### Objectives

**O1:** Develop robust and reliable mobile platforms

**O2:** Develop scalable and embedded intelligence for edge and edge/cloud operation

**O3:** Design silicon for deterministic low latency and build AI-accelerators for decision and learning

**O4:** Solve complexity by trustable AI in functional integrated systems

**O5:** Design functional integrated ECS systems

**O6:** Build ECAS vehicles for the green deal and future connected, shared mobility

**SCD 1.1: Lessons-learned based (critical scenario) update of ADAS/AD Controller**

**Leader: AVL**
**Contributing partners: AIT, TUGRAZ**

With an emphasis on safe and trustworthy ADAS/AD systems, demonstrator SCD1.1 prioritizes intelligent data collection, virtualization, training, and analysis. Key strategies include detecting valuable situations for testing and validating new driving functions, collecting data and converting it into virtual driving scenarios, and utilizing an AI training center for safety-critical scenarios. Additionally, validation of ADAS/AD functions is conducted safely through a passive testing approach, significantly reducing the need for extensive road testing by leveraging virtualization and enhancement methods.

By designing the demonstrator to ensure all developed components operate both within a complete toolchain and as standalone tools, a wide range of deployment and utilization possibilities emerge. This flexible approach enables seamless integration and versatile application across various use cases. For instance, it allows for the reduction of data collection by focusing on and identifying interesting situations, the enhancement and manipulation of scenarios in a virtual environment to create more critical and diverse driving situations, and the safe evaluation of ADAS/AD functions in a virtual environment to identify potential misbehaviours and faults for further investigations.

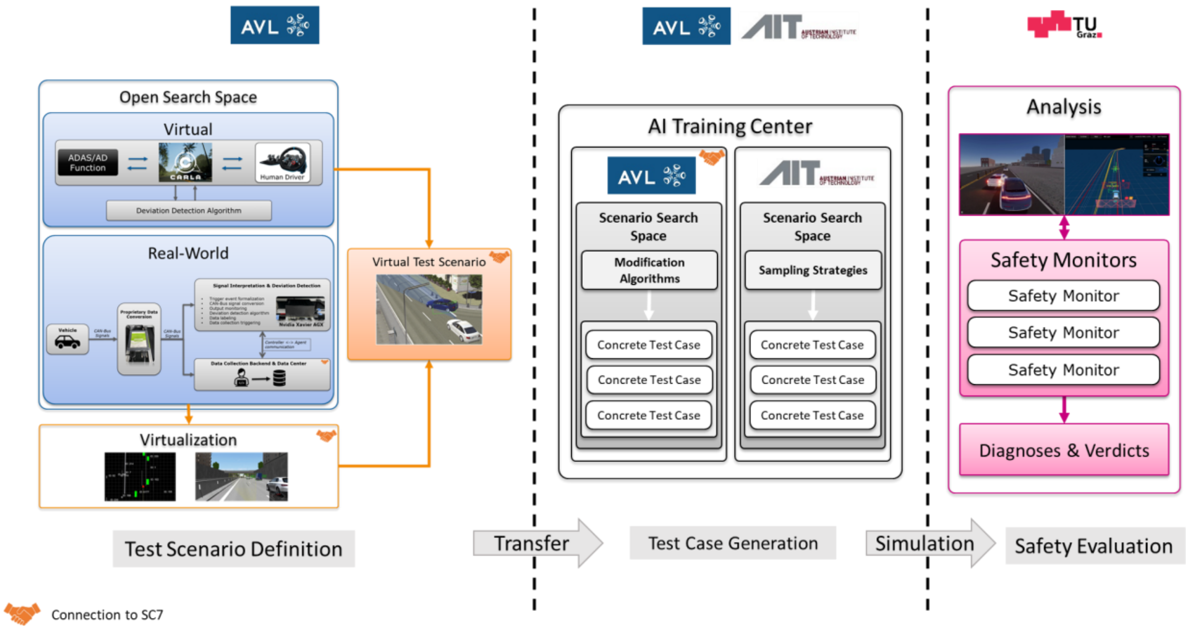


*Figure 1. High-level system level design of demonstrator SCD1.1*

**SCD 1.2: Robo-taxi**

**Leader: VIF**
**Contributing partners: TTTech Auto**

The main target of this demonstrator is to develop and integrate edge environment perception and vehicle intelligence algorithms in a robo-taxi to handle three urban use cases: Overtaking a vulnerable road user, Stopping in front of a crosswalk and Picking up a customer in a fetch-up zone.

A proof-of-concept for bidirectional communication approaches to the cloud (SCD1.3) is also implemented within this demonstrator.

The main hardware platform for this demonstrator is a Ford Mondeo equipped with lidar, IMU and GNSS sensors, an LTE modem and a drive-by-wire kit. The used main software platform is RTMaps which enables to integrate C++ (control), Python (intelligence) and Julia (perception) modules and provides interfaces to sensors and actuators (e.g. CAN Bus). The core processing unit is a power pc with dedicated GPU next to a communication module (TTTech Razormotion).

The real world demonstrator will be used in a lot of other projects that focus on shared perception, road monitoring, micro public transportation to name a few. The results gained in the development process (e.g. fast prototyping with Julia, embedding in different software platforms) will be used within other projects. The developed control and planning module RomPac is in use in several other projects with a focus on Co-Simulation. The perception module will be integrated in other platforms used for autonomous driving such as VifWare (based on AutoWare).

The gained competence in closed-loop simulation using Carla based on standards like openDRIVE and openSCENARIO and in future openMATERIAL will contribute to other projects where Co-Simulation, generation of labelled learning data or closed-loop simulation is relevant.

The Virtual Vehicle research GmbH has a strong focus on the SDV and thus the results achieved within this demonstrator will provide useful assets.


*Figure 2. VIF Demo Vehicle*

**SCD 1.3: Virtual City Routing**

**Leader: OTH**
**Contributing partners: VGTU, VIF**

The demonstration contains a virtual city twin on the example of Amberg where different traffic modalities are explored - especially ridesharing. The reinforcement learning based algorithm finds efficiently short route combinations based on simulated live traffic data, captured by virtual roadside units, which is then send to the Virtual Vehicle Self-Driving Car to pick up and drop off customers.

*Figure 3. Virtual City Simulation of the Town of Amberg*

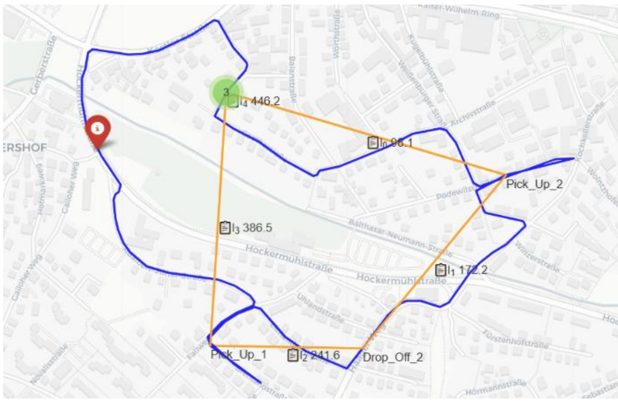


*Figure 4. Real-time routing in live mode*

The system operates as a cloud service, integrated with an edge device that controls the self-driving vehicle. The partners plan to release their code under an open source license, which allows experts to run studies regarding different mobility modalities on their own area of interest.

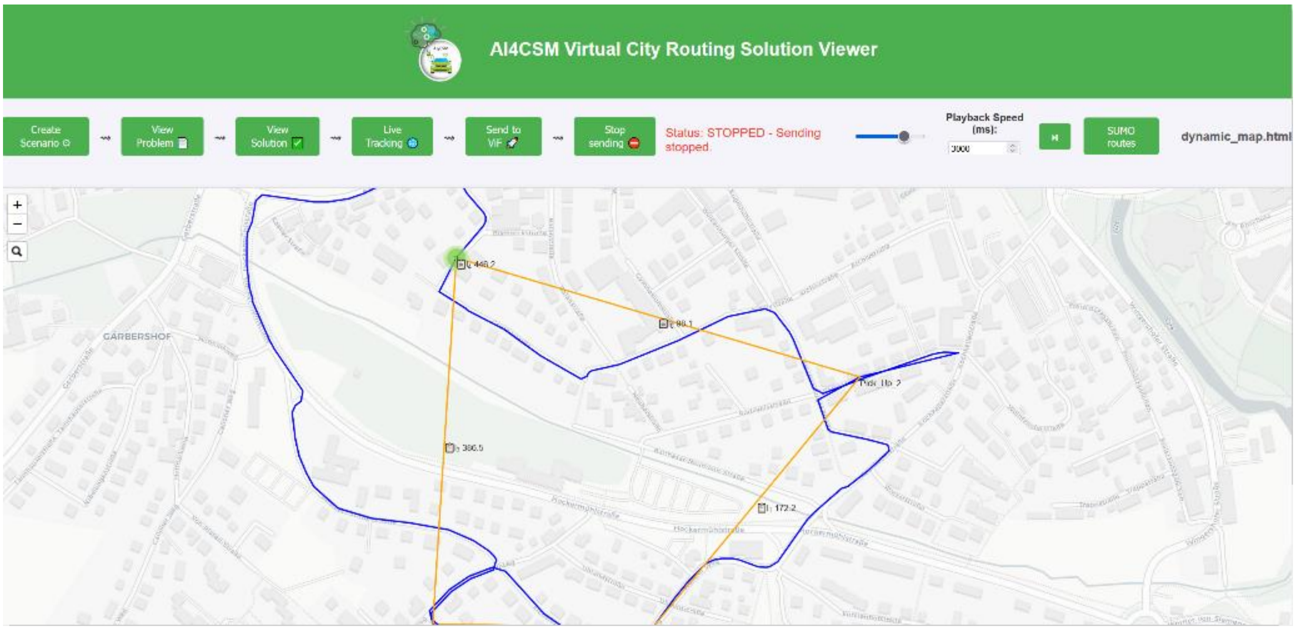


*Figure 5. Screenshot of the ride-sharing route calculation interface*

**SCD 2.1: EV5.0 vehicle with real-time AI-based fault detection, analysis and mitigation**

**Leader: AVL**
**Contributing partners: BUT, EDI, FHG, IFAG, MBAG, OTH, SSOL, ZF**

The "AI-based EV demonstrator" is part of the AI4CSM project and serves as the demonstration vehicle for Supply Chain 2. Built on the foundation of a Mercedes-Benz EQC, it integrates various demonstrators developed during activities of multiple Supply Chains into a single platform. The list of components replaced or added includes an 800V SiC-based inverter, a PPU-equipped controller platform, Time-of-Flight perception, algorithms for cognitive diagnostics using AI, and prediction algorithms for energy consumption.

The electrical and mechanical integration of the components into the base EQC platform has been completed (Figure 6). The Time-of-Flight perception system, developed by EDI within SC6, has been incorporated into the demonstrator vehicle by mounting it on the roof (Figure 7). The frame has been adapted, and its features can be utilized after a calibration and synchronization routine aligns the ToF camera inputs. The results from the perception system can be visualized through an interface in the vehicle (Figure 8).

*Figure 6. Exterior view of the demonstrator vehicle*

*Figure 7. ToF camera mounted on roof*

*Figure 8. Interior of the vehicle with interface to ToF camera*

**SCD 3.1: L3 vehicle with a Driver's Monitoring System**

**Leader: UNIMORE**
**Contributing partners: I&M, IFI, VEM, BYLO, MIN, POLITO, SAT, VWIEW**

The demonstration vehicle embeds multiple Driver Monitoring Systems (DMS) modules, enhanced perception through an array of smart sensors, and a new AI-based open platform. The main focus is to acquire, process, and deliver reliable information to the vehicle well before the driver detects or perceives any critical situation. To further support this, comprehensive cloud-based perception capabilities will also be integrated, ensuring the vehicle fully and timely understands its surroundings.

The demonstrator showcases various driving scenarios in manual and autonomous modes:
i) The vehicle is driven manually, with the driver fully focused, in good weather and minimal pedestrian presence. No interventions occur if pedestrians are encountered. If it rains, the driver is warned of reduced control, leading to lower attention. In this case, severe warnings are issued for pedestrians. If drowsiness or loss of focus is detected, the vehicle stops autonomously.

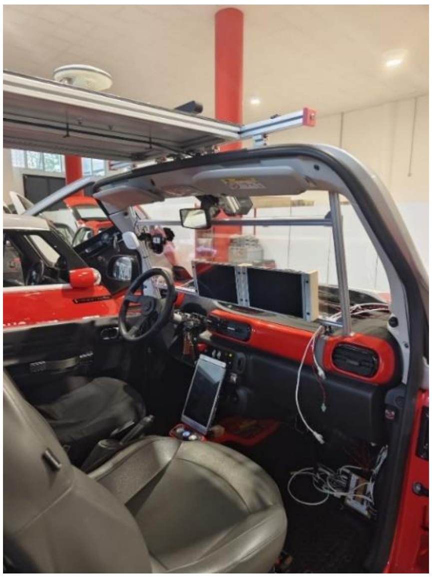

*Figure 9. Demonstrator vehicle internals*

*Figure 10. Hardware components and sensors of the demonstrator vehicle*

ii) Initially, the driver is fully attentive and in control. Later, distraction occurs, followed by sudden fog and pedestrians on the road. The system takes control to ensure safety.

iii) The driver starts attentive in normal conditions but becomes drowsy. When ice is detected, the vehicle slows down automatically to maintain safety.

**SCD 4.1: AI controlled redundant powertrain**

**Leader: ZF**
**Contributing partners:** BUT, TUDO, MBAG, IFAG, IFAT, IFI

Fail-operational 800V powertrain based on a three-level Active Neutral Point (ANPC) topology which can operate as a two-level inverter in case of a fault, and allows the use of 650V GaN power transistors in an 800V system.

Fault detection is achieved with several hardware (HW) and software (SW) components. Driver and FPGA boards perform data acquisition for controlling transistor deadtime and short-circuit faults. An add-on board monitors for electrical arcing in the HV system. These boards interface with SW-based cognitive diagnostic system which also monitors the health-state of the electric motor and defines system reactions to prevent further damage in case of faults.

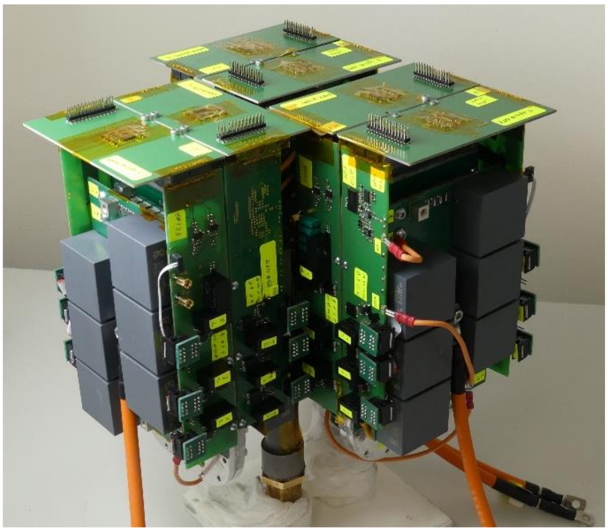

*Figure 11. Assembled six-phase 800V ANPC inverter*

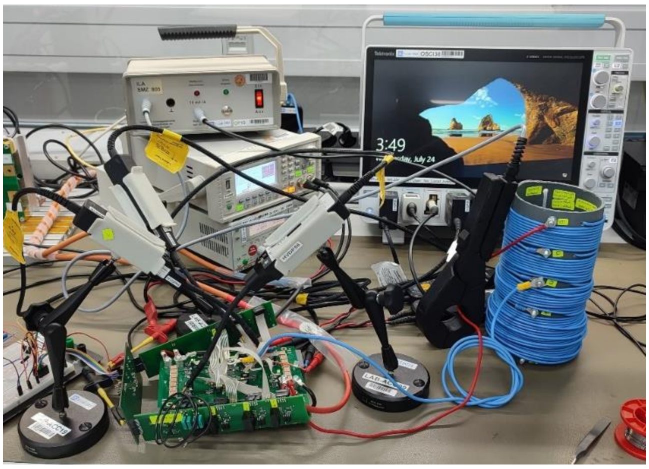

*Figure 12. GaN ANPC Phase Board testing setup*

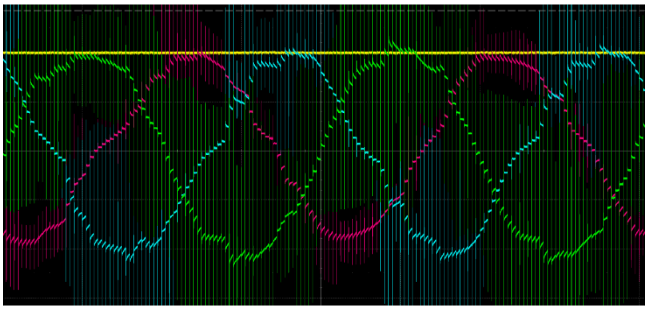

*Figure 13. Sinusoidal voltages in closed-loop current control with static load*

The diagnostic system is executed on a new generation AURIX with a parallel processing unit (PPU), speeding up the calculations of AI systems. Further components are a new generation power management integrated circuit (PMIC) and smart rotor position sensor, both of which are capable of performing self-diagnosis.

The demonstrator has been specified based on standard series requirements for 800V automotive powertrain applications. The power core, i.e. power board with GaN transistors, DC-link capacitor board, and gate-drivers, has been tested with double-pulse experiments up to voltages and currents of 920V and 180A respectively, where fast and low-oscillation switching has been confirmed.

The full inverter including closed-loop control has been tested together with an electric motor on a testbench from MBAG, where functionality in six-phase and three-phase operation has been demonstrated.

**SCD 4.2: AI accelerated powertrain control**

**Leader: BUT**
**Contributing partners: BUT, IFAG**

BUT used an evaluation board provided by Infineon with the AURIX 3G microcontroller, which contains a Parallel Processing Unit (PPU), to demonstrate its capabilities in accelerating the computation of complex algorithms related to powertrain control and diagnostics. Two directions were explored. The first direction focused on the acceleration of Finite Control Set Nonlinear Model Predictive Control (FCS NMPC) algorithms. These algorithms are known to be computationally intensive, and their complexity grows exponentially with the increasing number of prediction steps. The second direction involved the use of AI in diagnostics, specifically the implementation of a convolutional autoencoder for anomaly detection in powertrain operation.

A simplified variant of the FCS NMPC control algorithm (one-step-ahead prediction shown in Figure 14) for controlling a three-level inverter was implemented in the PPU of the TC49x microcontroller. The achieved execution time is below 4 µs, enabling the control of two 3-phase subsystems with a sampling period of 10 µs. The autoencoder algorithm was implemented and tested on the PPU of the TC49x microcontroller as C code, utilizing vector functions from the Synopsys Vector DSP library. The implemented autoencoder fault detection algorithm was verified in both fault-free conditions and with inter-turn short circuit fault emulation (Figure 15). The computation time of the implemented autoencoder on the PPU for one three-phase subsystem is below 17 µs.

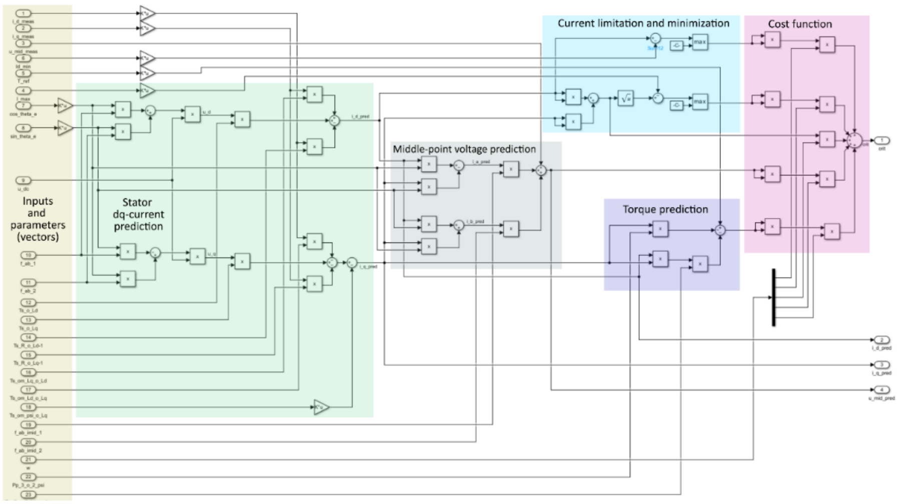


*Figure 14. Simulink Subsystem Representing Vector Computation of the IPMSM DQ Model and FCS NMPC Cost Function (FCS Core)*

The operation of both proposed algorithms was verified on a laboratory testbench using a 2x 3-phase motor capable of emulating short circuit faults showing the benefit of PPU for parallel/AI computing.

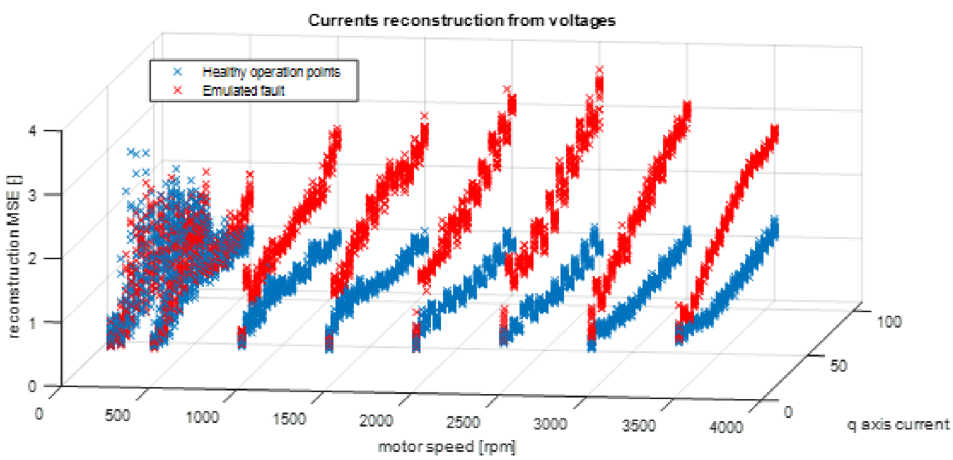


*Figure 15. Autoencoder Trained To Reconstruct DQ-Currents, Mean Squared Error (MSE) For Healthy Motor And For An Emulated Fault (2 Shorted TURNS)*

### SCD 4.3: Intelligent Battery by AI

**Leader: FHG**

Fraunhofer developed an AI powered algorithm to detect temperature sensor anomalies within a battery system. Potentially anomalous temperature sensors are detected based on the analysis of measured temperatures in a battery module and comparison to a temperature sensor model, which is obtained by dynamic mode decomposition.

The developed algorithm was deployed on an edge device with the Azure IoT Edge Runtime as basis. The edge device was integrated into the demonstrator vehicle and connected via CAN to the battery management system. The developed algorithm is triggered event-based and after each successful execution, the sensor status and output data of the developed algorithm are sent via Wifi to an Azure storage service for subsequent processing and alarm handling.

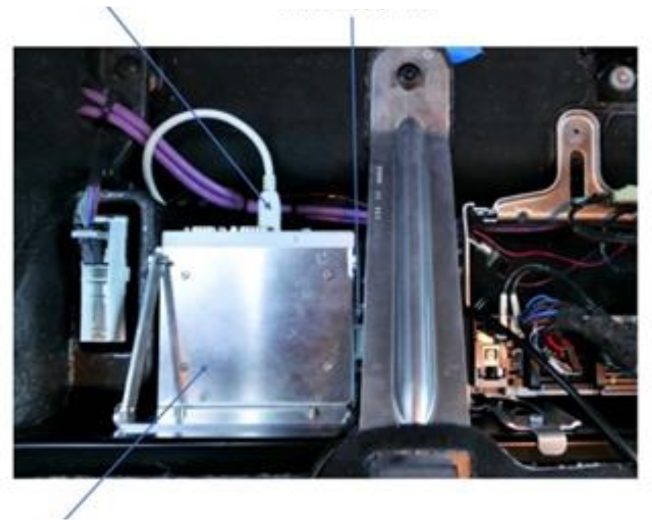


*Figure 17. Demo integration*

### SCD 6.2: Neuromorphic sensor fusion

**Leader: IMEC**
**Contributing partners: INNAT,TUDELFT**

Modern sensor pre-processing and fusion methods rely on rising number of sensors to the sensor suite. This causes a downstream data deluge with diminishing returns in terms of aggregate perception quality. In this demonstrator we showcase an event-based neuromorphic sensor fusion architecture, which aims to solve this bottleneck by enhancing the data quality coming off the sensors. All the involved partners worked together on the design and implementation of energy-efficient neuromorphic accelerators for edge intelligence. The architectures incorporate low-level neuromorphic intrinsic, e.g. complementing spiking neuron models by more detailed models of synapses and dendrites, and microarchitectures to support fast, efficient, and robust inference and learning capabilities at the very edge. Development efforts span the flow from architecture exploration, down to system-level design and prototyping, as well as physical tape out designs. By doing so the benefits of spiking neural networks: better focus on relevant senor data with subsequent lower computational energy demand as well as the possibility to perform online learning to adapt to changing environments and changes in sensor behaviour shall be explored. The partners demonstrate how event-based inference processing reduces energy consumption for a select number of use cases, using a single sensor and by fusing the data from different sensors. Different approaches are shown, including digital techniques (where all weights in the network are stored as digital numbers and all computations are carried as logic operations) and analogue techniques (where analogue voltages carry the values). The single sensor solution is sensor agnostic and fusion solution demonstrates the constructive performance for increased reliability of the system.

Demonstrator SCD 6.2 consists of two main parts sharing common spiking neural network technologies. The first demonstrator (SCD 6.2.A) focuses on a HW/SW co-design based on a spiking neural network and embedded processing for automatic detection, tracking, and classification of vulnerable road users and vehicles. This sub demonstrator utilises the developed and fabricated scalable neuromorphic accelerator hardware prototype for low-power, high performance deep edge processing for radar-based target classification and supportive SoC evaluation platform for the rest of the required processing.


*Figure 18. SCD 6.2.A Neuromorphic accelerator hardware prototype*

The second demonstrator (SCD 6.2.B) focuses on the development of a programmable analogue-mixed signal accelerator platform for always-on detection and recognition of time-series patterns in sensor data. The demonstrator utilises spiking neural network algorithms, implemented in an accelerator fabric for low-latency, ultra-low-power processing. The fabricated chip will utilise the SNN model for classification of time-series models was developed to run on the chip – uses audio as a representative case of time-series patterns.

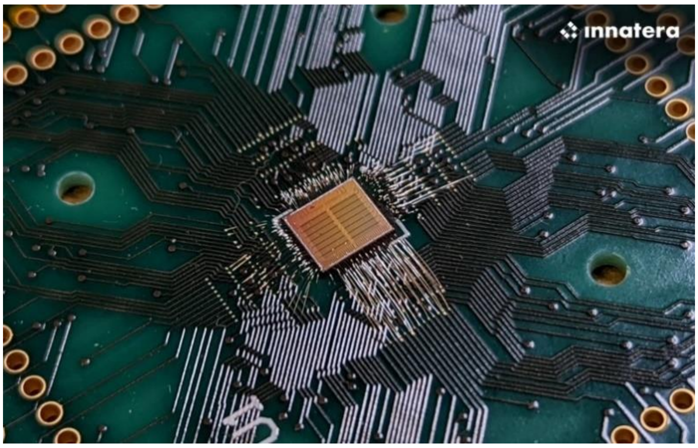


*Figure 19. SCD 6.2.B Neuromorphic accelerator hardware prototype*

**SCD 6.4: Localisation and 3D mapping**

**Leader: BUT**
**Contributing partners: BUT, IMA**

Demonstrator enables direct inter-vehicle sharing of 3D maps of surroundings. The information about vehicle neighbourhood is crucial for real-time sharing of obstacles among vehicles, thus improving the safety of operation and the optimality of driving process. However, since the data flow from sensors sensing around the vehicle is extremely high, it is important to reach a significant bitrate reduction to be able to share obstacles in real time. Such a bitrate reduction is performed using AI-based feature extraction, segmentation of clustering, followed by intelligent inter-agent data sharing, when only the simplified and necessary information are extracted from the raw sensor and shared; instead of sharing all the data. Another aim is to protect the vehicle body itself and the humans around it when the vehicle is stopped. The mapping of the nearest area of the vehicle will protect from damages and injuries, primarily during the door opening.

The greatest benefit of the mentioned technology is the ability to share obstacles between autonomous vehicles in real-time. Vehicles equipped with this system can "see around corners," gaining awareness of obstacles even before they appear in the vehicle's field of view. This allows them to react promptly, avoiding collisions or optimizing their movement.

Another advantage is the increased robustness of obstacle detection and classification, based on the principle of "two heads are better than one." Information about a single obstacle is received by a vehicle from multiple surrounding vehicles simultaneously. Since each sender observes the obstacle from a different angle, the data fusion of these inputs enables the elimination of potential errors in detection or classification.

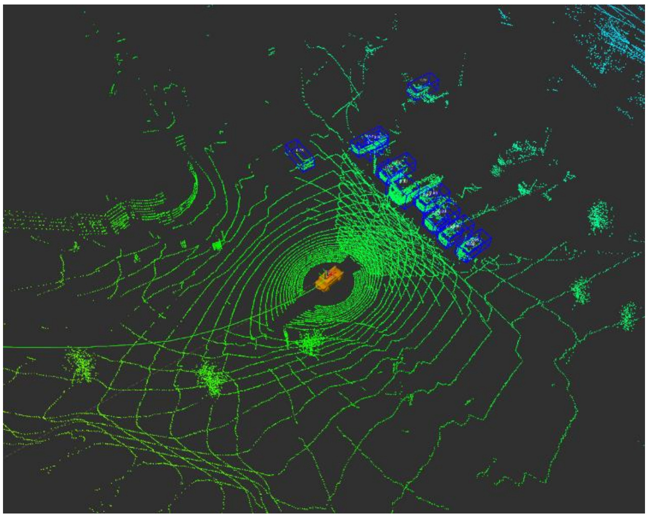

*Figure 20. Example of a local map containing parked vehicles (blue) in combination with raw lidar data (green).*

**SCD 6.5: AI-based near field, high resolution 360-degree perception system**

**Leader: Leader: EDI**
**Contributing partners: IFAG**

EDI designed, produced and assembled a modular and adjustable sensors platform for the time of flight (ToF) sensors used to create the AI-based near field, high-resolution 360-degree perception system. This sensor platform supports different ToF sensor types (support implemented for Monstar and Basler), as well as their trigger control and interfacing. A calibration algorithm and a custom fidelity check metric for inter-sensor translation and rotation were developed and introduced on this sensor platform. Implementation of vertical timestep encoding for the spiking neural networks (SNN) allows for spatio-temporal object detection by the perception system, by using spiking CNN on ToF sensor data.

*Figure 21. AI-based near field, high resolution 360-degree perception system's mobile setup used for initial testing, verification and algorithm design.*

*Figure 22. Perception system's integration onto EDI's Drive-by-Wire vehicle.*

Drivers in different vehicles, especially trucks, are susceptible to blind zones with severe safety risks. To address the challenge, EDI followed a multi-step deployment strategy. Initially, the perception system was integrated into a mobile system, which was used for early prototyping and data acquisition. Further, the system was deployed on an EDI Drive-by-Wire (DbW) vehicle to verify the developed registration and object detection algorithms. Finally, it is planned to leverage the system's automated configuration capabilities to deploy a perception system onto Mercedes-Benz vehicles and AVL's Drivingcube system (virtual environment) during the final project review.

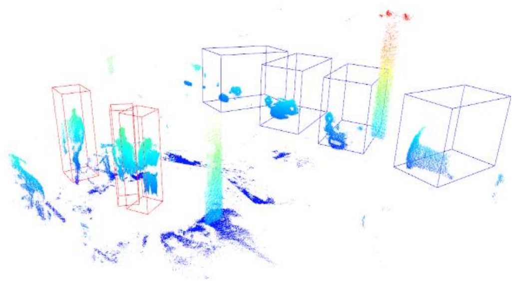

*Figure 23. Object detection based on spiking neural networks and obtained ToF data by 360-degree perception system.*

**SCD 7.1: Enriched virtual models based on standardized real-world data**

**Leader: AVL**
**Contributing partners: AIT, TUGRAZ**

With a focus on reliable and robust ADAS/AD systems, demonstrator SCD7.1 advances this vision by developing sophisticated methodologies for intelligent data collection, automated virtualization, and AI controller learning. This involves introducing dedicated data collection and processing pipelines to capture real-world data and virtualize it using standardized formats. These virtualized scenarios can then be utilized for AI-based controller learning strategies, as well as for validation and evaluation purposes through advanced monitoring systems. This comprehensive approach ensures the development of reliable and effective ADAS/AD systems.

With the goal of designing demonstrator SCD7.1 so that all developed components function both within a complete toolchain and as standalone tools, numerous deployment and utilization possibilities arise. Data collection and virtualization can be utilized to investigate and evaluate the performance of ADAS/AD systems or potential misbehaviours in a safe environment. Furthermore, virtualized scenarios can be used for training AI driving controllers, where the second part of the demonstrator plays an important role. The learning framework enables the training of controllers based on a diverse set of virtualized scenarios, allowing an agent to interact with the environment and receive feedback.

The validation and evaluation framework, responsible for validating ADAS/AD systems using implemented safety monitors, enables identifying potential problems in the system under test and provides valuable feedback for ADAS/AD development.

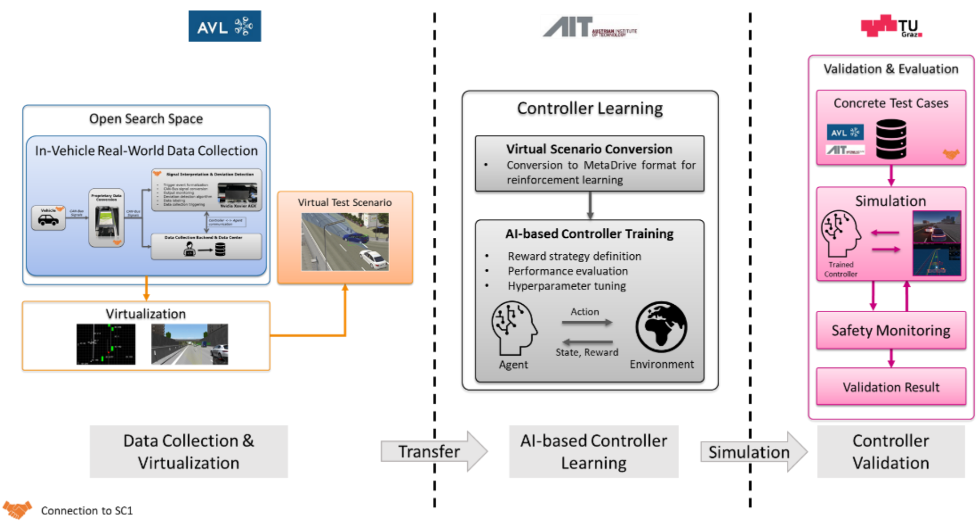


*Figure 24. High-level system level design of demonstrator SCD7.1.*

**SCD 7.3: Simulation and Virtualization for MultiModal Mobility**

**Leader: AIDIGI+**

For the software-related tasks, interfaces were developed that can ensure fully automated recording and generation of data records from the vehicle between the hardware components. These data sets were automatically read in a virtual environment for further processing and evaluation. Various approaches from the field of machine learning were used.

Based on a research vehicle, in this case an electric vehicle, various parameters were generated and extracted via the On-Board Diagnostic with CANEdge interface. These interfaces can be used to record and store thousands of vehicle parameters during a journey. This data can be further processed retrospectively and used for various evaluations with the help of machine learning approaches.

Integration of the On-Board Diagnostic with CANEdge in a Lab Environment and the integration as a prototype to test and sent data from vehicle to a virtual environment. In the project, an On-Board Diagnostic with CANEdge interface was used and further developed that was able to record parameters from various components of an electric vehicle. It was possible to record and store various variables such as voltage, current, state of charge, charging temperature, charging volume and other parameters. In addition, the ambient temperature was determined during real trips with the help of another sensor. This was set in relation to the battery parameters to obtain contextual information.


*Figure 25. LAB-Pipeline*

## AI4CSM at Conferences and Events

### TechTalk2024

On the 8th-9th of February, the AI4CSM project, together with A-IQ Ready, ARCHIMEDES, POWERIZED, FastLane, and HAL4SDV projects, was presented at the TechTalk2024 strategic event in Barcelona, Spain. The event gathered more than fifty participants to change their experience in many brainstorming sessions and define a number of strategic topics to be covered in future collaborative initiatives. Following a bottom-up approach: from the key players in the European semiconductor industry, represented by ST, NXP, and Infineon, towards all stakeholders in the value chain of e-mobility, including infrastructure, communication, and energy.

Even fifteen exciting presentations and seven Fishbowl discussions were planned for a two-day event to share expert insights and discuss challenges in mobility, future mobility needs, innovation drivers, and concluding takeaways on technology development and trends for the automotive industry.


*Figure 26: TechTalk2024 participants*


*Figure 27: AI4CSM at MESS24*

### MESS24

On the 6th-7th of June 2024, AI4CSM project was presented at the Micro-Electronic Systems Symposium 2024 (MESS24) in Vienna. AI4CSM Standardization expert and SC8 leader Erwin Schoitsch from AIT Austrian Institute of Technology presented the project poster and a collaboration between AI4CSM, A-IQ Ready, AIMS5.0, and PowerizeD projects, creating Synergies in Standardization through Research. Microelectronic Systems Symposium (MESS) focused on the following key topics: Microelectronic Systems; Measurement; Sensors; Embedded Systems; Radiotechnology; Related fields of electrical engineering and information technology. Gathering a various community, the symposium offers contributions from university and industrial research and development.

**EEAI 2024**

On the 21st-23rd of October 2024, AI4CSM was represented at the European Conference on Edge AI Technologies and Applications in Cagliari, Sardinia. This event brought together innovators and leaders in edge intelligence to explore the latest architectures, frameworks, platforms, and applications in the rapidly evolving field of AI at the edge.

A highlight for AI4CSM at the conference was a pitch presentation, sharing the project's advancements and contributions to enabling smarter, more efficient mobility solutions. Representing the research side, Anja Dakic from AIT Austrian Institute of Technology presented the project poster about her work on Enabling Reliable Communication in V2X Scenarios, a key area in supporting robust, vehicle-to-everything (V2X) communication for the future of connected mobility. The conference also featured a compelling talk by Andre Baldermann from AI4CSM partner Automotive-Team OTH Amberg-Weiden. Andre shared insights on "Federated Learning Applied on Edge-AI Hardware for Electric Vehicle Range Estimation," demonstrating how federated learning can improve range estimations for electric vehicles by utilizing edge AI.

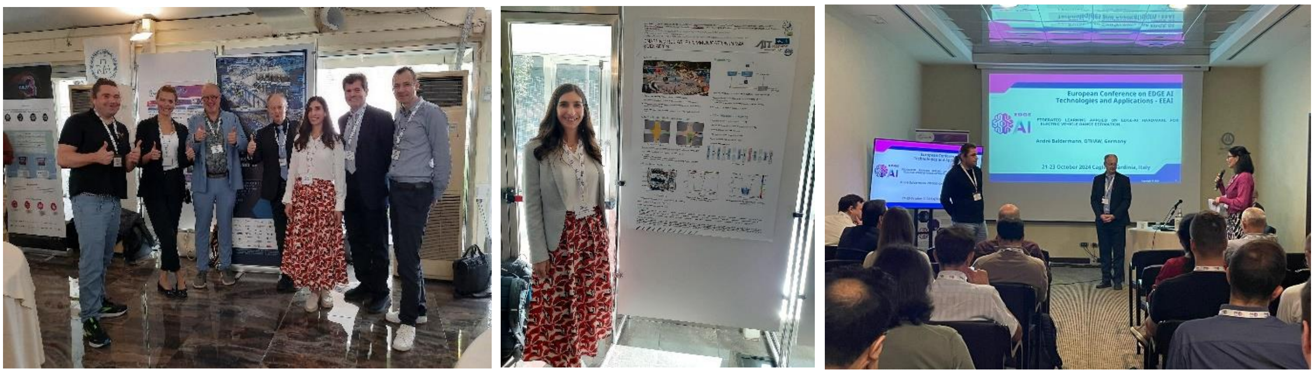

*Figure 28: AI4CSM partners at EEAI2024 conference*

**EFECS 2024**

On December 5th and 6th, 2024, the AI4CSM project was presented at the European Forum for Electronic Components and Systems (EFECS) conference and exhibition, held in Ghent, Belgium. This prestigious event brought together leading minds and organizations to shape the future of Europe's technological landscape. The EFECS 2024 conference offered a platform to explore Europe's technological and economic priorities through insightful presentations, strategic discussions and valuable networking opportunities.

AI4CSM's presence at EFECS reaffirmed its commitment to leveraging cutting-edge technology to revolutionize the transportation sector. The project's work exemplifies how collaboration within the European AI Ecosystem can help address global challenges while reinforcing Europe's leadership in innovation and sustainability. As one of the key contributors to the European AI Ecosystem, AI4CSM is paving the way for safer, more sustainable, and smarter transportation solutions.

*Figure 29: AI4CSM partners at EFECS*

**AI4CSM Standardization Team at International IEC TC56 (Dependability) Plenary Meeting**

The Plenary meeting of IEC TC56 (Dependability) (Figure 30) took place in Vienna from December 2-6, 2024. It was hosted by ÖVE (Austrian Electrotechnical Association) and supported by the Austrian Mirror Committee EG56, led by Erwin Schoitsch (AIT Austrian Institute of Technology) and Horst Lewitschnig (Infineon Austria), both also active in the AI4CSM Standardization Task. We had the opportunity to present the Standardization Synergies Roll-up Poster (see Figure 31) and give a short overview on the importance of standardization in ECSEL and Chip-JU industry-driven projects, funded by the and national funding Authorities.

*Figure 30: IEC TC56 Plenary in Vienna*

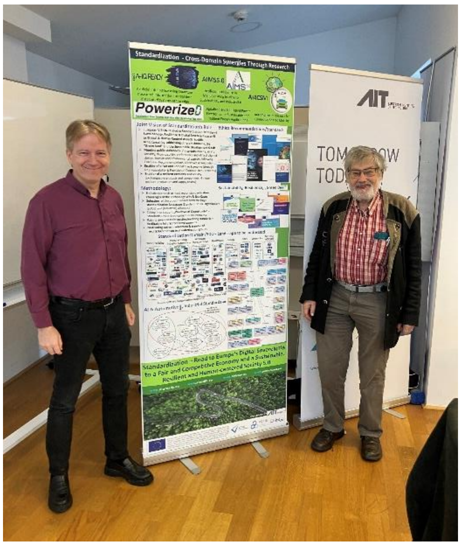

*Figure 31: Erwin Schoitsch and Horst Lewitschnig, at the Roll-up Poster*

Dependability includes reliability, availability, maintainability, and supportability, as shown in Figure 32. It is fundamental for the performance of systems and services and impacts both all types of organizations and society in general. Particularly reliability is essential in the context of hardware and semiconductors and upwards to system level.

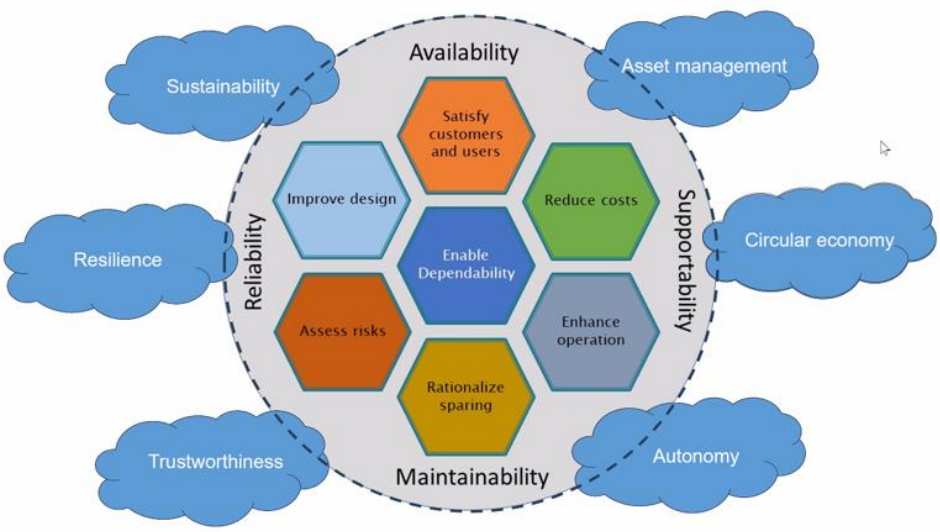


*Figure 32: IEC TC56 Dependability standardization (source: https://tc56.iec.ch/)*

Many targets of AI4CSM, specifically towards “Green Deal”, are covered by dependability standards, as shown in Figure 32, such as contributions to European goals of sustainability, resilience, circular economy, and public interest in trustworthiness of autonomous systems, and asset management in context of industrial supply chains.

## Project Partners:

## Funding

AI4CSM project received funding from the ECSEL Joint Undertaking (JU) under grant agreement No 101007326. The JU receives support from the European Union's Horizon 2020 research and innovation programme. It is co-funded by the consortium members and grants from Germany, Netherlands, Czech Republic, Austria and Norway, Belgium, Italy, Latvia, India.