# ENABLE-S3

# NEWSLETTER

01 / April 2017

## INTRODUCTION

The ECSEL JU project ENABLE-S3 (European Initiative to Enable Validation for Highly Automated Safe and Secure Systems) started in May 2016. This yearly newsletter aims at providing an overview of the project's latest developments and goals that have been achieved as well as presenting news and activities.

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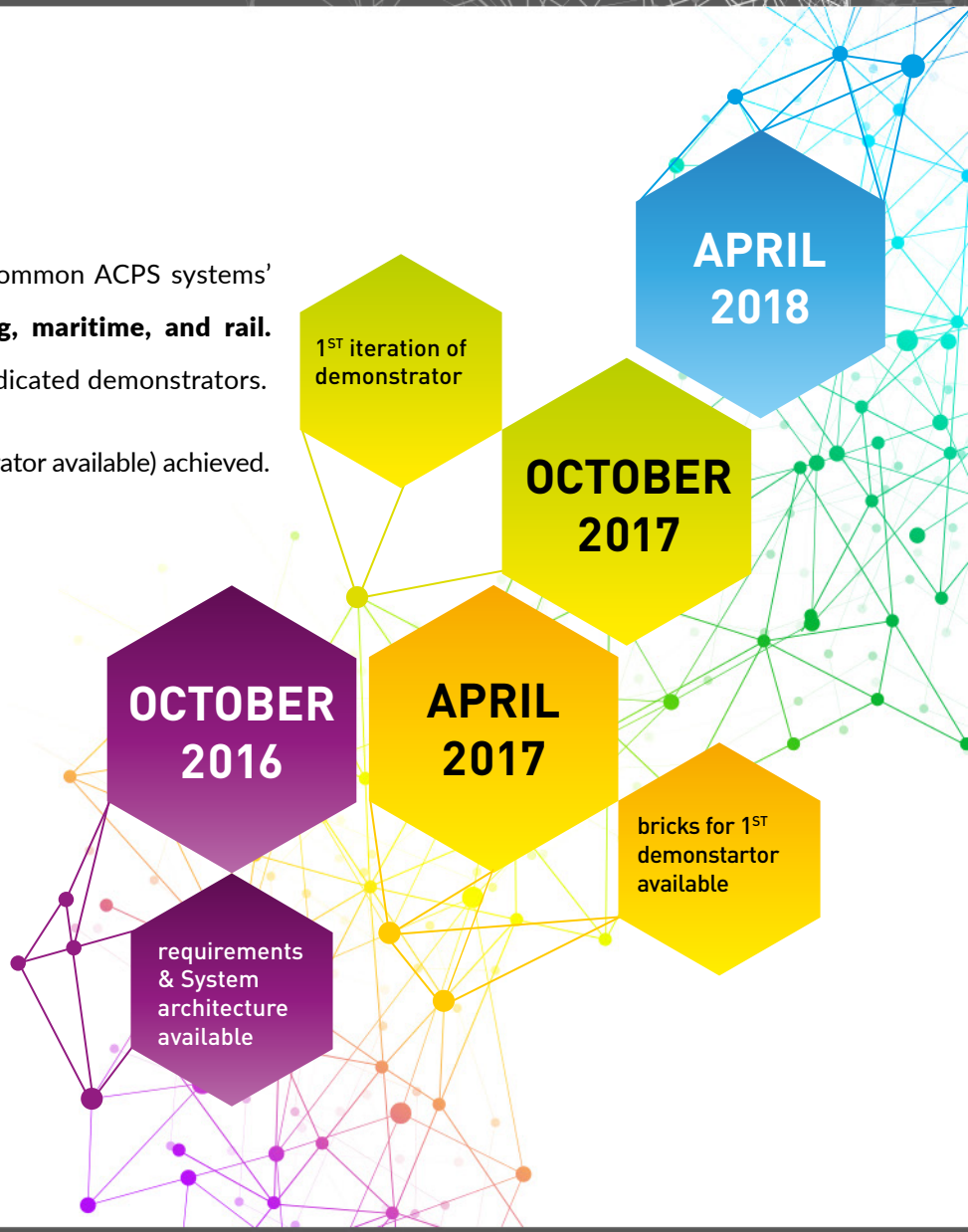
## PROJECT SUMMARY

**ENABLE-S3** is industry-driven and aspires to substitute today's cost-intensive verification & validation efforts by more advanced and efficient methods to pave the way for the commercialization of highly automated cyber physical systems (ACPS). Pure simulation cannot cover physics in detail due to its limitations in modelling and computation. Real-world tests are too expensive, too time consuming and potentially dangerous. Thus, ENABLE-S3 aims at developing an innovative solution capable of combining both worlds in an optimized manner. Driven by 12 industrial highly automated systems use-cases **from 6 industry sectors (automotive, aerospace, rail, maritime, health, farming),** the ENABLE-S3 consortium will develop a European cross-domain framework for cost-efficient verification and validation of the functionality, safety and security of ACPS, combining experts with tool suppliers and academia in order to overcome main testing challenges.

# FIRST PROJECT YEAR ACHIEVEMENTS

During the first year of the project, most of the work and effort was put on delivering common ACPS systems' architecture valid for six different domains — **aerospace, automotive, health, farming, maritime, and rail.** Components and bricks developed for the needs of certain domains will be presented in dedicated demonstrators.

- Milestones 1 (Requirements & System architecture available) and 2 (bricks for 1ST demonstrator available) achieved.
- First demonstrators already available at General Assembly in Porto (May 2017).
- Several workshops of UCs and SWPs have been conducted.
- Monthly Technical Board Meetings to align technical topics.
- Exchange with related projects such as PEGASUS and ADAPTIVE.
- First discussions with standardization organizations.
- At the end of April 2017, a total number of 37 deliverables were submitted to the ECSEL JU.



## USE CASES

ENABLE-S3 is following an **use-case driven approach.** This means that the requirements for the project are coming from industrial use cases within the 6 industrial domains and that each technical solution is required by a specific use case.

| ID | USE CASE NAME | DOMAIN |
|---|---|---|
| 1 | Highway Pilot | Automotive |
| 2 | Intersection Crossing using Autonomous Vehicles | Automotive |
| 3 | Context-Aware In-Car Reasoning System | Automotive |
| 4 | Traffic Jam Pilot with V2X | Automotive |
| 5 | Valet Parking | Automotive |
| 6 | Touch and Go Assistant | Aerospace |
| 7 | Reconfigurable Video Processor for Space | Aerospace |
| 8 | Automated Railway Command and Control Systems | Rail |
| 9 | Shore Based Bridge/Navigation Centre including Secure Data Exchange | Maritime |
| 10 | Autonomous Robotic Movements | Health |
| 11 | X-ray Imaging Automation | Health |
| 12 | Autonomous Control Platform | Farming |

# PROJECT PROGRESS & MILESTONES

In the first year of the project, two main objectives have been addressed — the detailed **specification of the use cases** and the **definition of system under test and test system requirements** for each of the ENABLE-S3 domains (Automotive, Aeronautics, Farming, Maritime, Health, and Rail). Furthermore, demonstrators were specified and first implementations have started. At the end of the project, dedicated metrics and measurements will be used by the use case owners to **evaluate the project results** and to determine whether the goal of ENABLE-S3 to replace the current costly validation techniques has been achieved. A first set of these quality metrics has been identified and will be available as a public deliverable on the ENABLE-S3 website in the upcoming months.

One of the crucial project objectives is the development of a **methodology for testing and validating highly Automated Cyber Physical Systems (ACPS)**, which can lead to the minimization of the testing effort without compromising safety, security, and quality of the final system. In the first year, the effort was put into defining inputs for the ENABLE-S3 methodology and extending the MBAT Analysis and Testing Patterns.

Based on the requirements collected from different domains, a comprehensive list of **requirements for co-simulation platform, simulation models, and sensor models** was delivered. The respective documents will be available on the ENABLE-S3 website in the upcoming months.

Achieved results are to be shown in the upcoming General Assembly meeting in Porto (23–24 May 2017). Amongst others, the following demonstrators will be shown:

*Figure 1 — Mini DrivingCube sample setup with VTD*

1. ARTEMIS Project MBAT http://www.mbat-artemis.eu/home/

**The Mini Driving-Cube (via livestream from Karlsruhe):** 1:10 Scale powertrain test bed suitable for RC model cars. The purpose is to demonstrate sensor simulation and stimulation using mono camera and ultrasonic sensors on the example of an automated driving RC car. The applied methodology (processes and software tools) can then also be applied to the final DrivingCube (real test bed).

*Figure 2 — Traffic situation in VIRES VTD*

**Context-aware in car companion:** Video of an experiment that happened in Dublin will be shown. The video will illustrate how the companion interacts with the driver.

**Valet parking initial virtual integrated system:** A virtual vehicle in the Vires VTD simulation environment will be shown. At this stage, a simple, empty park garage with no obstacles will be considered. The demonstrator will show fundamental trajectory planning, tracking and manoeuvring functions that are implemented in the system under test (as ROS nodes). Within the virtual simulation, a scenario-generation for the automatic generation of parking environments for the test system will be presented.

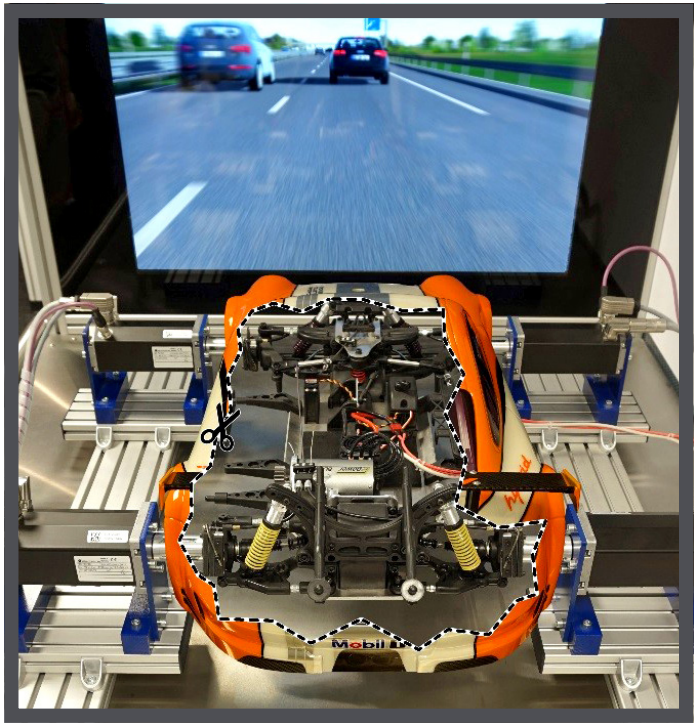
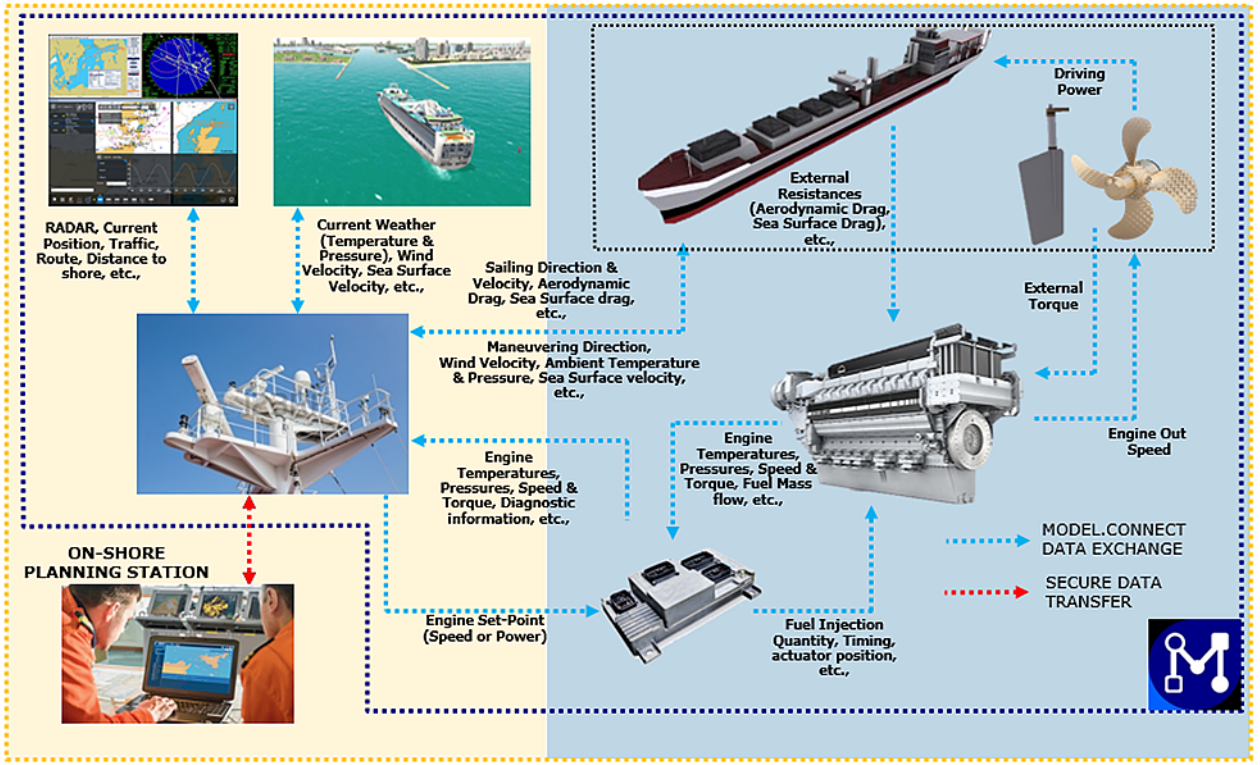


*Figure 3 — Mini DrivingCube sample setup with VTD (II)*

## RUNTIME ENVIRONMENT — HIGH LEVEL PLAN

AVL SOFTWARE AND FUNCTIONS

OFFIS OLDENBURG AVL REGENSBURG




**Virtual Ship platform** that allows the virtual validation of a planning station under different environments conditions (weather conditions, traffic conditions, etc.). The virtual ship platform is intended to be used as a part of the testing environment for the NAVTOR Shore Based Bridge validation, needed to drive the ship under safe conditions to the final destinations.

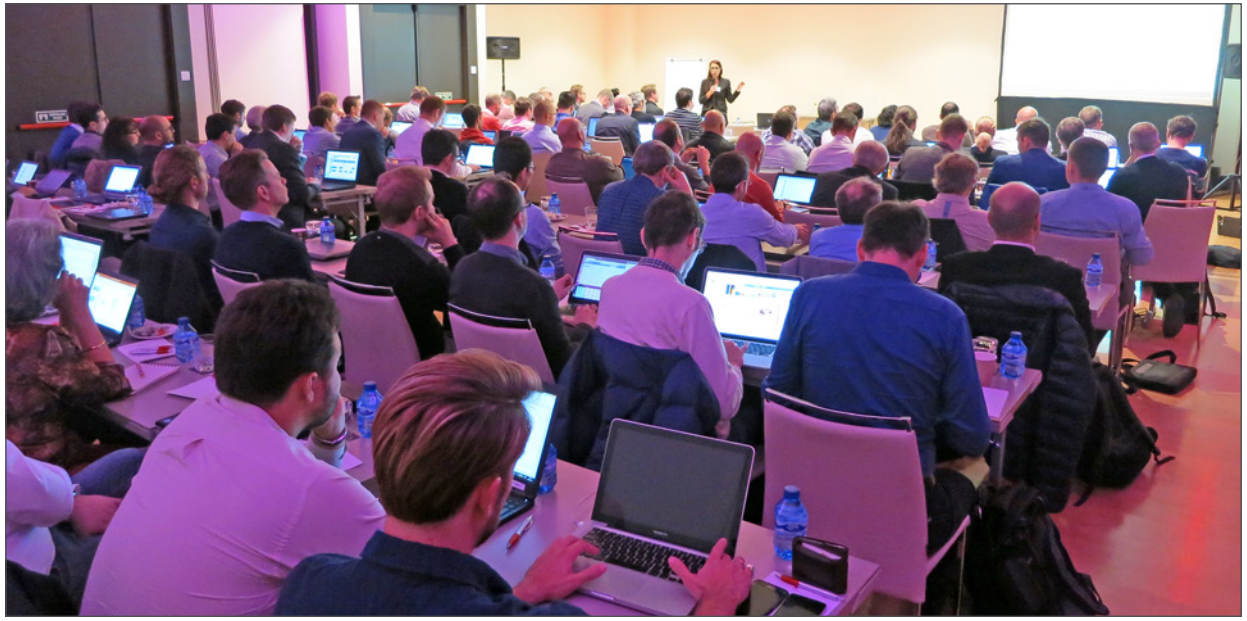
# MEETINGS

## PROJECT KICKOFF MEETING GRAZ

The project's kick-off meeting took place from 2 — 3 June at Hotel Novapark in Graz, Austria. Around 130 partner representatives joined this event and discussed the overall ENABLE-S3 objectives, domain challenges, project management as well as the project's timelines. The attendees already began working on the 12 Use Cases and workshops were held to finalize the work packages.

## GENERAL ASSEMBLY 2016

The first General Assembly Meeting took place in Madrid, from the 8th to 9th of November at the Madrid Marriott Auditorium Hotel & Conference Center. Around 92 delegates took part and discussed requirements as well as potential solution bricks during the 2-days conference. One major achievement was the introduction of the technical management process, which was implemented to keep track of the common goal of the project. In addition to that, work package (WP) presentations were held to gain understanding among all consortium's representatives of the various Work Packages. Last but not least, the delegates met in break-out sessions to work more efficiently on the different project areas. The result of the meeting was a major step forward in the elicitation of requirements and the definition of system architectures for all the use cases.



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## UPCOMING MEETINGS

ENABLE-S3

**ENABLE-S3 General Assembly Meeting 2017 – Porto;**

**23rd – 24th May 2017**

**First Review Meeting Oldenburg;**

**29th – 30th June 2017**

**Artemis Digital Innovation Forum Amsterdam;**

**10th – 11th May 2017**

**ECSEL JU Symposium – Malta;**

**13th – 14th June 2017**

# PERFORMED DISSEMINATION ACTIVITIES

**1**

**ENABLE-S3 Project Presentation**

AVL ADAS Working Group

**14.09.2016**

**AVL**

**2**

**ENABLE-S3**
Validation of Highly Automated Systems

ARTEMIS Technology Conference

**05.10.2016**

**AVL**

**3**

**PRESS RELEASE**

ARTEMIS-IA exhibition at DIF2017

**20.03.2017**

**ARTEMIS**

**4**

**Can hyperspectral technology help automated vehicles?**

10th Annual Meeting of the CEI-UPM

**23.03.2017**

UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA

**5**

**ENABLE-S3**
and scenariobased testing

CARTRE Side events to Connected and Automated Driving conference

**05.04.2017**

AVL / TNO

**6**

**Project representation with booth at DIF**

Digital Innovation Forum 2017

**10.05.2017**

**AVL / OFFIS**

# SCIENTIFIC PUBLICATIONS SUBMITTED IN 1ST YEAR

1. **[JOURNAL PAPER]**

   Statistical Model Checking for Scenario-based verification of ADAS; Sebastian Gerwinn, Eike Möhlmann, Anja Sieper; Development, Testing and Verification of Control Strategies for Advanced Driver Assistance Systems and Autonomous Driving Functions (Springer LNCIS).

2. **[TECHNICAL PAPER – CONFERENCE]**

   Model-based safety validation of the automated driving function Highway Pilot; Halil Beglerovic, Andrea Leitner, Hans-Michael Koegeler, Jürgen Holzinger, Rolf Hettel; 8th International Munich Chassis Symposium 20.06.2017 — 21.06.2017 – Munich, Germany.

3. **[TECHNICAL PAPER – CONFERENCE]**

   Mutation-Based Test-Case Generation with Ecdar; Kim G. Larsen, Florian Lorber, Brian Nielsen, Ulrik M. Nyman; 13th Workshop on Advanced in Model Based Testing (A-MOST) Co-located with ICST 2017.

4. **[JOURNAL PAPER]**

   Snook C., Hoang T.S., Butler M. (2017) Analysing Security Protocols Using Refinement in iUML-B. In: Barrett C., Davies M., Kahsai T. (eds) NASA Formal Methods. NFM 2017. Lecture Notes in Computer Science, vol 10227. Springer, Cham.

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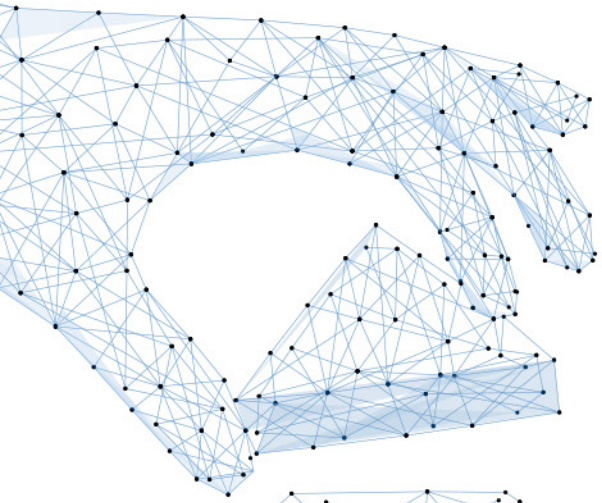

5. **[JOURNAL PAPER]**

   Simple 2-D Direction-of-Arrival Estimation Using ESPAR Antenna; Lukasz Kulas; IEEE Antennas and Wireless Propagation Letters.

6. **[TECHNICAL PAPER – CONFERENCE]**

   Improved Jamming Resistance Using Electronically Steerable Parasitic Antenna Radiator; Michal Tarkowski, Mateusz Rzymowski, Lukasz Kulas, Krzysztof Nyka; 17th IEEE International Conference on Smart Technologies IEEE EUROCON 2017.

7. **[TECHNICAL PAPER – CONFERENCE]**

   Investiagtion of Continuous Wave Jamming in an IEEE 802.15.4 Network; Jakub Rewienski, Mateusz Groth, Lukasz Kulas, Krzysztof Nyka; 17th IEEE International Conference on Smart Technologies IEEE EUROCON 2017.

8. **[TECHNICAL PAPER – CONFERENCE]**

   Direction-of-Arrival Estimation Using an ESPAR Antenna with Simplified Beam Steering; Lukasz Kulas; 47th European Microwave Conference 2017.

# CONTACT INFORMATION

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