Objectives of PEGASUS REFLECTION

The objective of PEGASUS Reflection was to evaluate the PEGASUS method regarding completeness, correctness and consistency. The second objective was to harmonize the PEGASUS Results, first internally with the project parameters but also on a national level with different stakeholders like type approval authorities and international level with the participation at symposia and workshops in relevant international committees.

Conclusion of TP4 PEGASUS Result Reflection.

The PEGASUS project has developed, implemented and tracked various approaches to internal result reflection in order to improve the quality of the project results. These are documented in the Central-Result-Reflection Table, ID-assigned & tracked. The different approaches to Central Result Reflection are described as follows below.

As well, independent stakeholders at national level were contacted and involved during the project. As a further measure, PEGASUS has promoted the work at the international level and taken into account the results of the international activities already during the project period in order to encourage joint results, harmonization and standardization.

Approaches of Central Result Reflection.

- Table of “Tracking measures”
- Questionnaire (PEGASUS internal)
- PEGASUS NEWSLETTER (project-intern)
- In-company Reflection (OEM & Tier-1 PEGASUS project partners)
- Reflection in cooperation with independent stakeholders
- with various entities and stakeholders Information~, Exchange~, Harmonization~ Activities on National Level as well as on International Level.
PEGASUS has internally reflected the results of the different partners already during project runtime to encourage joined results.

**PEGASUS Questionnaire**

Internal result reflection was performed at sub-work package (UAP level) using a questionnaire with guiding questions on sensitivity, consistency and traceability by means of:

Focus 1: **Bottom-Up reflection** to ensure that expected inputs and outputs of the different methods are consistent  
Consistency analysis of the PEGASUS method

Focus 2: **Top-Down reflection** to check whether the basis on which the building blocks were created is comprehensively documented. Critical examination of interface definition and linking between UAPs.

In addition, there was the possibility of identifying newly emerging topic areas within PEGASUS.

**In-company Reflection (OEM & Tier-1 project partner)**

Implementation of an in-company result reflection of the PEGASUS work status in the respective PEGASUS partner company with experts was performed. The extent of the reflection was adjusted at the decision of the company. At the company's discretion, the different areas such as R&D, series production, but also different functions such as requirements engineers, test engineers, product managers, quality departments, etc. were taken into account where possible.

**PEGASUS project-intern NEWSLETTER**

Since the different result reflections concern all subprojects of PEGASUS, the TP4 prepared a project internal NEWSLETTER – with a quarterly publication date – to inform the other subproject of these activities. In addition, another aim of the NEWSLETTER is to provide current feedback from the central reflection of results for further reflection.
PEGASUS has reflected the results on the national level with different partners already during project runtime to encourage joined results and aiming at harmonization.

Furthermore, exchanged described as NARIO regarding the legal perspective. As additional information, the project, appointments were set up with these authorities for technical deep dives concerning the topics “Database” & “PEGASUS tools”.

An ‘one-to-one transfer’ of the PEGASUS modules into the type approval is not directly possible. The type approval is a key point for deeper examination. A comparison of the PEGASUS activities with the proposals of OICA shows: The base of both approaches (PEGASUS and OICA) is that edge cases develop from typical driving scenarios. The proof of the typical driving scenarios must also be represented by simulation and the planned real driving tests. However, the consideration between safety (in order to obtain approval), function and customer acceptance must also be considered. The balance between the three pillars can change over time.

1. real world test drive [in the sense of an inspection drive in real traffic]
2. physical certification tests
3. audit / assessment / simulation

Furthermore, a horizontal testing combined with vertical components is considered.

Questions of interpretation regarding content were discussed, among others the PEGASUS side started the discussion on a possible digitalization of existing laws & regulations (StVO) as well as further necessary adaptations (e.g. safety distance for automated driving systems). The effects and acceptance on possible mixed traffic were considered.

In connection with the necessity of harmonization and standardization, the current activities regarding ASAM e.V. (use for the description of the scenarios the OpenDRIVE® or OpenSCENARIO® format) and ISO (see next slide) were discussed.

As part of the internationalization of the database, the aim is that the scenarios should also be described internationally in OpenDRIVE®/OpenSCENARIO®-format, so that they can be merged, exchanged and compared in the perspective of an international database.

Furthermore, the role of the PEGASUS database after the end of the PEGASUS project is under discussion. A continuation in the follow-up project V&V methods is currently conceivable. A further appointment with BMVI, BAdT after the end of the PEGASUS project is planned.
PEGASUS has reflected the results of the international activities already during project runtime to encourage joined results, harmonization & standardization.

→ Introducing PEGASUS:
   In alphabetical order:
   - China: CATARC
   - Europe: OICA, UN-ECE Horizontal Initiative, EU-Commission, EU Strategic Transport and Innovation Agenda
   - Germany: BMVI, BMWi, BMJV, KBA, BASi, DVR, ADAC, Ethics commission (Prof. Hilgendorf)
   - Korea: Hyundai
   - Japan: METI, JAMA, Toyota, Honda, Nissan
   - Singapore: CETRAN
   - USA: NHTSA, US DOT, AutoAlliance, RAND

→ Conducting events:
   - Symposium & Workshop Aachen
   - Workshop Wien
   - Workshop San Francisco
   - Workshop Tokyo
   - Symposium & Workshop Wolfsburg

→ Worldwide:
   - ISO: ISO/TC 22/SC 33/WG 9
   - ISO/TC 22/SC 33/WG 16
   - ISO TR21959 Part 2 and SOTIF
   - DIN SAE: Spec Project Terms and Definitions

→ Additional cooperation requests and bilateral exchange:
   - FP Nouvelle France Industrielle, AutoAlliance, Jaguar LandRover, Hyundai, Volvo, RDW, etc.