

# Learn to apply SOTIF principles for ADAS and AV systems according to ISO 21448:2022

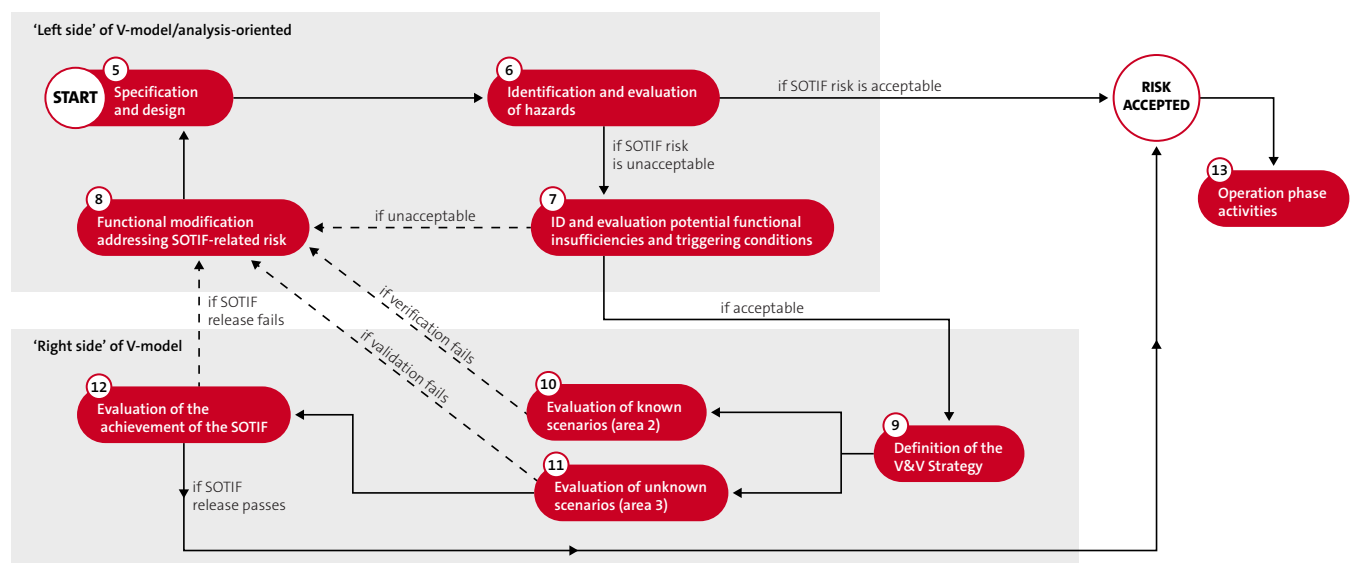
UL Solutions autonomous systems safety training helps engineers achieve safety of the intended functionality (SOTIF) for autonomous vehicles

## Course overview

This comprehensive training course, which lasts two and a half days, establishes guiding principles and practical best practices for autonomous vehicle safety as described in the ISO 21448:2022 standard – “Road vehicles – Safety of the intended functionality.” The course agenda closely aligns with the ISO 21448:2022 standard, and the relevant certification is for autonomous and semi-autonomous (or “automated driver assist”) systems ranging from Society of Automotive Engineers (SAE) autonomy level through level. Several group exercises and work examples are included to illustrate key concepts using relevant real-world automotive technologies and systems.

## Training topics

- Introduction to advanced driver assistance systems (ADAS) and autonomous vehicles (AV).
- Safety of the intended functionality (SOTIF) definitions and concepts.
- ADAS and AV system specification and design.
- Hazard Identification and Risk Evaluation (HIRE).
- Acceptance criteria, validation targets and validation efforts using rationale such as:
  - Globalement au moins aussi bon or “globally at least as good” (GAMAB).
  - “As low as reasonably practicable” (ALARP).
  - “Minimal endogenous mortality” (MEM).
- Analysis of functional insufficiencies and triggering conditions using various methods such as functional insufficiencies to triggering conditions (FI2TC), triggering conditions to functional insufficiencies (TC2FI), fault tree analysis (FTA), and systems theoretic process analysis (STPA).
- Functional modifications to reduce SOTIF risks.
- Developing a complete verification and validation strategy.
- Verification – evaluating known hazardous scenarios using scenario testing at the system and vehicle levels.
- Validation – evaluating unknown hazardous scenarios using simulation and tests.
- Defining criteria for SOTIF release and the associated SOTIF release process.
- Operating phase activities necessary for post-release implementation in the field.
- An introduction to other relevant safety standards in ADAS and AV.
- Process-oriented requirements for safety development processes.
- Wrap-up and discussion topics.





### Optional UL Certified Autonomy Safety Professional Exam

Participants who complete the full two and a half days of training are eligible to take a two-hour certification exam in the afternoon of the third day. Each participant that passes the exam is individually certified as a UL Certified Autonomy Safety Professional (UL-CASP) in ISO 21448:2022.

Upon the successful completion of the UL-CASP exam, participants will receive a certificate and badge that they can use to demonstrate their competence in the ISO 21448:2022 AV safety standard. This certification is valid for three years, after which time individuals may apply for recertification.

#### Course objectives

Upon successful completion of this workshop, you will be able to:

- Understand the fundamentals of SOTIF according to the ISO 21448:2022 framework, in order to comprehend and construct development processes for ADAS and AV systems that achieve SOTIF.
- Perform hazard identification and risk evaluation in accordance with ISO 21448:2022, including definition of acceptance criteria for validation of ADAS and AV systems.
- Analyze systems with respect to both triggering conditions and functional insufficiencies, and derive scenario-testing to fully develop and verify performance in the face of such conditions.
- Develop a verification and validation strategy to address both known and unknown hazardous scenarios, through a combination of testing methods and techniques applied at the system level and at the vehicle level.
- Understand the role of simulation, vehicle scenario testing, and vehicle field/fleet testing in the creation of a complete verification and validation argument.

#### Target audience

- AV hardware and software developers.
- Simulation engineers working with ADAS and AV verification.
- Test and validation engineers.
- Project and product leaders.
- Compliance engineers.

### Why choose UL Solutions?

From materials testing to supply chain management, new energy options to security and interoperability solutions, leverage our expertise and insights to navigate the global regulatory landscape and bring your products to market.

Our global network of state-of-the-art facilities, technical experts and partner laboratories and our extensive regulatory knowledge help manufacturers build brand trust and compete in an increasingly complex global supply chain.

**Knowledge you can trust** – Our experienced staff will support you from the initial design stage of product development through testing and production. Our experts can assist you in understanding the certification requirements for your specific markets.

**Speed and efficiency** – Our cost-effective systems and state-of-the-art facilities can help streamline the certification process and accelerate your time to market.

**Single-source provider** – We meet your compliance needs and — by bundling safety, performance and interoperability services — help you save valuable time and money.

**Global reach and access** – Our global network of expert engineers helps you understand the various national and global requirements for your specific market application.

For more information, email: [kvasales@UL.com](mailto:kvasales@UL.com)  
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