ISO 26262
Update on development of the standard

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Agenda

- Why update ISO 26262?
- What is the process for updating the standard?
- Current status of Edition 2 draft and key changes
- Wider standardization activities
- Global adoption and the challenges we perceive

A frequently asked question …

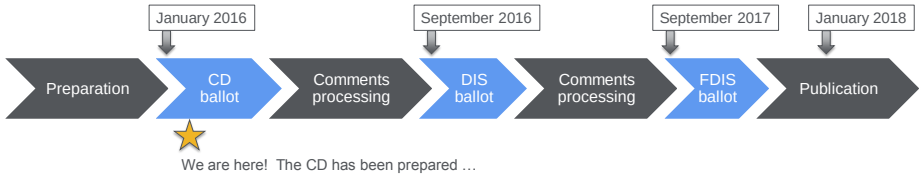
- ISO 26262 was officially published on 15 November 2011
- Almost immediately on 16 November 2011 …

Why update ISO 26262?

- Specific requirements to adapt ISO 26262 to
  - Extend scope to other types of vehicles (motorcycles, trucks, buses)
    - Motorcycles ISO/PAS 19695 and new Part 12 in Edition 2
  - Give additional guidance on semiconductor devices
    - ISO/PAS 19451 and new Part 11 in Edition 2
  - Address ADAS-related hazards caused by "normal operation" of the sensors
    - Currently will be proposed as a new work item for a separate PAS
- Other challenges include
  - Addressing highly distributed architectures
  - Moves towards autonomy
  - Cybersecurity

Timescales for the revision (simplified)

- ISO timescales
  - Require at least 3 years from first publication before revision starts
  - Likely timescale for full Edition 2 is ~ 2018 based on a 36 month project
  - Specific needs will be addressed earlier in a PAS (Publicly Available Specification)
- Timescales are approximate and may be subject to change!

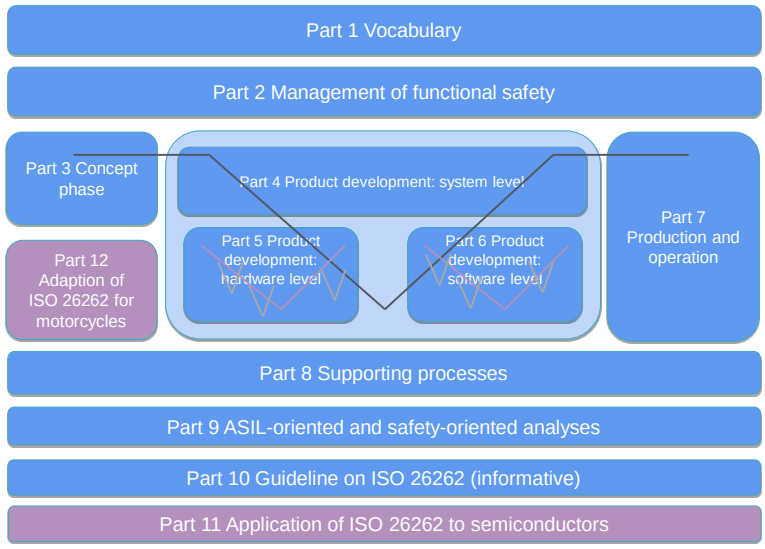


Key changes being considered for Edition 2

- Disclaimer: The CD is an internal committee document and many of the concepts are still subject to discussion and change!
- Key changes to be covered today include
  - New lifecycle
  - Part 1 – new definition of FTTI
  - Part 2 – link to cybersecurity
  - Product development at the hardware level
  - Product development at the software level
  - Semiconductors
  - Extensions to other types of vehicles

The structure of ISO 26262 Edition 2

Provisional information only and subject to change!



Fault tolerant time interval

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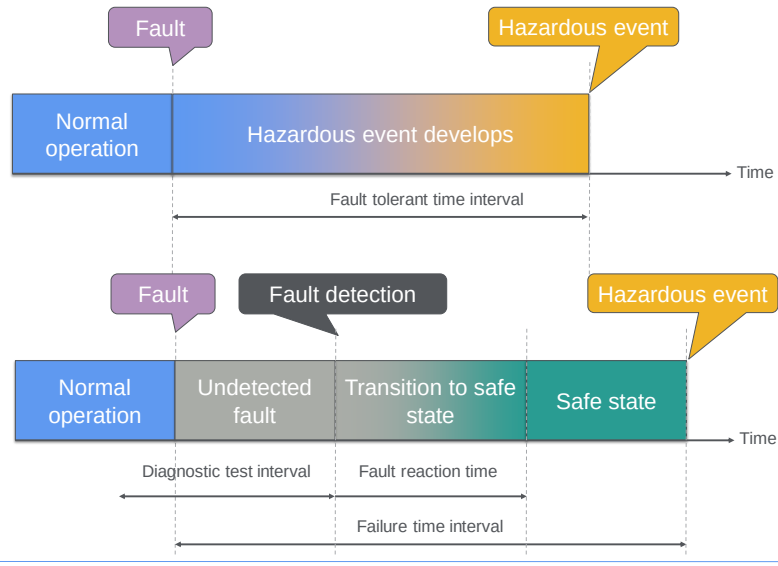

Functional safety management

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- Key new requirement to create and maintain effective communication channels between functional safety and other disciplines that are related to functional safety
  - Cybersecurity is the key activity in mind here but other disciplines can also be related
- New Annex showing example interfaces between functional safety and cybersecurity

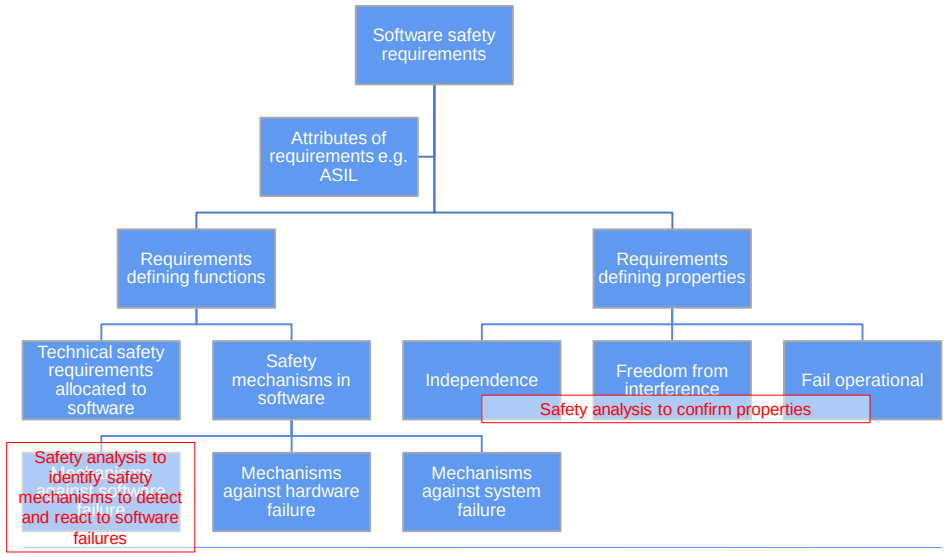
Product development at the hardware level

Provisional information only and subject to change!

- Evaluation of safety goal violations due to random hardware failures
  - Probabilistic metric (PMHF / Method 1)
    - Possibility to increase target values by up to one order of magnitude for items composed of multiple systems
  - New: residual risk assessment (“Method 3”)
    - Applied if the target values for Method 1 are not met

Product development at the software level

Provisional information only and subject to change!



Semiconductors

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Common topics

- Intellectual property
- Base failure rate estimation
- Semiconductor dependent failures analysis
- Fault injection
- Production and operation
- Interfaces within distributed developments
- Confirmation measures and functional safety audit
- Clarification of hardware integration and testing

Specific semiconductor technologies and use cases

- Digital components and memories
- Analogue/mixed signal components
- Programmable logic devices
- Multi-core components
- Sensors and transducers

What types of vehicles are in the future scope of ISO 26262?

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Class of vehicle	In scope?	Status
L1/L2	Excluded	
L3/L4/L5	In scope	PAS Integration into Edition 2
L6/L7	Not defined	
M1	In scope	Edition 1
M2/M3	In scope	Integration into Edition 2
N1/N2/N3	In scope	Integration into Edition 2
O1/O2/O3	In scope	Integration into Edition 2
Other categories	Not defined	

Motorcycles

Provisional information only and subject to change!

- Part 12 contains requirements for
  - Functional safety management (concept phase and product development)
    - Maximum I2 independence
  - Hazard analysis and risk assessment
    - Use of MSILs
    - Example tables
- Chapters from PAS on vehicle integration and testing and safety validation appear not to be included in Part 12

Trucks and buses

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- Unlike motorcycles, truck and bus requirements are integrated into the main Parts of the standard e.g.
  - Some specific requirements for hazard analysis and risk assessment
    - Management of variants in performing the analysis
    - Integration of truck and bus examples in the tables of Annex B
  - New supporting processes for
    - Development of a base vehicle for an application out of scope of ISO 26262
    - Integration of safety elements developed out of scope of ISO 26262

Link to other activities

- Related standardization activities include
  - SAE J2980™ (functional safety guidebook)
  - SAE J3061™ (cybersecurity guidebook)

SAE J2980™ – Considerations for ISO 26262 ASIL hazard classification

- Original objectives
  - Develop a global harmonized approach to determining ISO 26262 ASIL classifications for vehicle level hazards
  - Develop global harmonized ASIL classifications for vehicle level hazards
  - Develop global standard hazard metrics for harmonized ASIL classified hazards
- Membership started with US OEMs but has grown to include Europe and Japan
- Now mostly concerned with guidance on a consistent process
  - Found very quickly it was not possible to agree on “global harmonized ASIL classifications”

SAE J3061™ Recommended Practice – Cybersecurity Guidebook

- Tailors a cybersecurity process framework from the ISO 26262 process framework
  - Cybersecurity and functional safety share parallel processes e.g.
    - Threat analysis and risk assessment vs hazard analysis
    - Attack tree analysis vs fault tree analysis
  - Security countermeasures should be consistent with safety measures and safety mechanisms
  - The cybersecurity and functional safety teams need to interact

What are the challenges we perceive?

- Differing approaches to interpreting and applying the standard still exist globally
- Discussions on cybersecurity highlight the narrow focus of ISO 26262 compared to system safety and wider issues of system dependability
- Some issues associated with autonomous vehicles have been acknowledged but it is unlikely the standard will fully address autonomy in the timescales being discussed for their deployment
- Vision for 2025 (personal opinion!)
  - Edition 3 of ISO 26262?
  - Majority of cars on the road will have at least one SAE Level 1 (or above) application
  - Level 3+ systems will become more prevalent along with new entrants / new modes

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Conclusions

- ISO 26262 is already well established as the “state of the art” in development of automotive safety-related systems
- Still some variance in actual practice
- Edition 2 is under preparation addressing some of the issues in application of Edition 1 and future trends
- Further work remains to be done, particularly addressing wider issues for example
  - System assurance
  - Driverless vehicles

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