Introduction to ISO 26262

Hazard analysis

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Overview ISO 26262

- An investigation made by WHO 1997 showed that traffic accidents caused as many as 4% of all deaths worldwide. Approximately 10% of these road accidents are caused by failure in technical systems where E/E is a part of this.

- Due to the fact that the technical complexity and integration complexity are increasing in today's vehicles, the need for a defined safety strategy for automotive business is growing.

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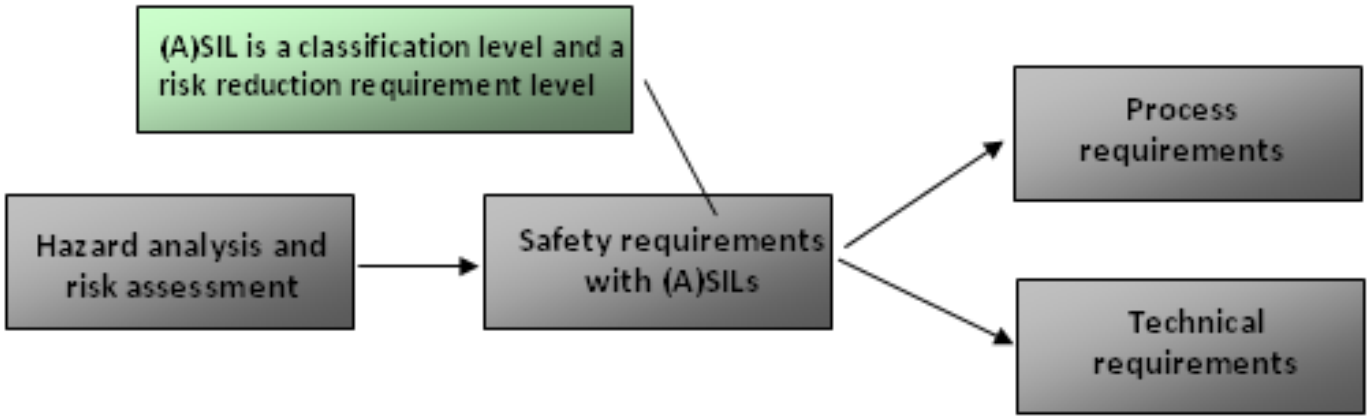
Overview ISO 26262

- **Overview of the strategy and working process to achieve a high functional safety for the automotive business.**



Hazard analysis

- Hazards are found early in the development cycle
- HA can save development time and system cost
- HA adresses function failure modes
- HA is not applied to internal components
- Hazard classification (ISO 26262) is based on 3 parameters
  - Exposure (E)
  - Severity (S)
  - Controllability (C)

Exposure classification

- Exposure is an estimation of how much or how often the user (or third party) is exposed to a situation that is hazardous if a certain failure occurs.
- Exposure is judged on item basis and not on a specific user basis.

E1	E2	E3	E4
Very low probability	Low probability	Medium probability	High probability
Not specified	< 1% of average operating time	1% - 10% of average operating time	> 10% of average operating time

Severity classification

- Severity shall be considered for all involved parties. State explicitly for who the severity is judged.
- Severity is depending on vehicle type and situation
- The involved parties may include but is not limited to:
  - Unprotected road users
  - Driver
  - Passenger(s)
  - Oncoming vehicle occupants
  - Vehicle(s) in behind occupants
  - Service personnel
  - Production personnel

S0	S1	S2	S3
No injuries	Light and moderate injuries	Severe injuries, possibly life-threatening, survival probable	Life-threatening injuries (survival uncertain) or fatal injuries
Damage that cannot be classified safety-related	> 10% probability of AIS 1-6	> 10% probability of AIS 3-6	> 10% probability of AIS 5-6

AIS – Abbreviated Injury Scale

1. Minor
2. Moderate
3. Serious
4. Severe
5. Critical
6. Maximum

Controllability classification

- Controllability is classified from the ability of any driver/user or other road user(s) to avoid harm.
- Mitigations by other technical systems are not considered when classifying controllability.
- Driver reaction time, misuse, preventive action shall be considered when judging controllability

C0	C1	C2	C3
Controllable in general	Simply controllable	Normally controllable	Difficult to control or uncontrollable
	99% or more of all drivers or other traffic participantsare usually able to avoid a specific harm	90% or more of all drivers or other traffic participantsare usually able to avoid a specific harm	Less than 90% or more of all drivers or other traffic participantsare usually able to avoid a specific harm

Hazard analysis

		C1	C2	C3
S1	E1	QM	QM	QM
	E2	QM	QM	QM
	E3	QM	QM	A
	E4	QM	A	B
S2	E1	QM	QM	QM
	E2	QM	QM	A
	E3	QM	A	B
	E4	A	B	C
S3	E1	QM	QM	A
	E2	QM	A	B
	E3	A	B	C
	E4	B	C	D

Classification example

- Simplified example for steer-by-wire functionality

Function	Failure mode	Situation	E	S	C	ASIL	Safety goal
Steer-by-wire	Commission	Driving at high speed	E4	S3	C3	D	Steer-by-wire shall not steer unintended during driving
	Stuck	Driving at high speed	E4	S3	C3	D	Steer-by-wire shall not lock during driving