Safety and Security
Opportunities for Eclipse?

Presentation to the Board of Directors of the Eclipse Foundation

Santa Clara, 21 March 2011

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Product and Service Properties vs. “Affected” Industries

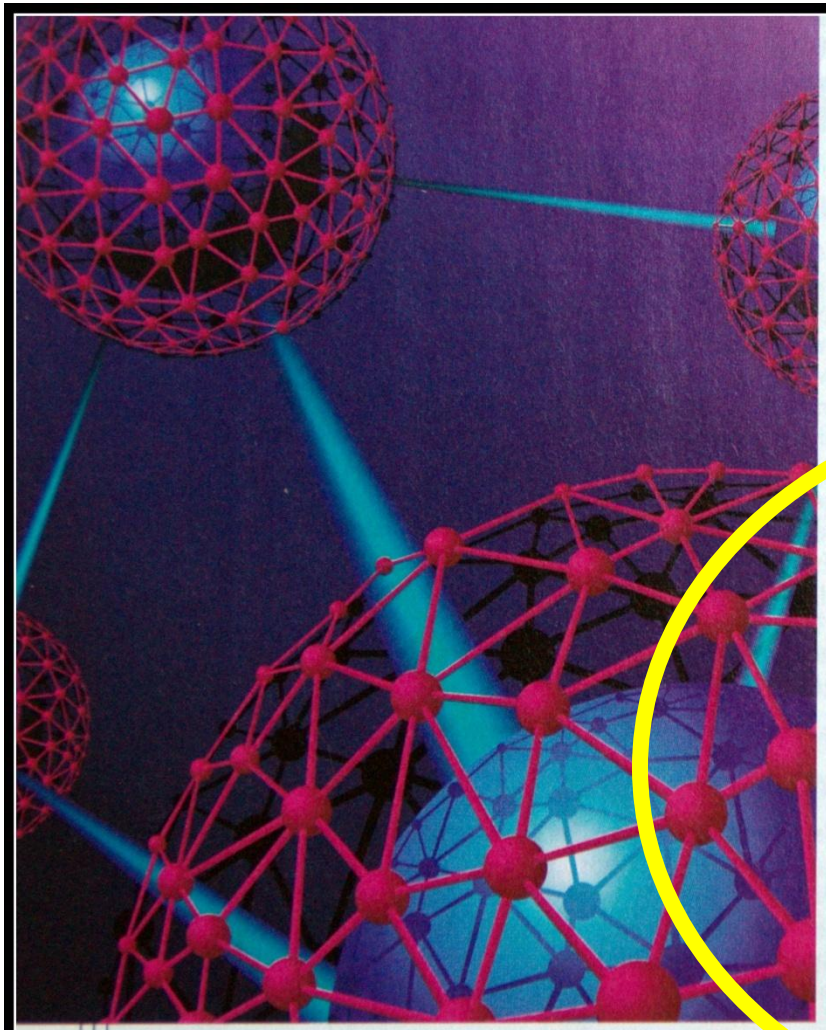
- Safety
  - Aerospace
  - Transport
  - Automotive
  - Medical devices
  - …
- Security
  - Defence
  - Communications
  - Finance
  - …
  - *Automotive*

Compliance with regulatory frameworks needs to be demonstrated.
These can be based on industry or on general standards.

The **Internet of Things** makes the situation worse …

Safety and security requirements behave like epidemics …

… all connected systems get “infected”



GUEST EDITORS' INTRODUCTION: EVOLVING CRITICAL SYSTEMS

Lorcan Coyle, Mike Hinchey, and Bashar Nuseibeh, *Lero—the Irish Software Engineering Research Centre*
José Luiz Fiadeiro, *University of Leicester*

Example:

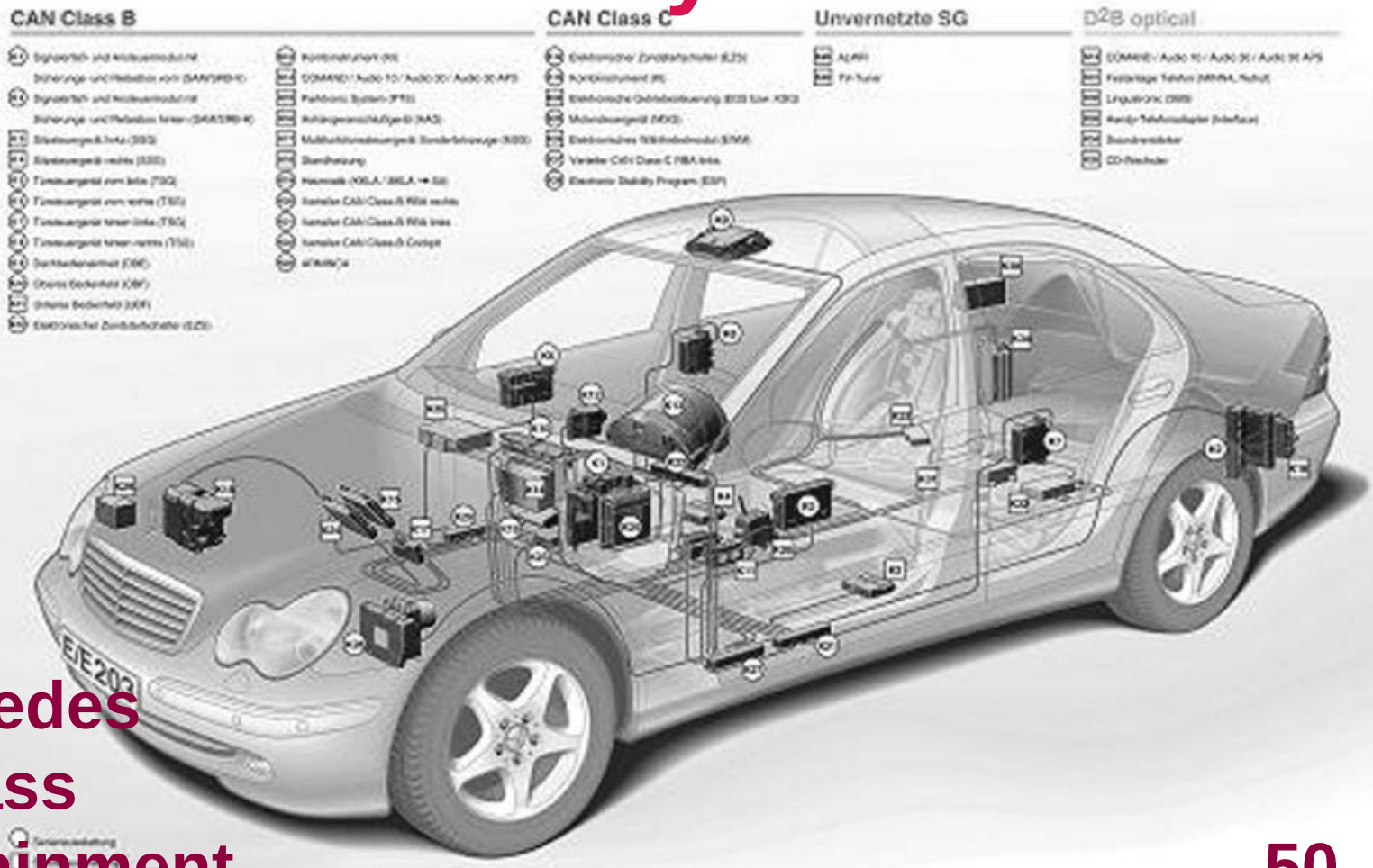
Safety

and

Automotive Industry


The only automobiles
without software.

90% of automotive innovations are realised by software



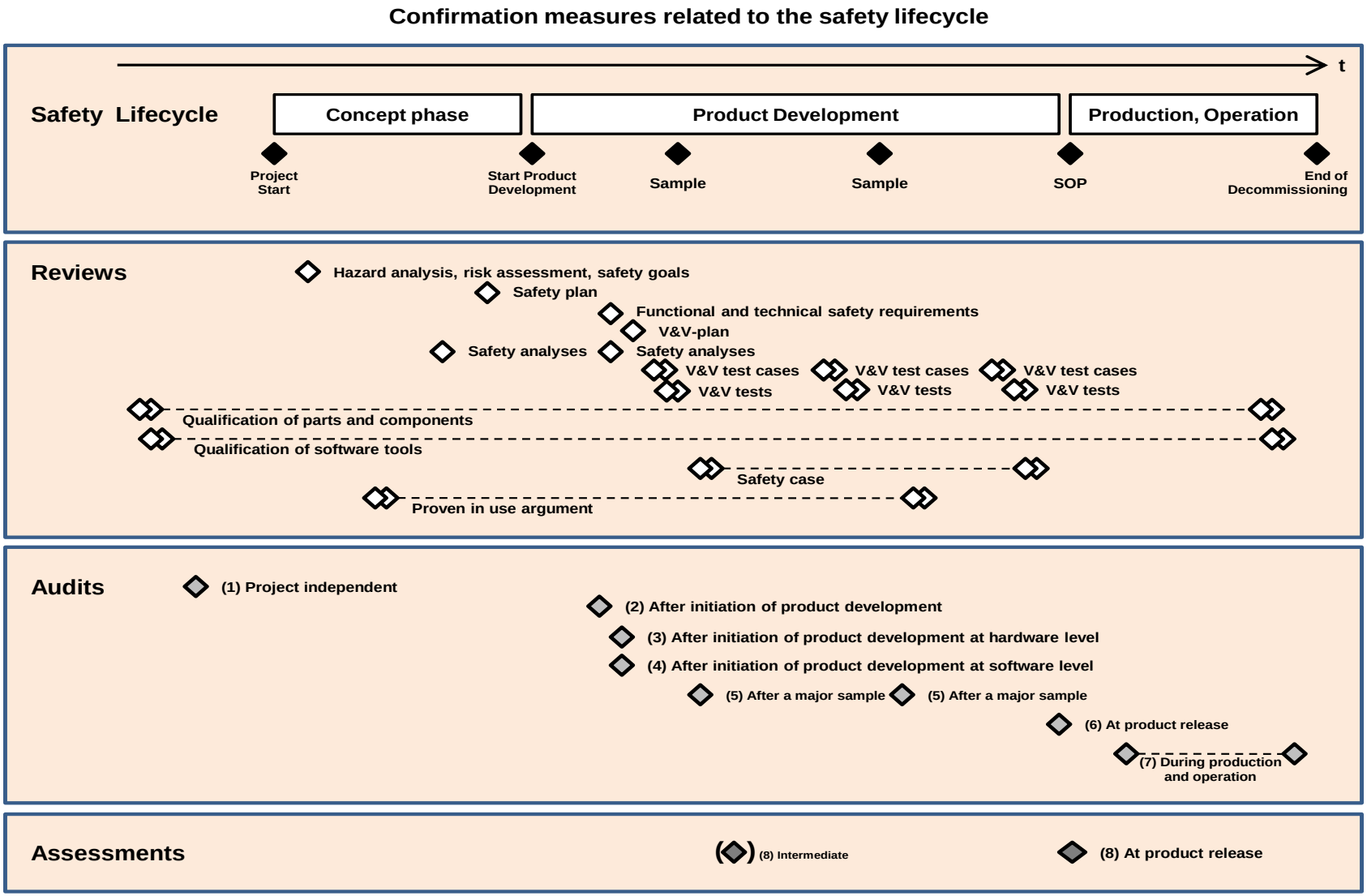
Mercedes S-Class
Infotainment Subsystem
20 Mio. LOC

50 – 100 networked ECUs

Regulatory Framework for Safety in Automotive

- ISO DIS **26262**
  - Based on ISO/IEC 61508
  - Driven by the automotive industry
  - More specific to industry needs in requirements both on process and product/service

Functional Safety Development Life Cycle



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State of method and tool support for a ISO DIS 26262-based functional safety development lifecycle

- There is **method** support for **most** of the activities in the functional safety lifecycle.
- There are **tools** for **many** of the individual activities, but not for all.
- The is **no** underlying **lifecycle support** for integration and traceability.

Everybody is expected to do their own thing … best practice:FSSC

Integrated Functional Safety Support Centre (FSSC)

The project side: Develop safe products

Planning functional safety in projects

- Sales support
- Supplier management
- Functional safety plan including
  - Analyses, design, and test for safety
  - Confirmation measures
  - Project safety process
- Safety know-how

Managing functional safety in projects

- Hazard analysis and risk assessment
- Functional and technical safety concept
- Safety architecture
- Safety analyses (FTA, FMEDA, …)
- Test support
- Reviews, audits, assessments
- Safety case

FSSC
Strategy and Control

Establish functional safety competence

- Safety training
- Safety job aid workshop
- Design for functional safety
- Safety analyses training (H&A, FTA, FMEDA)
- Testing safety-related products
- Functional safety networking
- Functional Safety Engineer Automotive

Managing functional safety for the Organization

- Safety process compliance check
- Provide organizational processes for safety
- Qualification of hard- and software components
- Qualification of software tools

The organizational side: Achieve functional safety capability

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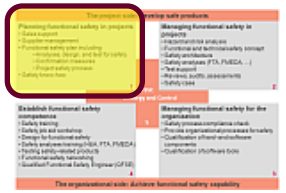
Planning Functional Safety in Projects

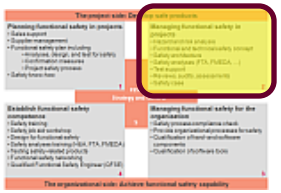
Task descriptions



Task	Description
Sales support	The Functional Safety Manager supports the sales department during the project preparation phase. He reviews the requests for quotation and the offers and estimates the impact of safety requirements on the project.
Supplier management	Project Manager and Safety Engineer develop and review the development interface agreements with the suppliers. The Safety Engineer is responsible for the safety-related deliverables e.g. safety requirements, safety verification results, analysis results.
Functional safety planning	The Safety Engineer sets up the safety plan describing the project specific safety lifecycle and tasks. The Project Manager is responsible to assign resources to the safety-related tasks and to update the project plan accordingly.
Safety know-how planning	Project Safety Engineer in cooperation with a competent trainer identifies the safety-related know-how needs of the project and plans trainings for the project team or know-how transfer from outside the project.

Managing Functional Safety in Projects

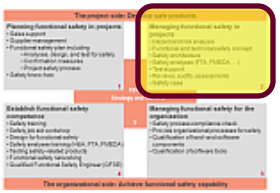
Task descriptions



Task	Description
Hazard analysis and risk assessment	Hazard analysis and risk assessment is performed by a team of experts once in the concept phase of the customer project and at any change of the safety-related system as part of impact analysis. Results are safety goals, top level safety requirements, and safety integrity levels required.
Functional and technical safety concept	During the concept phase hardware and software architects derive the functional safety requirements from the top level safety requirements. In a next step during product development they create the specification of the technical safety requirements.
Safety analyses (FTA, FMEDA)	Safety analyses are performed by a team of experts during system design to identify causes and effects of systematic failures and to initiate design improvements. Quantitative analyses are performed to estimate failure rates and to support safety validation.

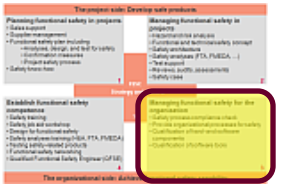
Managing Functional Safety in Projects

Task descriptions



Task	Description
Testing	Testers supported by the Project Safety Engineer apply the test methods prescribed by the safety standard to verify that the product and its components comply with the safety requirements.
Reviews	Reviewers supported by the Project Safety Engineer examine work products to provide evidence that they meet safety requirements.
Audits	Auditors examine processes applied in the project to provide evidence that their implementation meets the process-related requirements of the safety standard.
Compiling safety case	The Project Safety Engineer progressively compiles the argument that the safety goals are complete and satisfied.
Safety assessments	The Safety Assessor assess the functional safety achieved by the item. Assessments include the product, the work products, the processes required for functional safety, and a general review of safety measures.

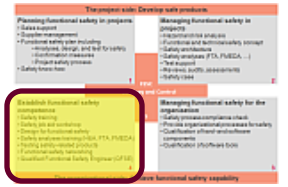
Managing Functional Safety for the Organization
Task descriptions



Task	Description
Check process assets for safety compliance	The Safety Assessor checks process assets of the organization to identify gaps with respect to the process-related requirements of the safety standard.
Provide organizational processes for safety	The Functional Safety Manager is responsible to close the identified process gaps by providing organizational processes (e.g. safety analysis process) that comply with process requirements of the safety standard and can be applied in safety-related projects.
Qualification of hardware and software components	The Functional Safety Manager ensures that only qualified hardware and software components are used in safety-related projects. He is responsible to manage qualification testing and to provide qualification reports for components.
Qualification of software tools	The Functional Safety Manager ensures that software tools applied in safety-related development are qualified according to requirements of the safety standard.

Establish Functional Safety Competence

Task descriptions



Task	Description
Safety training including • Job-aid workshop • Design for safety • Safety analyses • Testing	Safety trainings are planned and performed according to the qualification needs of the projects staff. A competent safety trainer moderates the workshops.
Functional safety networking	Networking supports the exchange of information and experiences related to functional safety. Practitioners learn from practitioners.

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Where is the opportunity for Eclipse?

- Solve the support deficiencies by providing a “Functional Safety Lifecycle Support” platform

- Automotive Functional Safety Platform on Eclipse
  - Integration
  - Traceability
  - New tools

- Why Eclipse and Open Source?
  - Functional safety should be the hallmark of an industry, and not the competitive advantage of a few leading companies.

EAIWG

2008 Automotive Interest Group

- 15 interested companies

2011 EAIWG - - key automotive players

- BMW
- Bosch
- Continental

EAIWG

Holy Grail → Common Automotive Tool Chain

Realistic → Integration to improve Traceability

Current Key Topics

- CDT
- Large Models
- *Functional Safety*
  - *E.g. collate topic related practices and tools from other domains.*

Related

Sphinx (ARTOP), TOPCASED, Opees, OpenETCS, …

Generalise the Functional Safety Considerations as “plugins”

- Safety
  - Aerospace
  - Transport
  - Automotive
  - Medical devices
  - …
- Security
  - Defence
  - Communications
  - Finance
  - …
  - *Automotive*

Different standards and different practices
Similar approach

What comes after safety and security ?

- Reliability ad robustness (ruggedness)
- Accessibility

And the pattern of spread will be equally explosive!

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