Safety, Security, Quality
Artificial Intelligence versus Common Sense

Embedded Linux Conference
North America 2020

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Introduction & Overview

About

- Siemens Corporate Technology: Corporate Competence Centre Embedded Linux
- Technical University of Applied Science Regensburg
  - Theoretical Computer Science
  - Head of Digitalisation Laboratory
**Current Research Trends**
- Empirical, quantitative, evidence based software engineering
- Automated software engineering/construction

**Why investigate Linux?**
- Among largest collective engineering undertakings of mankind
- Open, public development data beyond source code
- Understand development, integration, ... processes: Growing importance
“Compliance to the Standards” is becoming mandatory. However, existing standards are hardly applicable to OSS. The challenge is to establish a general certification process for OSS/Linux.

Here are some functional safety standards:

- **Electrical Power Drive**: IEC 61800
- **Nuclear Power Plants**: IEC 61513
- **Medical Device Software**: IEC 62304
- **Railways**: IEC 62278
- **Industrial Process**: IEC 61511
- **Robotic Devices**: ISO 10218
- **Machinery**: IEC 62061
- **Automotive**: ISO 26262

These standards can be considered as an "umbrella" standard, IEC 61508, which provides a comprehensive framework for safety-related systems.

**Routes to Safety**

- Standard compliant development
- Proven in use
- Compliant non-compliant development
Ultra Long Term Maintained Systems and Civil Infrastructure

Civil Infrastructure Platform

- Maintain Linux systems for 10+ (hopefully 20+) years
- Supporter of Debian LTS
- Strong interest in reproducible builds
- Automated SW engineering!
- Quantifying processes: Trust, involvement, ...
SWE4ML vs. ML4SWE
Selecting Examples

- 100s of SW engineering papers published each year
- Debian often not explicitly mentioned
- Choice: Unfair & subjective!

Method

- Limit: WebOfScience + appropriate keywords
- Select subset

Result

- 34 representative papers
- Apologies for not covering them in detail
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Categories

- Quality and Reliability
- Communities, cooperation and processes
- Testing and analysing code at large scale
- Understanding licensing and code sharing
- Effort Estimation
Quality and Reliability
Communities, Cooperation, Processes
Effort Estimation
Challenges
Conclusion

Thin Points and Fat Tails
Thanks for your interest!