

# EMI RISK MANAGEMENT

At the crossroads of EMC and Functional Safety

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# Safety Lifecycle

Phase 0  
Risk  
Assessment

Phase 1  
Safety  
Analysis

Phase 2  
Speci-  
fication

Phase 3  
Verification

- EMC testing primarily based on a rule and test-based approach.
- Mostly deals with compliance testing based on frequency spectrums.
- Does not take into account safety implications of EMI events.

- IEC-61508 enlists safety integrity requirements.
- EMC aspects are not adequately covered.

Functional Safety hazards due to EMI are not addressed!

A Risk based approach  
needed instead of a  
test-based approach

### A Harsher EM Environment foreseen

- Increasing use of electronic devices in Safety Critical Applications.
- Higher susceptibility of digital circuitry operated at low voltages.
- Use of Switched mode power supplies and VFDs.
- Higher bandwidth requirements for wireless communications.

Functional Safety  
risks due to EMC  
higher than ever  
before!

# The Impending Revolution

1980-2000 : Computer Revolution



2000-2010 : The Mobile Phone Revolution

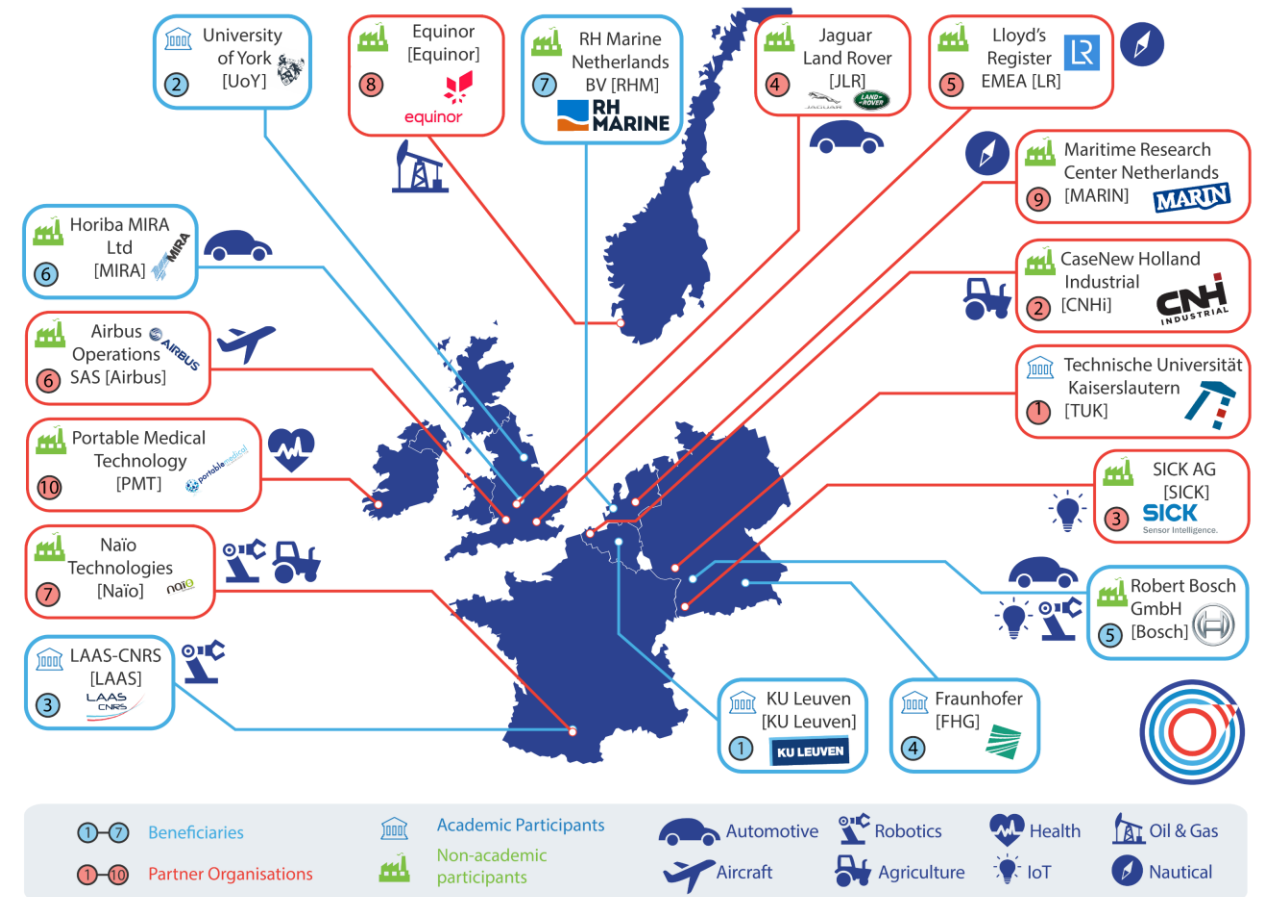


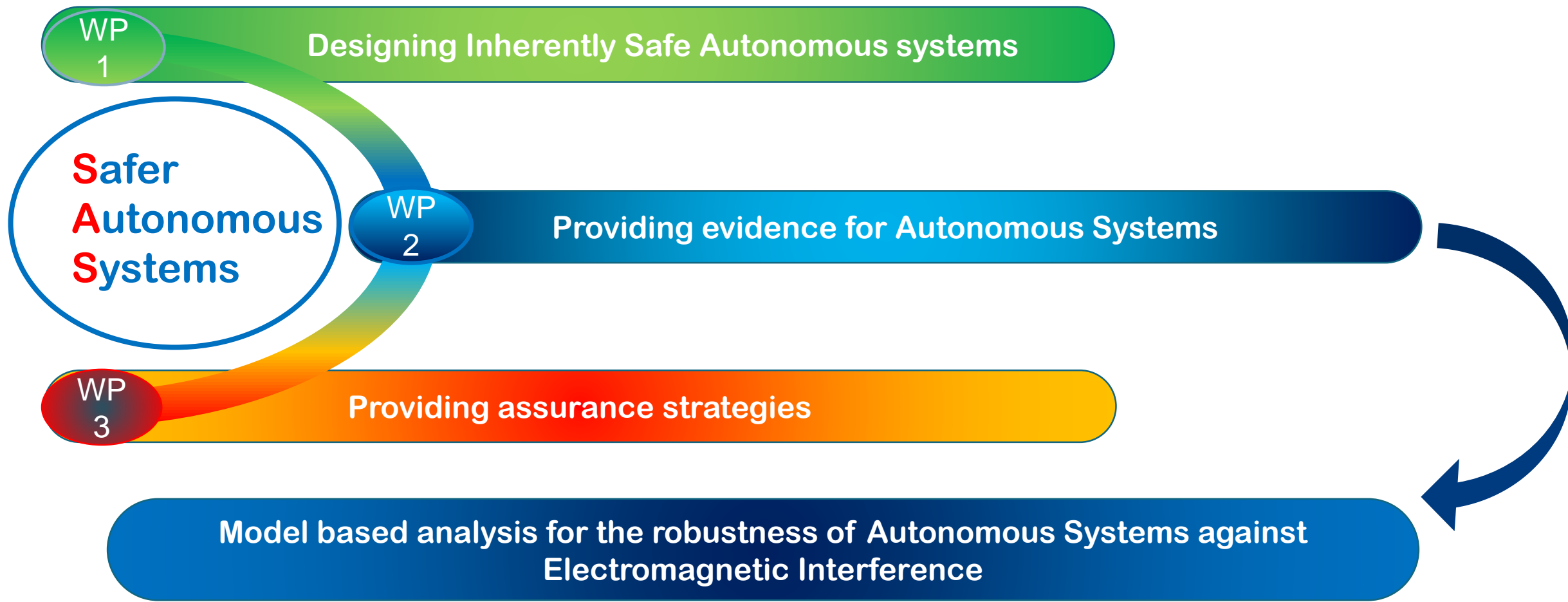
**Autonomous Systems**  
Pundits estimate a 42 billion-dollar industry  
However **Safety** remains a major concern!



# TRUST MATTERS

## Safer Autonomous Systems Ensuring Reliability of Autonomous Systems

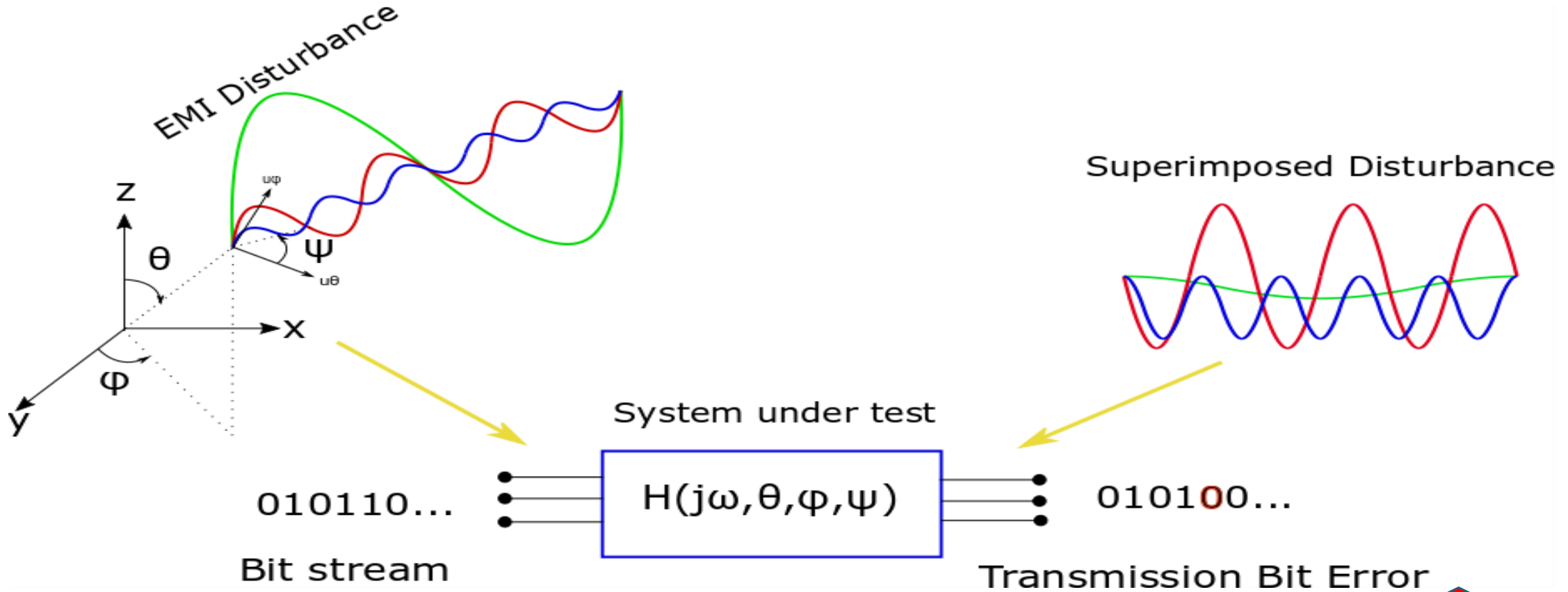




## Research Objectives

- Applying Functional Safety hardening techniques and measures for hardware design
- Tackling the challenges of deterministic EMI
- Embedding Fault Error detection in EMI analysis

# EM Diverse Systems



Redundancy

EMI Diversity

Majority Voting

EMI Risk  
Assessment

# Conclusions

- EMI testing based on confidence interval testing insufficient.
- 5% confidence interval testing inadequate
- Bridging this gap between EMC and Functional Safety.
- Fault tolerant behavior and probabilistic risk assessment.
- Current Research in the KU-Leuven M-group is focused on modeling real life scenarios.
- Of prime importance for Autonomous system safety.



# Dissemination and Outreach

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BLOG

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