

Explainable AI for Systems with Functional Safety Requirements

Context overview by Jaume Abella



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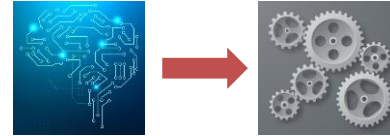
Critical Embedded Systems and AI

- **AI techniques** are at the very heart of the realization of **advanced software functions** such as **computer vision for object detection** and tracking, path planning, driver-monitoring systems,...
- **Till today, AI mostly in fail-safe systems** (i.e. systems with a safe state)
 - Supervise the AI-based functionality and, if it fails, switch it off, switch to a degraded mode, etc.
 - AI software without safety requirements
- **No longer possible with fully-autonomous systems**
 - AI software inherits safety requirements, so it must adhere to a development process guaranteeing functional safety
- Challenge: **AI software development does not adhere to the process for usual control software**
 - **Empirical** development without explicit and precise requirements
 - **Data-based** software design
 - **Not “correct-by-construction”**
 - **Monolithic** architecture

SAFEXPLAIN ambition

- Architecting DL solutions **enabling certification/qualification**

- Making them **adhere to “safety culture”**



- Preserving **high performance**



- Tailoring solutions to **varying safety requirements** (e.g., different safety needs for a coffee machine and a plane)



OCT 2022 – SEP 2025

SAFEXPLAIN

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Critical Embedded Systems based on AI

BARCELONA SUPERCOMPUTING
CENTER (BSC) (**coordinator**)

<https://www.bsc.es/>

IKERLAN, S. Coop (IKR)

<https://www.ikerlan.es/>

AIKO SRL (AIKO)

<https://www.aikospace.com/>

RISE RESEARCH INSTITUTES OF
SWEDEN AB (RISE)

<https://www.ri.se/>

NAVINFO EUROPE BV (NAV)

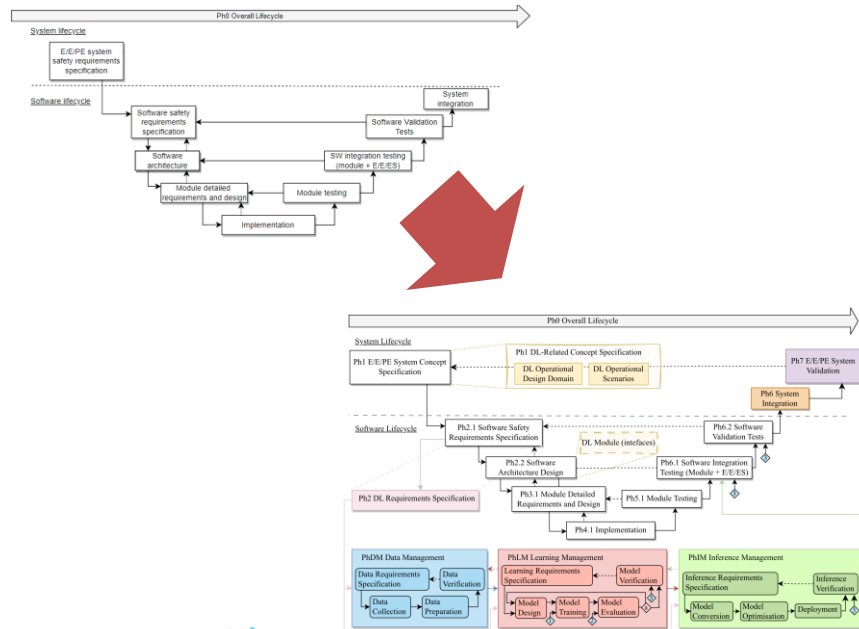
<https://www.navinfo.eu/>

EXIDA DEVELOPMENT SRL (EXI)

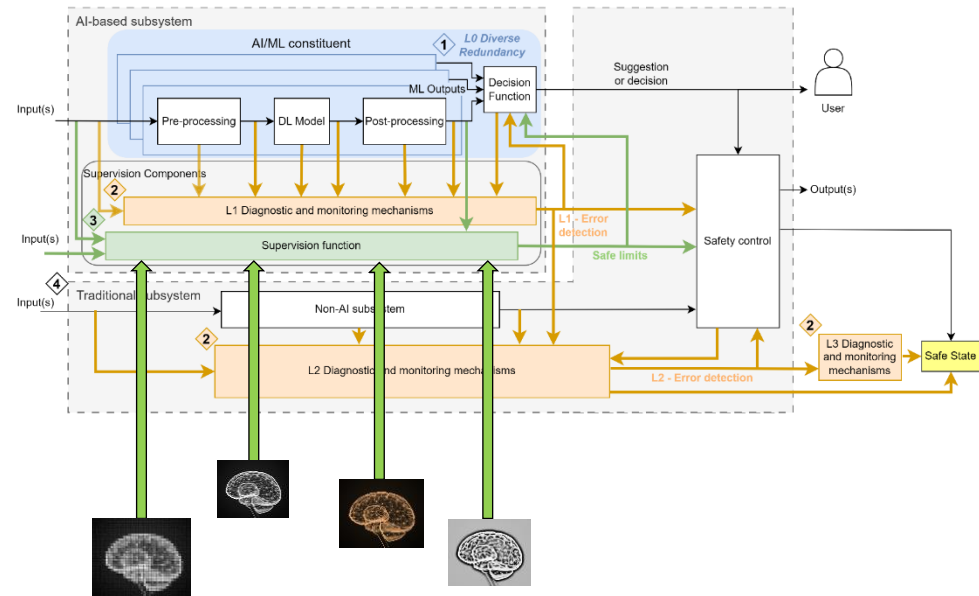
<https://www.exida-eu.com/>

DL solutions building on XAI

- New development process
 - **XAI** needed to make the system be **correct-by-construction** despite building on AI



- New software architecture
 - **XAI** needed for **supervision** and realization of **safety measures**





Thank You



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Funded by
the European Union

This project has received funding from the European Union's Horizon Europe programme under grant agreement number 101069595.

