Formalizations of CPS Lifecycle Knowledge for Zero-Downtime

Formal Methods Markov Processes Fault Trees Car uncontrollable ✓ Intelligent decision making OR Rear brakes Front brakes ✓ Formal guarantees failed failed Car failure Operational uncontrollable **AND** Steering fails Front brakes Rear brakes failed failed Rear brakes Front brakes fail repair Supports Top-down Integrated knowledge Ontological Analysis WP3 Aligned communication WP4 ✓ Domain understanding Bottom-up WP3 Knowledge Sources WP4 Supports Logs and Traces Operations manuals Field Service Engineers Operations ✓ Domain-native models **End-users** ✓ Traceability ✓ Expert in the loop Maintenance Maintenance manuals Design Capella MBSE Support SysMI Engineers







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