Project SAFARI
Secure Automation for Advanced Reactor Innovation

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SAFARI Overview

**GOAL**
Reduce NPP O&M costs by delivering a capability which will enable smart functionalities in advanced reactor systems including:
- Autonomous, flexible operations
- Predictive maintenance
- Agile Design
- System and sensors optimization

**DEMO** Kairos FHR

**END PRODUCT**
Physics-based, data-enabled, modular and scalable capability that can be extended and applied to any reactor technology
Project Team Organization

PROJECT DIRECTOR
A. Manera (UM)

Deputy Administrative Director
T. Downar (UM)

Deputy Technical Directors
H. Garcia (INL), R. Vilim (ANL)

Task 1: Digital Twins
Lead: K. Duraisamy (UM)

Task 2: MPE module
Lead: H. Garcia (INL)

Task 3: OIC module
Lead: R. Vilim (ANL)

Task 4: ODS module
Lead: H. Garcia (INL)

Task 5: Molten Salt Loop
Lead: X. Sun (UM)

Task 6: Demo on FHR
Lead: T. Downar (UM)

COMMERCIALIZATION
Theresa Sutter (CW)

ADVISORS
B. Huges (KAIROS)
C. Kerr (EPRI)
P. Tomski (SAS)

Brandon Haugh (KAIROS)
Central to SAFARI is a scalable digital-twin

OUTCOMES
- Accurate and reliable models that can be used in decision support systems
- Will feed into controls, health-assessment and supervision

No BLACK-BOX AI Approach!

Physics-based Digital Twin to ensure robustness over the entire range of operations and data-enabled to enhance predictive capabilities
SAFARI Validation

- Well-instrumented, controllable, and sophisticated high-temperature molten salt testbed
- Comprehensive experimental databases (with and without feedback and operator action) for model validation
- Experimental demonstration of proposed capability-enabling functionalities
SAFARI Demonstration

- aid and optimize the plant design
- optimize sensor location
- aid selection of control strategies
- provide autonomous control, including load follow
- allows for predictive maintenance of selected high-risk components
Commercialization of SAFARI Tool

Lead by CURTISS-WRIGHT

- Definition of system architecture (software structure) [Q2]
- Software formal test plan [Q7]
- Roll-out of technology road-map [Q12]