

Integrated Transmission, Distribution, and Communication Models

Performers: PNNL, LLNL, NREL, ANL, ORNL, SNL, INL



Project Description

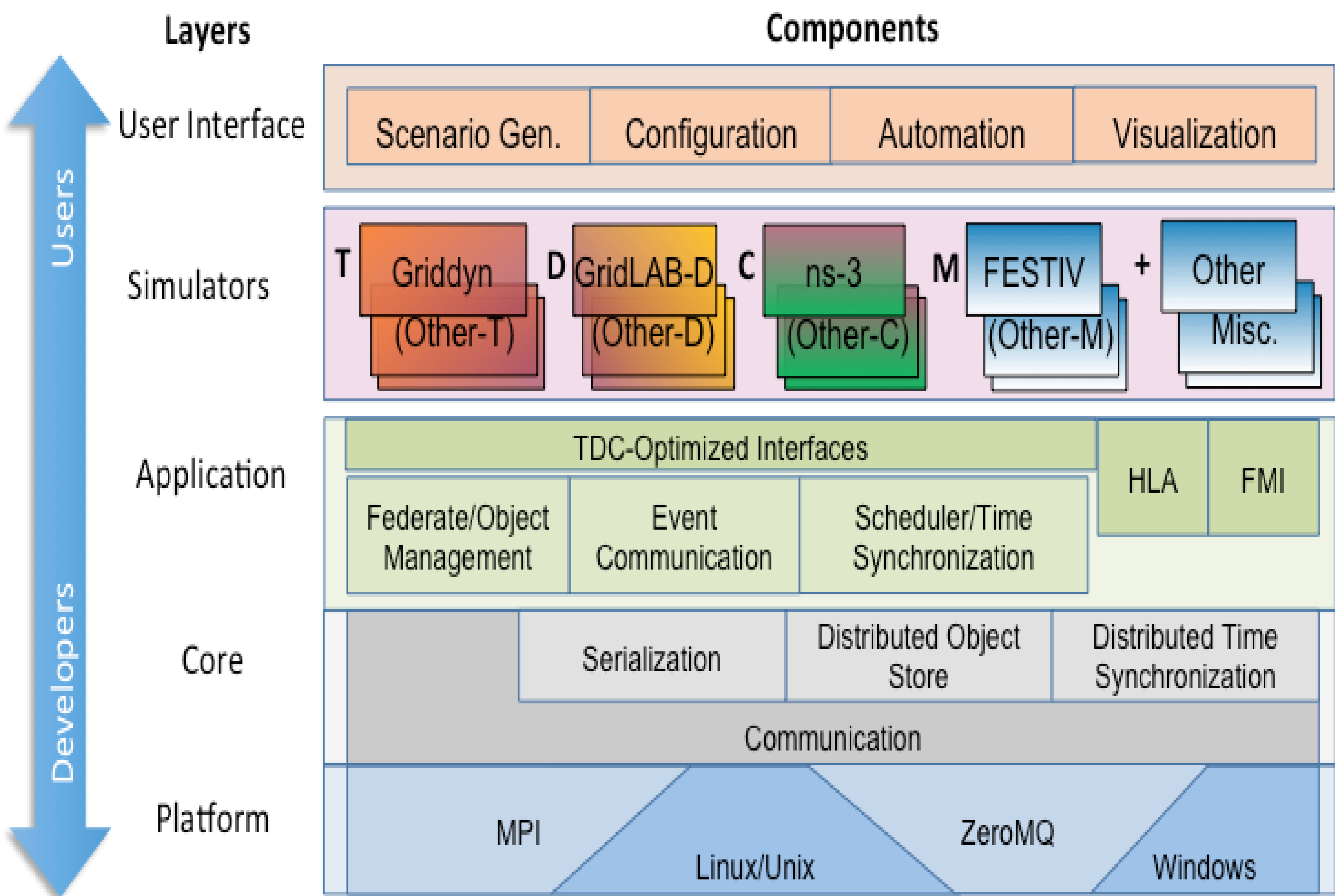
- The electric power system is becoming more integrated and complex with the wide spread of distributed energy resources and abundant communication systems.
- The interdependency and interaction across transmission, distribution and communication systems can no longer be ignored, demanding integrated analysis of the end-to-end power grid.
- This project aims to develop a scalable co-simulation platform and enable such integrated analysis to maximize flexibility and resilience of the grid.

Expected Outcomes

- Fill current gaps in simulation and modeling technology that inhibits integrated planning across multiple domains.
- Bring together best-in-class simulation efforts from multiple national labs.
- Create HELICS™, an **open-source co-simulation platform**, enabling interactions between leading commercial & lab-developed simulators on a wide range of computing environments.



Image from smartgrid.ieee.org



HELICS (Hierarchical Engine for Large-scale Infrastructure Co-Simulation) platform is designed to be modular and flexible to future needs

Progress to Date

- Developed and documented 12 use cases to guide HELICS development and benefit the broad community.
- Developed an initial version of the use-case driven HELICS platform, with documentation, on a collaborative GitHub project repository (>200 commits).
- Implemented 3 prototype use cases with the HELICS platform for demonstration of functionality and value.
- Initiated a “guiding document” to be released in May.
- Conference paper on HELICS design accepted in *2017 Workshop on Modeling and Simulation of Cyber-Physical Energy Systems*.
- Reviewed use cases at TRC webinar in November 2016. Next TRC meeting scheduled for May 2017 to review HELICS.

Technical Review Committee: Southern California Edison, National Grid, PJM, Peak Reliability, InterPSS Systems, MITRE Corporation, University of Arizona, Nexant, Washington State University, General Electric, Electric Power Research Institute, National Rural Electric Cooperative Association

Significant Milestones		Date
✓ Documented 12 initial use cases.		9/1/2016
✓ Held TRC webinar to review use cases and initial HELICS design.		12/1/2016
✓ Documented requirements, metrics, and design of HELICS through use case analysis.		3/1/2017
Host technical review meeting with stakeholders.		6/1/2017
Deliver guiding document on TDC co-simulation.		6/1/2017
Release v0.1 of HELICS platform to open-source.		6/1/2017