

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.

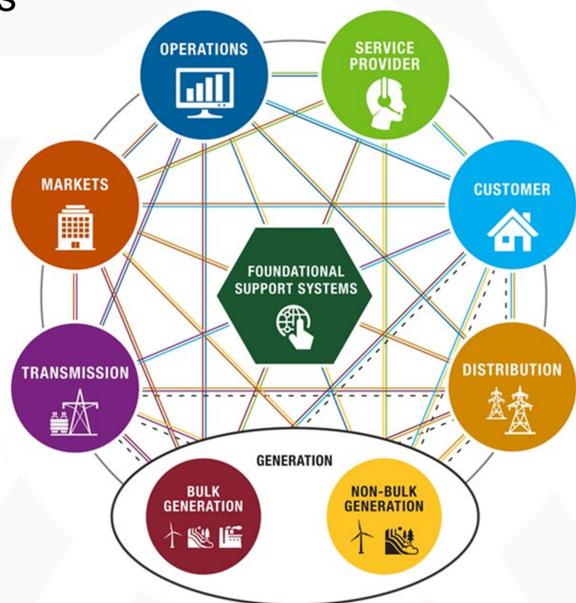
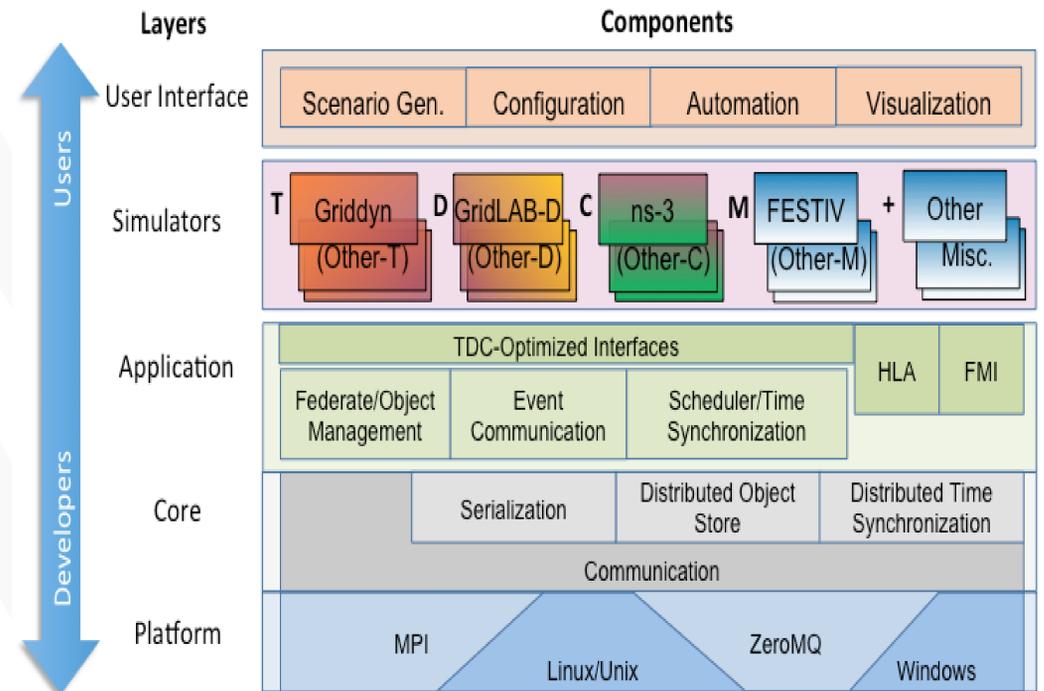


Image from smartgrid.ieee.org

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



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