

EMT Working Groups: Overview

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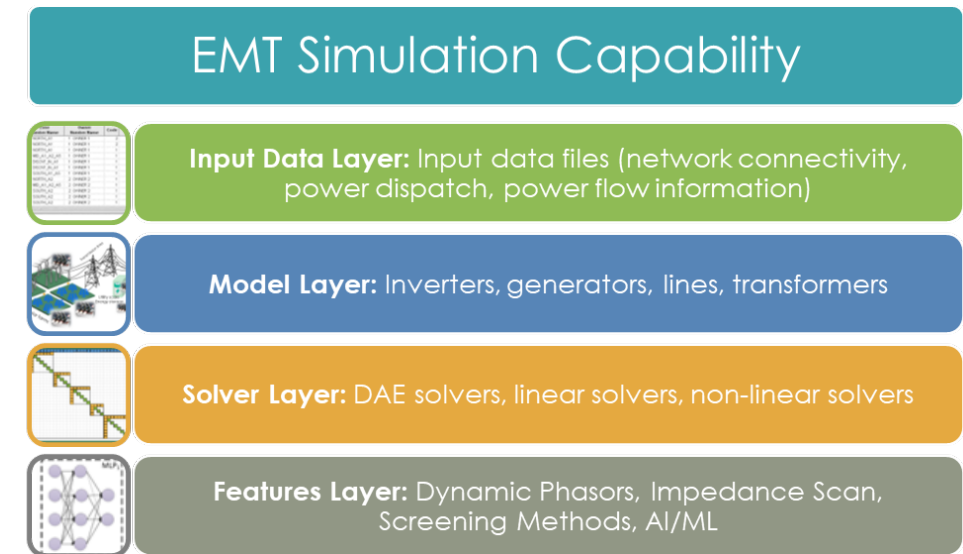
Members: LLNL, PNNL, LBL, NERC, SPP, CAISO, MISO, ISO-NE, DLC, TVA, City Utilities of Springfield, SCE, Southern Company, Dominion Energy, NYPA, EP Electric, Southern Power, Silicon Ranch, Enel Corporation, Radian Generation, MKIRPS, GE Vernova, Hitachi Energy, Siemens Energy, MEPPI, Nayak Corporation, FIU, PSU, GIT, ASU, ISU, Purdue University

EMT Simulation: Current Challenges

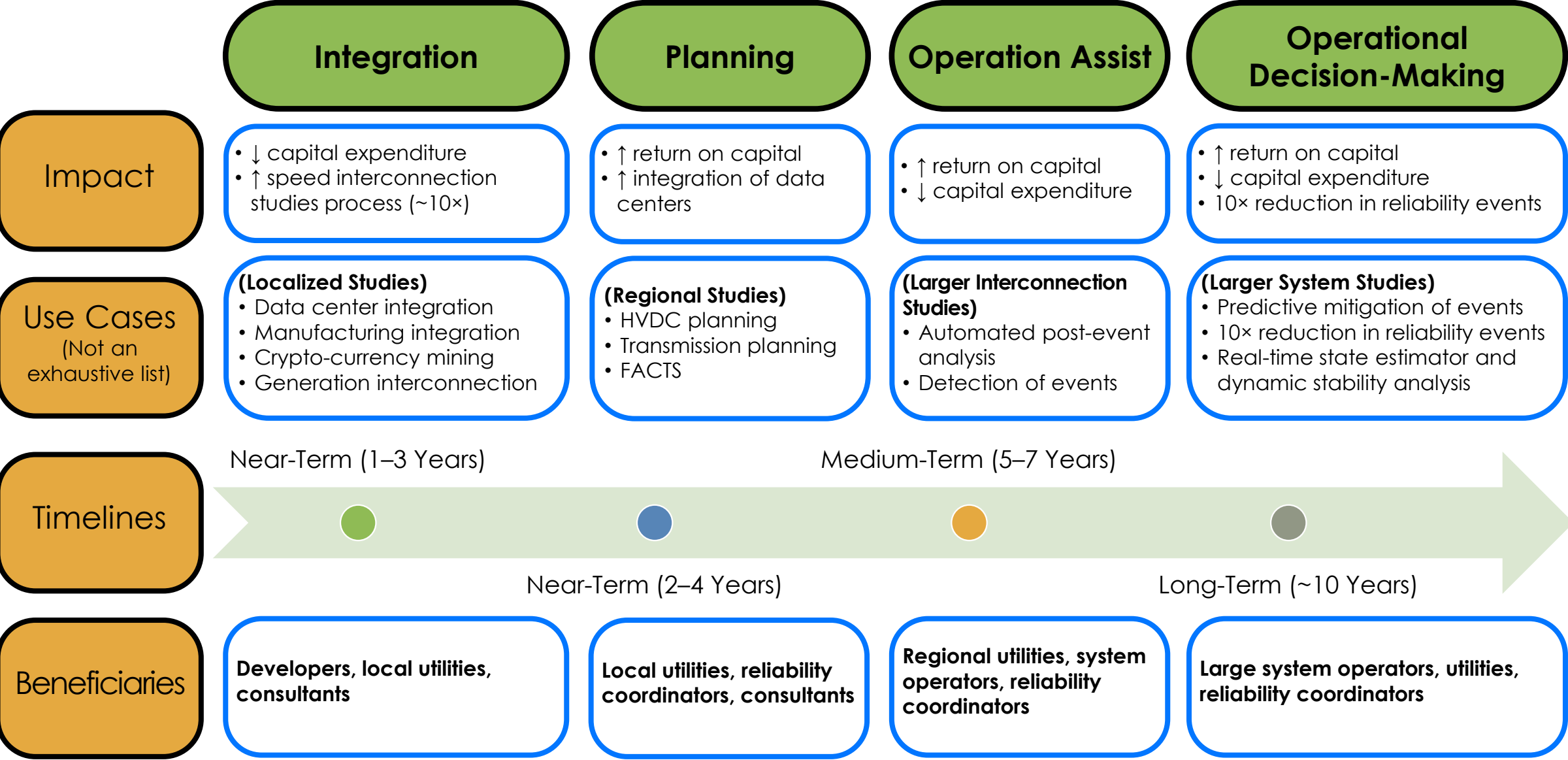
- Some of the challenges
 - Conflicting models in organizations
 - Slow nature of simulations
 - Challenges with limited access to grid models by developers
 - Challenge expressed by utilities, system operators—not having access to good plant models
 - Meeting PRC-029 standards (for example) requires understanding of grid interaction with plants
 - How to accomplish this is not well understood
 - Reliability challenges—significant ones observed (e.g., partial trips)
- More challenges will follow as road mapping happens

EMT Activity Overview

- EMT Activity
 - Bring together national labs, academia, and industry partners under one platform to accelerate the development and use of electromagnetic transient (EMT) simulation software.
- Vision
 - Create an ecosystem that assists industry with realizing the transition needed to perform EMT simulations for ensuring the reliability and security of the future power grid.
- Overall Goal
 - Develop a backbone that integrates models, data, validation processes, and standards and that educates/trains individuals to analyze new applications in EMT.
- Impact
 - In the near-term, accelerate the process of interconnection studies, increase deployment of large loads (e.g., data centers without reliability challenges in the power grid) and generation, increase return on capital, and reduce capital expenditure.

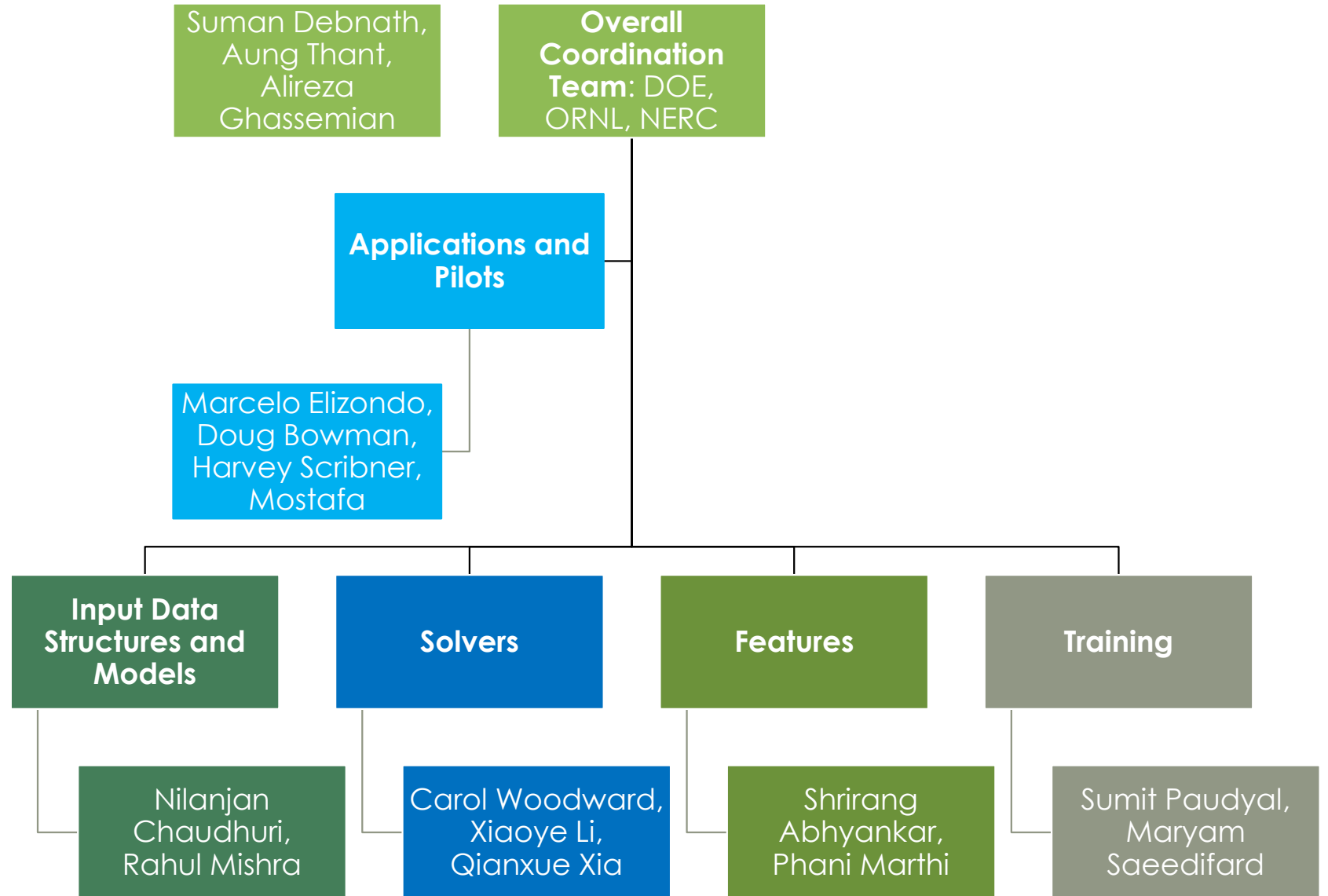


EMT: Long-Term Timeline



Working Groups

- Working groups created to help formulate needs and requirements that drive EMT use in different applications



Scope of Working Group Activities: Road Map [Draft]

- Applications and Pilots
 - What are the applications of EMT that can benefit from a unified framework?
 - Which are the most important today, and which ones are expected in the future?
 - What are the input data formats for each application?
 - **End goal:** Identify different applications and pilot opportunities and the timeline of interest for each application
- Input Data and Models
 - What are the input data formats needed to form EMT simulation models?
 - What types of data need to be considered for model development?
 - What types of models are needed in EMT?
 - What are the verification and validation processes needed for models?
 - **End goal:** Identify the data and models that need to be standardized in formats and the timeline to achieve the same

Scope of Working Group Activities: Road Map [Draft]

- Solvers
 - What are the properties of DAEs to explore and consider in EMT?
 - What are the linear solvers in EMT that can help with speed-up?
 - How can intelligence play a role in helping speed-up simulations?
 - What software architectures can help with scalability and parallelism in different computing architectures?
 - **End goal:** Identify solvers that can help with meeting near-real-time specifications for large power grid simulations
- Features
 - Which of the following are the features of main interest?
 - Control system design, control interactions, oscillations identification and mitigation, automation in understanding response from simulations and next steps, visualization
 - **End goal:** Identify features and the timeline in which they can be implemented to assist engineers with EMT simulation
- Training
 - What are the training needs for industry to make this initiative's activities impactful?
 - What are the curriculum needs for improving EMT literacy?
 - **End goal:** Identify training and workforce development needs to complement the activities of this initiative

Working Group Activities

- 2025
 - Prepare draft road map
- 2026
 - Conduct monthly webinar series
 - Prepare documents and track progress
 - Identify collaboration and coordination opportunities
 - Assist with ongoing R&D and provide guidance/guidelines
 - Enable translation of R&D to real-world impact

Questions?
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