

PROJECT DEVELOPMENT AREA for TRANSACTIVE ENERGY / MODELING AND SIMULATION

<p>Title: Co-Simulation Platforms</p>	<p>Brief Description: Write 2-3 sentences/bullets.</p> <ul style="list-style-type: none"> • Create a system of systems; co-simulation of different nodes/planets revolving around central ‘sun’ as shown in Figure 1 • Could have multiple simulation platforms (not just a single central one) • Nodes can communicate with each other and also with the central ‘sun’ • Include ‘wrappers’ behind each node (how to control clock, data exchange, mapping, etc.) 	<p>Challenges: Identify the anticipated challenges for creating a workable demonstration or testbed for the concept</p> <ul style="list-style-type: none"> • Harmonization of time/ synchronization across platforms • Load balancing • Defining data models and what data should be exchanged
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PROJECT APPROACH

<p>Major Tasks: Describe a possible approach to developing the project, including 3-5 major tasks</p> <ul style="list-style-type: none"> • Agree on common data model based on regions; common descriptions for experiments and domains • Define data models for different nodes (each domain can define, but basic model is agreed upon) • Explore data broker model – broker sets up simulation, remainder is proprietary; some exchanges can be private • Identify data for market exchange between nodes • Reconcile physics and data deviations • Incorporate pattern matching, analysis/ sensitivity analysis • Examine lessons learned from prior projects 	<p>Major Milestones with dates: Define 3-5 milestones that can be used to measure progress.</p> <ul style="list-style-type: none"> • Well-defined state of interfaces between layers • Direct interaction between planets • Reconciliation of physics / physical data • Substantiation of top layers – interface with the bottom two layers 	<p>Performance Targets: Identify 1-5 (quantitative) performance targets that define a successful outcome.</p> <ul style="list-style-type: none"> • See Figure 2. Two bottom layers are the target for modeling and simulation for TE applications • Managing the ‘planets’ effectively • Simulation tools for ‘planets/nodes’ working together • Component layer that includes some generic applications or domains • Standardized communications <p>Limits: What parameters should be used to define the realistic limits to use of the system/platform</p> <ul style="list-style-type: none"> •
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PROJECT IMPACTS and DEMONSTRATION

<p>Impacts: Describe the anticipated economic benefits (new products, jobs, economic growth, exports, tax base, etc.) as well as impacts on energy, health, safety, environment, and other quality of life aspects</p> <ul style="list-style-type: none"> • Enables simulation of distributed systems, interfacing/talking between nodes, components, and markets • Shows how to embed smart systems so market works with the grid and is complementary 	<p>Demonstration vehicle: Describe how you might demonstrate the project concept (physical or virtual)</p> <ul style="list-style-type: none"> • Demonstrate that TE controls work for sure; demo that grid plus controls plus communications and island layers work together better <p>Status of Commitment: Please advise on the current status of the CPS idea detailed on this worksheet (underline/circle one):</p> <p>Launched</p> <p>Ready for Public Announcement</p> <p>In Deliberations / Negotiations</p> <p><u>Concept only Stage / No partners yet</u></p>	<p>Team Lead:</p> <ul style="list-style-type: none"> • TBD <p>Participants and Roles:</p> <ul style="list-style-type: none"> • Himanshu Neema, Vanderbilt; general purpose co-simulation platform • Ron Melton, PNNL; TBD, layered models, simulations • Maria Ilic, CMU; physics-based models • Mark Yao, IBM • Christopher Irwin, DOE • Subject Matter Experts (domain experts, economics/finance, markets) • Data – distributed energy side, microgrids, some application data
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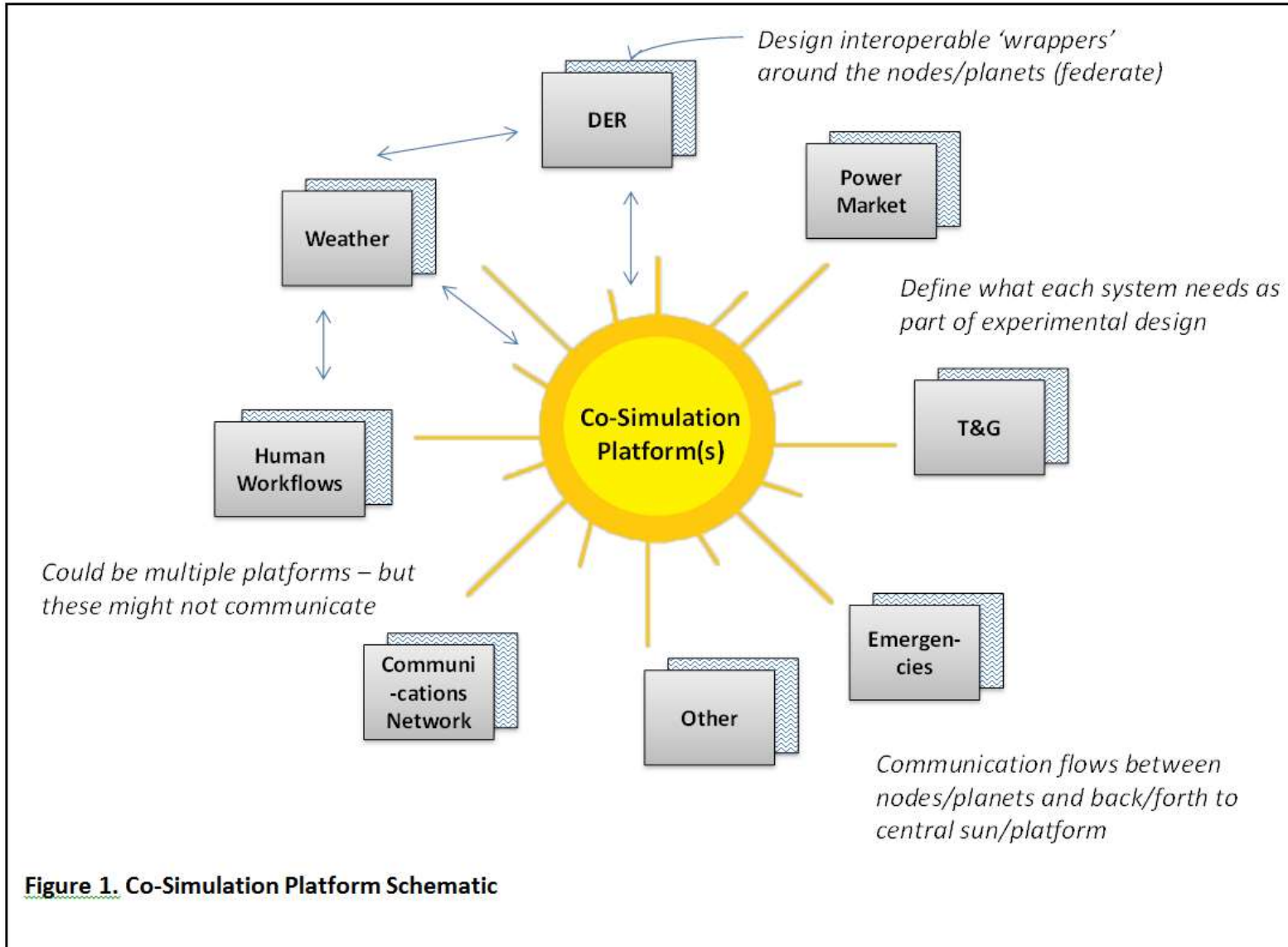


Figure 1. Co-Simulation Platform Schematic

Three Layered Approach

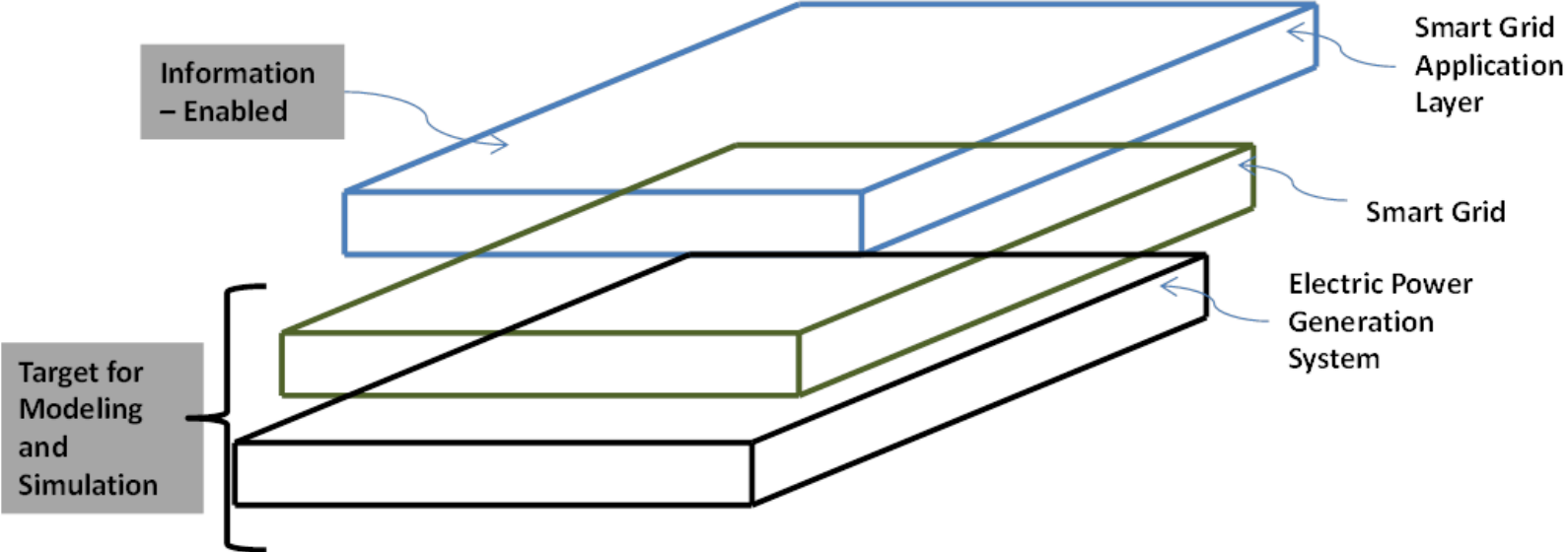


Figure 2. Layers for Co-Simulation Platform Approach