POTENTIAL TE PROJECT WORKSHEET

PROJECT DEVELOPMENT AREA for TRANSACTIVE ENERGY / MODELING AND SIMULATION

Title:

Co-Simulation Platforms

Brief Description: Write 2-3 sentences/bullets.

- 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.)

Challenges: Identify the anticipated challenges for creating a workable demonstration or testbed for the concept

- Harmonization of time/ synchronization across platforms
- Load balancing
- Defining data models and what data should be exchanged

PROJECT APPROACH

Major Tasks: Describe a possible approach to developing the project, including 3-5 major tasks

- 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

Major Milestones with dates: Define 3-5 milestones that can be used to measure progress.

- 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

Performance Targets: Identify 1-5 (quantitative) performance targets that define a successful outcome.

- 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

Limits: What parameters should be used to define the realistic limits to use of the system/platform

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PROJECT IMPACTS and DEMONSTRATION

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

- 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

Demonstration vehicle: Describe how you might demonstrate the project concept (physical or virtual)

- Demonstrate that TE controls work for sure; demo that grid plus controls plus communications and island layers work together better

Status of Commitment: Please advise on the current status of the CPS idea detailed on this worksheet (underline/circle one):

Launched

Ready for Public Announcement

In Deliberations / Negotiations

Concept only Stage / No partners yet

Team Lead:

- TBD

Participants and Roles:

- 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