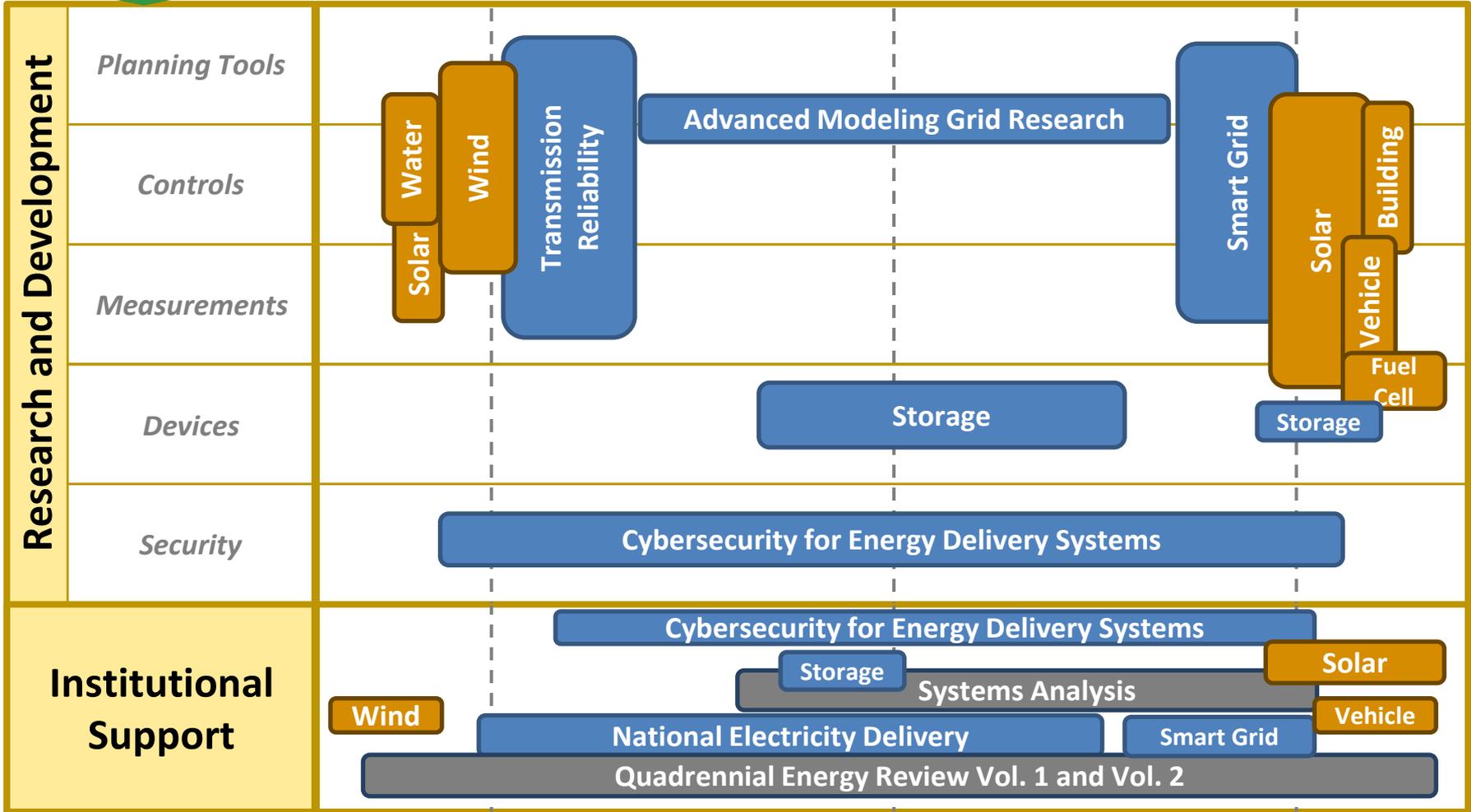




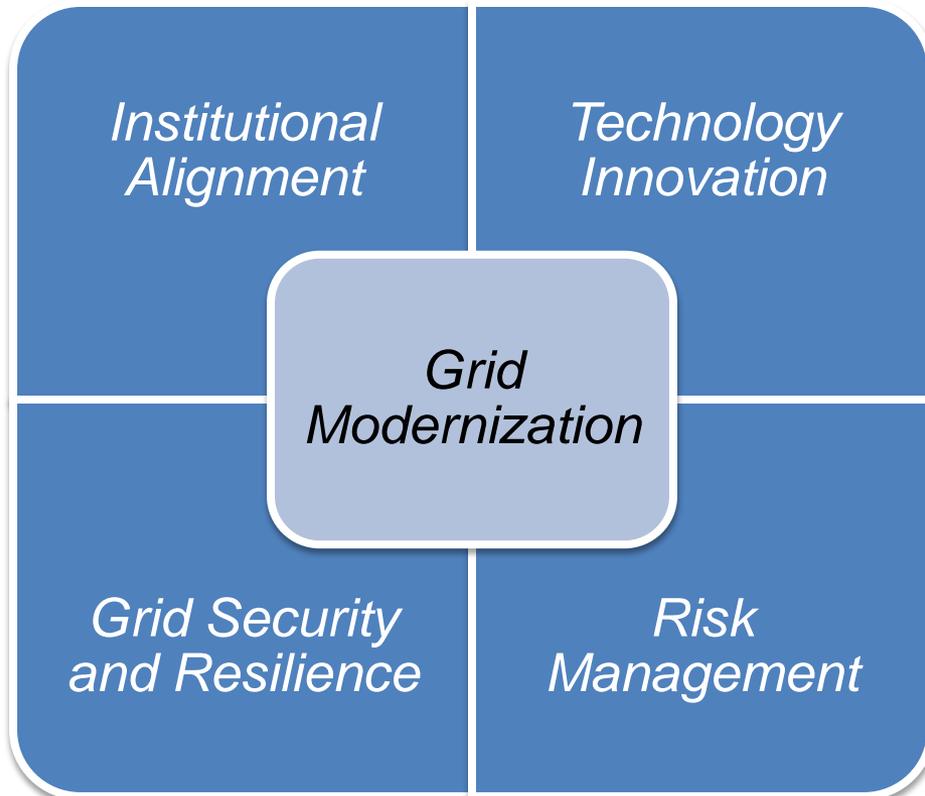
# Coordination of Grid Modernization Activities

**Quadrennial  
Technology  
Review**





# GTT Grid Modernization Proposal



- ***Institutional Alignment:*** Focus on key policy questions related to regulatory practices, market designs, and business models.
- ***Technology Innovation:*** Increase the emphasis on coordination and create tools and technologies that measure, analyze, predict, and control the grid of the future.
- ***Grid Security and Resilience:*** Research cyber security solutions for the electric sector and provide situational awareness and incident support during energy related emergencies.
- ***Risk Management through Multi-scale Demonstrations:*** Collaborate with regulators, utilities and other stakeholder groups to test and demonstrate combinations of promising new technologies and new institutional approaches.



# GTT Five-Year Goals

Technology Innovation

## Institutional Alignment

- Evaluate regulatory and policy options and implications of various grid ownership and operations models – **new utility business models evaluated**

## Design and Planning Tools

- Develop planning tools that integrate transmission and distribution and system dynamics and can use high performance computing platforms - **deliver 50x speed-up**

## System Control and Power Flow

- Increase ability to coordinate and control up to millions of devices and integrate with energy management systems – **coordinate millions of devices; enable one-minute contingency analysis at the interconnect scale**

## Sensing and Measurements

- Develop sensors, analytics, and visualizations that enable 100% observability of generation, loads and system dynamics across the electric system – **develop low cost sensors at all scales, handle 1000x data volumes, visualization tools, dynamic accuracy**

## Devices and Integrated Testing

- Develop advanced grid control and integration devices and validate integrated systems that can optimize operations at high variable RE penetrations and provide high reliable service – **validate 50-100% DG penetration scenarios on feeders**

## Security and Emergency Response

- Develop advanced security (cyber and physical) solutions and real-time incident response capabilities – **capable of identifying cyber events in real-time and analyzing within 12 hours.**

## Risk Mitigation through Multi-scale Demonstrations

- **Develop 3-5 megawatt-scale demonstrations** that show transfer of the technologies developed through R&D activities into the field

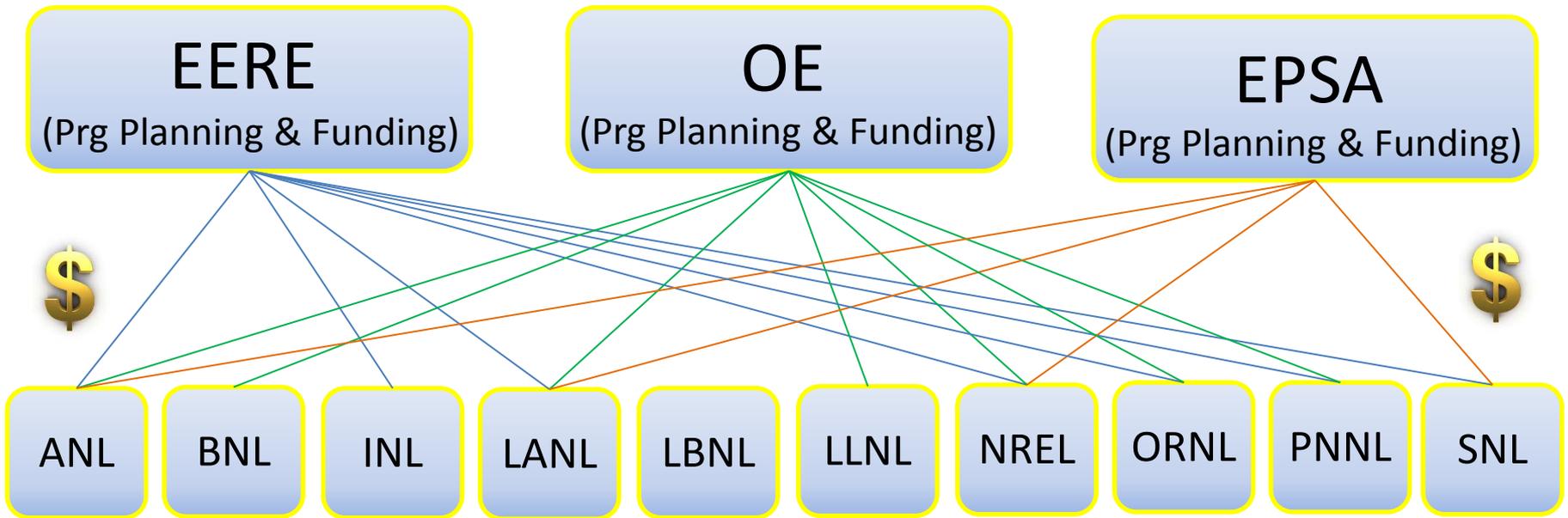


# Modernized Grid Laboratory Consortium

- DOE National Labs working on grid issues are developing an integrated approach to grid modernization, better leveraging lab capabilities and multi-agency work
- Self-formed teams from the labs are targeting the six target areas identified in the MYPP to rapidly advance the evolution of the grid

# TODAY

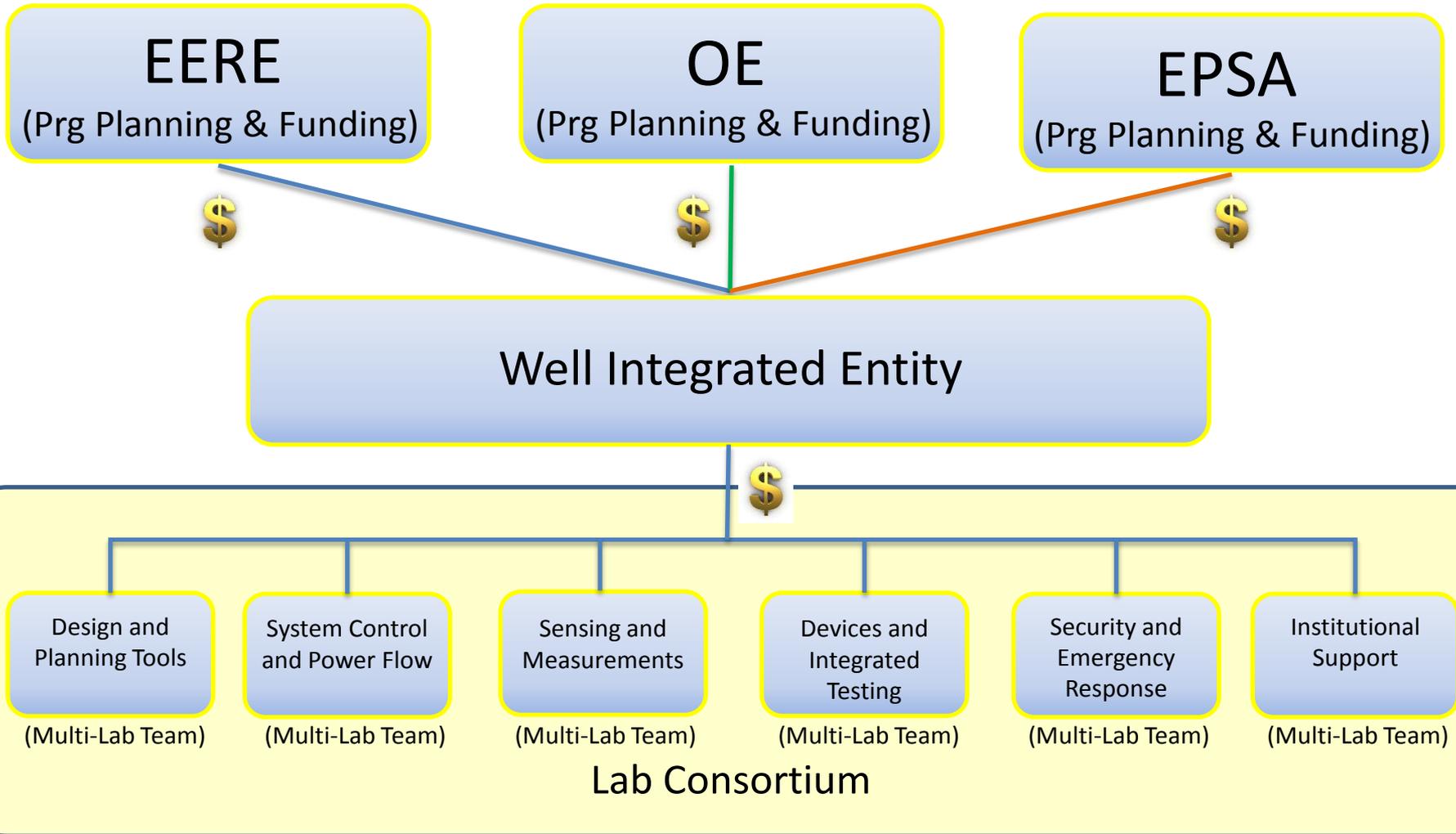
## GRID MODERNIZATION PLANNING & FUNDING



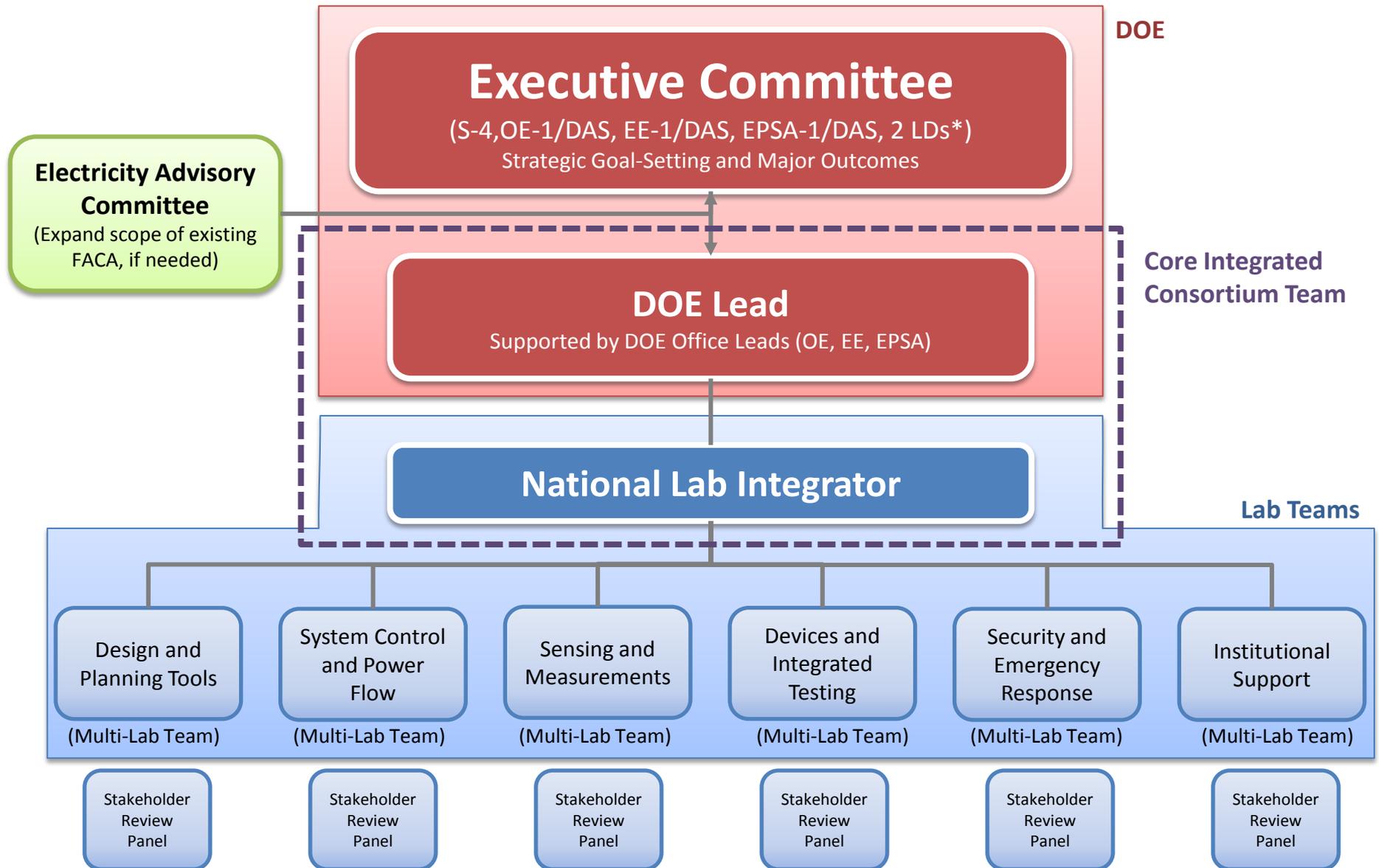
GTT coordinates budget formulation, planning and execution;  
however, this entity does have budget authority.

# DESIRED GENERIC MODEL

## GRID MODERNIZATION PLANNING & FUNDING



# Grid Modernization Laboratory Consortium (GMLC)



\* LDs are full consortium executive partners without Federal fiduciary responsibility.