



U. S. Department of Energy Grid Tech Team



The Grid Tech Team (GTT), with DOE-wide representation, is responsible for leadership within and outside DOE on grid modernization through strategic thinking and improved communication, coordination, and collaboration. Through outreach and engagement with stakeholders, the GTT seeks to facilitate the development of a vision of the future electricity grid and a strategy to address national and regional grid modernization challenges.

What attributes will the future grid have?

With input from stakeholders, the GTT drafted a vision describing a future electricity system with several key characteristics.

VISION of the FUTURE GRID

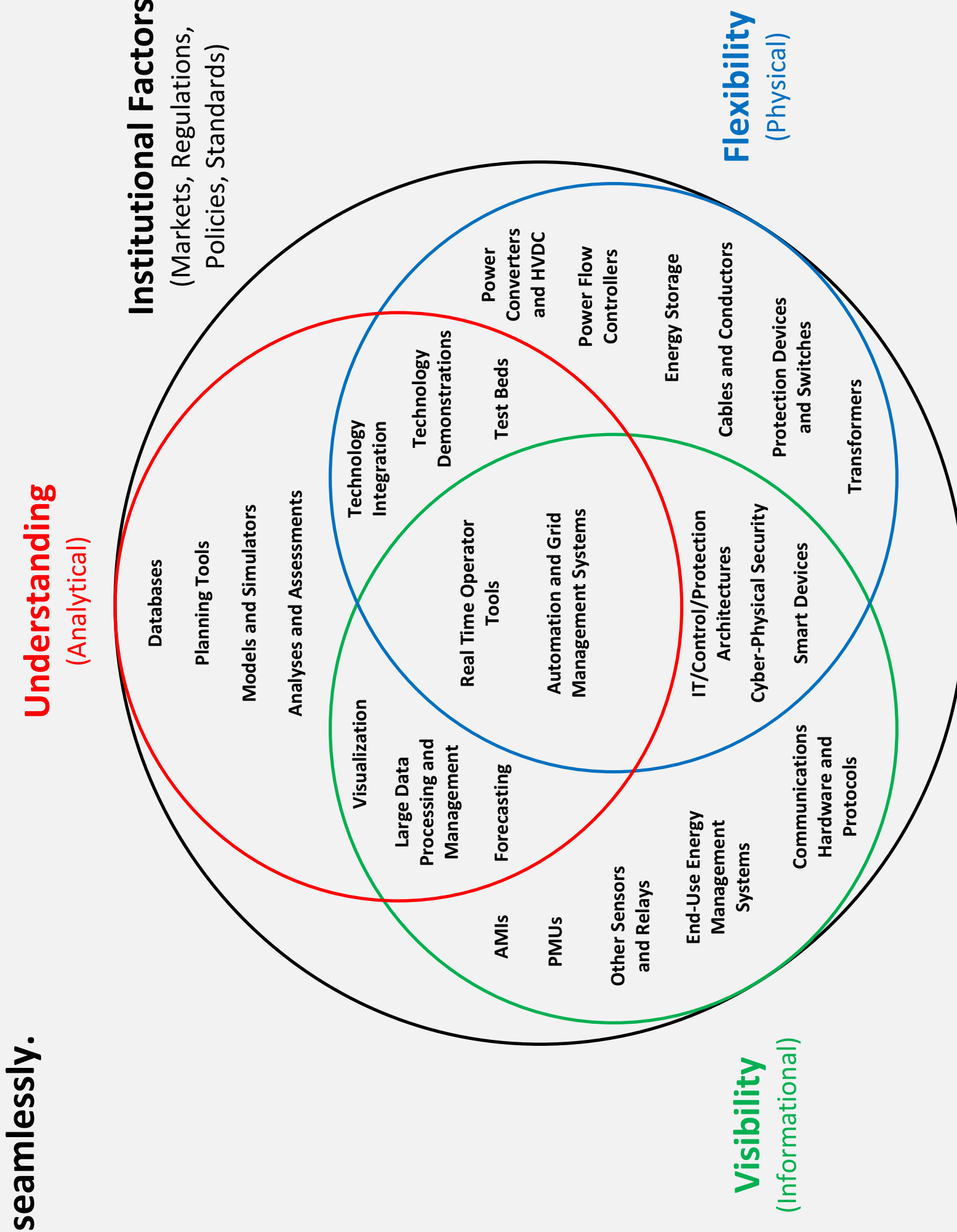
A seamless, cost-effective electricity system, from generation to end-use, capable of meeting all clean energy demands and capacity requirements, with:

- Significant scale-up of clean energy (renewables, natural gas, nuclear, clean fossil)
- Universal access to consumer participation and choice (including distributed generation, demand-side management, electrification of transportation, and energy efficiency)
- Holistically designed solutions (including regional diversity, AC-DC transmission and distribution solutions, microgrids, energy storage, and centralized-decentralized control)
- Two-way flows of energy and information
- Reliability, security (cyber and physical), and resiliency

- This vision will continue to evolve and be refined as the GTT continues to engage with stakeholders.
- The draft vision accommodates the diversity and uncertainty of future energy demands and generation portfolios, and recognizes inherent regional differences in needs, goals, and available resources.
- As the grid changes it must remain reliable and secure against cyber and physical threats, and become more resilient to disruptions and outages.

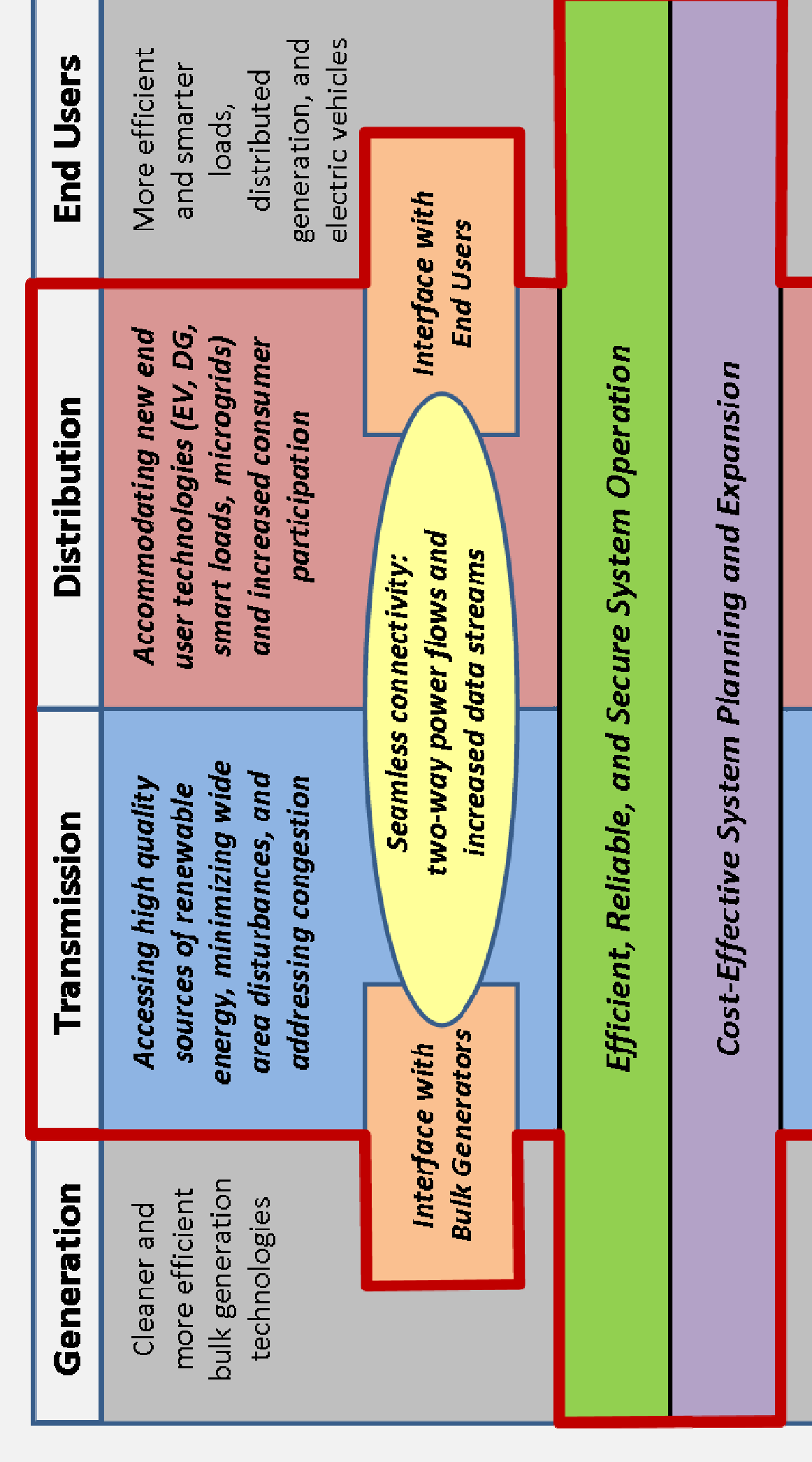
Challenges facing the grid

- Through outreach and workshops, the GTT has been working to identify technological and institutional challenges facing the future grid. The GTT has proposed a strategic framework to organize research and development activities and initiatives to address these challenges.
- Efforts are needed to improve the visibility of grid conditions, increase our understanding of the implications of observed conditions, and enhance the flexibility of the grid to respond to that understanding.
- A modernized grid should be able to “see” an event or condition, “know” what is happening or about to happen, and “do” something appropriate in response – quickly and seamlessly.



Thinking outside of and across boxes

- No single entity will be able to overcome the numerous challenges associated with grid modernization.
- The Grid Tech Team advocates using a comprehensive, holistic systems approach that balances technical and institutional solutions that are sensitive to regulatory, policy, and market issues.



Institutions
state, federal, FERC, PUCs, environmental regulations, siting, etc.

Technologies
generation, infrastructure, smart grid, electric vehicles, storage, etc.

Markets
business models, cost allocation, wholesale power trading, utilities, vendors, etc.

Developing a 5-Year Roadmap for GTT Grid Modernization Activities

Establish and maintain a long-term vision for the future grid

The GTT's draft vision was developed after:

- Interactions with the Electricity Advisory Committee (October 2011);
- Hosting a *Future Needs of the Electric Grid* public workshop (November 2011) and webinar to NARUC (January 2012);
- PSERC and NASEO Board meeting presentations (December 2011); and,
- Discussions with the National Academy of Sciences (January 2012).

An original draft of the vision was presented in February 2012 as part of the National Electricity Forum. It was revised and is available to the public on our website. It will continue to be updated as needed.

Identify high priority technical and institutional issues/challenges to achieving the vision

The GTT identified six key technology areas currently receiving R&D attention: energy storage, smart grid, renewables integration, advanced modeling, cyber security, and power electronics.

To identify additional areas, and future challenges and opportunities in R&D, the GTT is sponsoring a series of stakeholder workshops organized around specific topics. To date, these workshop topics have included:

- Distribution (September 2012)
- Transmission (November 2012)

Additional workshops that covering both technological and institutional issues are in the planning stages. Summary reports from all workshops will be posted on the GTT website.

Insights from these workshops inform the GTT's 5-year Roadmap for future R&D and initiatives.

Align DOE Office/Program projects and initiatives for objective consistency

A key component of the GTT's internal responsibilities is to better align DOE's efforts to assist stakeholders in addressing the many challenges associated with grid modernization.

Regular meetings that increase the communication and linkages between the many research programs at DOE and collaborative grant announcements are part of the GTT's strategy to accomplish this goal.

Develop near-, mid-, and long-term plans to address key issues

The GTT will use the information collected to develop a draft 5-year Roadmap that will inform future grid R&D funding and DOE initiatives over the near-, mid- and long-term.

The GTT welcomes your comments on our draft vision, potential topics for additional workshops, and ideas you have on research challenges and opportunities associated with grid modernization.

Office of Science (SC) ♦ Office of Electricity Delivery & Energy Reliability (OE) ♦ Office of Energy Efficiency & Renewable Energy (EERE) ♦ Office of Fossil Energy (FE)
Office of Policy & International Affairs (PI) ♦ Advanced Research Projects Agency - Energy (ARPA-E) ♦ Chief Financial Office (CFO) ♦ DOE Senior Management (S1)

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