



2021 CIGRE USNC GOTF Symposium

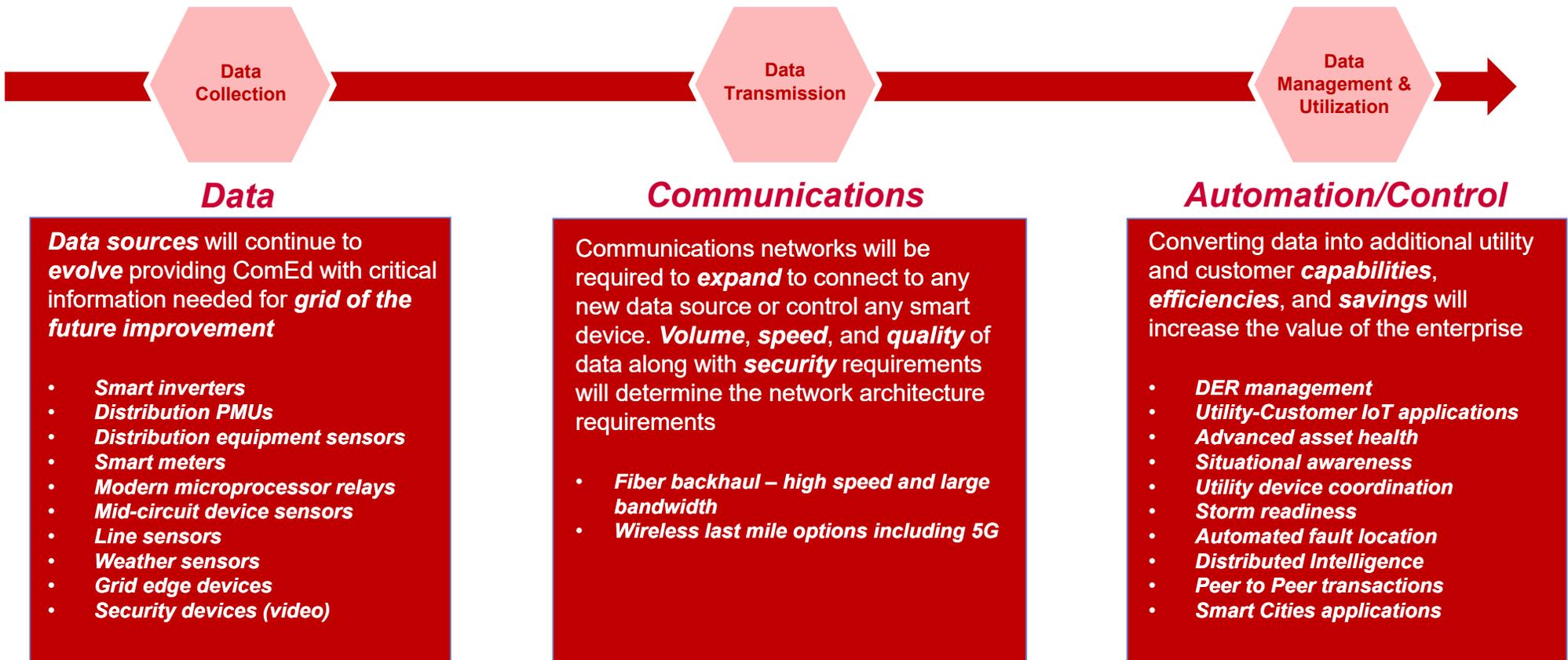
Handing the Grid to a Supercomputer

10/19/21

**Aleksi Paaso, PhD, PE
Director, Distribution Planning, Smart Grid & Innovation**

Grid of the Future Communication Needs

There are three key components that transform an electrical grid into a Grid of the Future. **Data** from grid devices that can be analyzed and converted into efficient **Automation & Control**, and the **Communications** network that ties it all together.



Leveraging advanced computing capabilities to enable grid capabilities



Smart Sensors (SIMPLE, PMU)



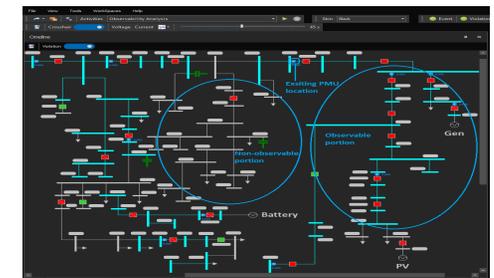
DERs (e.g. BESS, Solar, Wind, EV, Charger)



Model-based Analytical Applications (MMC, DERMS, DLSE, etc.)



Data-Driven Advanced Applications



All of today's power systems applications rely upon conventional computers, but we are exploring quantum algorithms as tools for improved performance to address a challenging class of NP hard problems in power systems, problems that are likely to become increasingly difficult to solve as the number of DER assets increases on the distribution grid.

For utilities, the emerging quantum technology may help with:

- Improving solution speed or solution itself for classical power system problems (optimal placement, contingency analysis, state estimation, SCUC)
- New problems that require big data analytics capability (resilience modeling, image processing, asset management)
- Creating new business development opportunities for utilities