The new "Smart Grid" workforce - Challenges faced and a roadmap to success

Dr. Mani Vadari

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Meet the Author:

An IEEE Fellow, electricity industry visionary, and leader, Dr. Mani Vadari delivers strategic services to a global set of utilities, vendors, and service providers seeking deep subject matter expertise in setting the business and technical direction to develop the next-generation electric/energy system. As a Business Architect, Dr. Vadari has been delivering solutions focusing on Transmission/ Distribution/ generation operations, Energy markets, and Smart Grid for over 35 years. In addition, he is an Adjunct Professor at Washington State University and an Affiliate Professor at the University of Washington. He has published two popular books, "Smart Grid Redefined: Transformation of the Electric Utility" and "Electric System Operations – Evolving to the Modern Grid, 2nd Edition", in addition to over a hundred industry papers, articles, and blogs. His books are serving as textbooks at several universities in the US and around the world

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In 2006, a leading utility industry magazine[1] stated "Assuming only nominal growth, by 2010 the industry will need to hire some 10,000 new skilled workers each year". This statement included both utilities and their vendors.While the actual loss of skilled employees was substantially slowed by the financial meltdown of 2008, the trend is slowly beginning to turn. Both utilities and their vendors are beginning to actively look to hiring new workers. Making this process somewhat complex is a host of social and market factors that are constraining the supply of skilled workers.

Enter, the Intelligent Utility Workforce:

The Intelligent Worker of the Future is a technology-enabled worker with new assets and new tools to support the necessary changes in mobility and computational power as they work. Where are these workers coming from? Given that in many cases, our need is immediate and our universities and trade schools are not yet producing enough graduates with the right set of skills, these people are coming from other affiliated industries such as computer hardware/software, communications, manufacturing, and so on.

It is important to note that these new entrants bring a lot of key and much-needed skills that our industry sorely needs. These skills included enterprise systems development, communications protocols and standards, business and financial analysis, systems integration, and so on. In the past, these skills were lacking in our industry and these showed up as gaps in how our systems were engineered and implemented. As a result, several of our legacy systems and methods of interaction severely fall behind other companies that do similar kinds of work.

There are however, equally important sets of skills and competencies that they severely lack. There are several examples of the gaps:

Utility/Power Systems Skill gaps	Smart Grid skill gaps	Business analysis skill gaps
Basics of power system components and how the electric value chain works.	Define Smart Grid. What are the key drivers, dimensions, and technologies of Smart Grid? Also, what are the barriers to the Smart Grid?	What are the top utility executive concerns and how they can be solved?
Key power system concepts like AC versus DC, singe phase versus three phase, control area/balancing authority, and so on.	The various Smart Grid technologies along the entire electric value chain.	What innovations drive these markets? What transformation do utility business models need to undergo to adopt Smart Grid?
Basics of utility operations to also include the different types of utilities and why they function the way they do. Also how does the rate-making process work and why is this important?	How Power System operations, Information Technology, and Communications converge to make Smart Grid a reality?	How to generate value from the Smart Grid and how to build successful Smart Grid business cases.
The challenges facing the current power grid and the imperative for the Smart Grid.	Smart Grid adoption worldwide and expected progression of core technologies.	What is the Cost-Benefit analysis for implementing Smart Grid and what is the path to realizing the smart grid via a roadmap?
	What disrupting technologies are on the horizon and when are they expected to make an impact.	

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It is important to note that as one reads this article; you may notice some gaps that may apply to industry veterans as well. You would be correct!!! Industry veterans have a different issue – they have been doing the same thing for so long that very often they tend to ignore new and possibly more innovative solutions or even potentially disruptive technologies that may provide a better solution.

Vendor or utility, these gaps are important to fill as soon as possible.

We believe there is a roadmap to success here. The path to creating an effective workforce of the future starts with an introductory set of course materials that would deliver training targeted to four different audiences.

Step 1: Introductory Business and Technology briefing on key topics of interest based on the targeted audience. Of interest in this is the particular focus on power systems, electric utilities, and the rate-making process that is needed for the non-utility audience.

Utility Executive: Key topics could include	Non-Utility Executive: Key topics could include
• Smart Grid Drivers, Dimensions, & Architecture • Top Smart Grid Benefits & utility Executive Concerns • Utility Business Model Evolution • Smart Grid Business Case Modeling & Analysis • Smart Grid Roadmap • Smart Grid Cost-Benefit Analysis • Utility Transformation & Key Drivers	• Current State of Power Grid • Electric Value Chain and types of Electric Utilities & Examples • Utility Operations & Rate Making Process • Smart Grid Drivers, Dimensions, & Architecture • Smart Grid Cost-Benefit Analysis • Top Smart Grid Benefits & utility Executive Concerns • Smart Grid Implementation Methodology • Smart Grid Roadmap
Utility Personnel: Key topics could include	**Non-Utility Personnel: Key topics could include**
• Current State of Power Grid • Smart Grid Drivers, Dimensions, & Architecture • Core Technologies along Electric Value Chain • Major Smart Grid Projects & Industry Mega Trends • Smart Grid Cost-Benefits Analysis • Smart Grid Areas of Growth & Key Players	• Current State of Power Grid • Electric Value Chain and types of Electric Utilities & Examples • Smart Grid Drivers, Dimensions, & Architecture • Major Smart Grid Projects & Industry Mega Trends • Smart Grid Worldwide Market Adoption • Smart Grid Cost-Benefits Analysis • Smart Grid Areas of Growth & Key Players

Step 2:

if needed, move on to more detailed training on one or more of the specific dimensions of the Smart Grid which are identified in the following list – Distributed Energy, Energy Storage, Transmission and Distribution Automation, Advanced Operational and Decision-Support Systems, Microgrids, Smart Meters, Demand Response and Energy Efficiency, Data Analytics, Communications, Smart Homes and Buildings, Electric Transportation, Privacy and Cyber Security.

Step 3:

Training on specific focus areas – as appropriate:

- *Distribution Management Systems*
- *AMI/Smart Meter*
- *Microgrids*
- *Distribution and Transmission Automation*
- *System and Market Operations – Already delivered once to client*
- *Demand Response*
- *Distributed Energy*
- *Smart Cities*

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IThese courses would provide a deeper dive into these specific systems and also train on implementation challenges and increase the state of readiness for the employee.

A common thread on this roadmap is to ensure that the training includes a combination of both business and technology topics thereby exposing the people to all aspects of the topic and answering questions like what is it, why is it necessary, how can I use it at my company, how can I build the business case for this area and so on. Training provided to this audience also needs to include case studies and videos of actual implementations so that it becomes real for them.

In Conclusion:

Many people both new and experienced are entering the electric utility industry both at utilities and vendors. The right kind of training is important to ensure that they understand the new environment really well to face the challenges of today and get ready to deliver on the vision for tomorrow.