Key Considerations for Grid Modernization

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Meet the Author:

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Utilities are embarking on the first set of movements in the post-ARRA world. ARRA provided the biggest shot-in-the-arm for electric utilities in North America by funding a series of infrastructure grants and demonstration projects. On their own, much of this effort would not have taken place.

Some of the biggest benefits that came to light around this time – not all attributable to the ARRA experiment include:

- *The US had the largest expanse of AMI installations ever in its history. These installations allowed us to validate the efficacy of AMI installations, test out meter installations, assess communications technologies, and also analyze different options for us to use both meter data as well as the entire AMI infrastructure.*
- *Utilities were able to move out of the traditional proprietary protocol using RTU-based real-time communications mechanisms to using the more advanced IP-based IEDs. This move also allowed vendors to experiment with newer sensors that could be easier and cheaper to install.*
- *There was also a clear and distinct movement from the main focus on Transmission to Distribution as newer and cheaper technologies slowly started making their presence known and were being tested in the Smart grid demos*
- *Several new OT-based technologies came to being and saw use in the demos – specifically solving major distribution level problems such as FLISR (Fault Location Isolation and Service Restoration), IVVC, and others.*
- *Newer systems such as DMS and DRMS came into being and OMSs became popular as there was a need to run the distribution system in a more optimal manner and take advantage of the increased number of sensors, controls, and the AMI data.*
- *Newer solutions such as Demand Response – saw a new light different from their origins such as DSM, DLC, and so on. These solutions were expected to be more sophisticated and their load impacts more measurable to the extent that we started seeing them play even in wholesale markets.*

The bulleted list presented above is not intended to be exhaustive in any manner – rather a testimony to the broad set of changes that made their appearance over the last ten or so years.

At the end of the ARRA period, utilities came to a realization that it was now time to take the next set of moves – this time without the benefits of ARRA funding.

And thus was born the Grid Modernization Plan

Just like the term Smart Grid, when you ask three people about Grid Modernization Plans, you are liable to get more than 3 answers. So, let us use this opportunity not to define what it is – but to define what it should be.

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What a Grid Modernization Plan should not be:

Despite the list of bullets provided above, grid modernization cannot be only about technology – IT and/or OT. A focus purely on technology alone misses out on several potential benefits – such as the ability to focus on the right technologies to solve the right problems. It also misses the need to assess the impacts of both disruptive business models and disruptive technologies.

What Grid Modernization should be

The Grid Modernization Plan should be one of the most important strategic initiative at a utility. The Grid Modernization Plan should provide an integrated view of future business capabilities and a plan that integrates and prioritizes the changes required to transition the utility to increased levels of performance in order to respond to stakeholder expectations. At the very least, it should incorporate a broad segment of the utility operations such as –

- *Grid Operations (real-time), Operations Support and Restoration*
- *Planning and Engineering*
- *Meters, Sensors, and Controls*
- *Operation Technology*

It must also consist of the following key set of steps –

- *Identification of key technologies (applications, field equipment, and infrastructure) that will be enablers in upgrading the business capability*
- *An impact analysis for infrastructure changes that can be further detailed in the future*
- *Assessment of the major capability (People, Process, and Technology) gaps and initiatives to close those gaps*
- *The benefit categories will add value and increase overall performance.*
- *A prioritized plan that describes the major initiatives and timelines (e.g. a roadmap for execution, subject to a more detailed program plan and business case)*

The major outcomes of the Grid Modernization Plan should finally include key Initiatives outlining the key projects and activities that are required to close gaps and reach the target state aligned into a roadmap for future capabilities upgrades.

Key Challenges and Risks:

Developing a Grid Modernization Plan is not without Challenges or risks – we can try to identify some of them:

- *Policy: Both at the utility level and at the regulatory level, having the right policies in place is critical for the success of both the development of the plan but also its successful implementation*
- *Linking to the utility's business drivers: The Grid Modernization Plan must be directly and inextricably linked to the most important business drivers for the utility.*
- *Utility leadership buy-in: It is imperative that the leadership buys into the plan as the best way forward. This can only happen if they are involved in the development of the plan right from the beginning.*