



Challenges of Implementing AMI

By James Ketchledge, General Manager for Projects
Enspira Solutions

Introduction

Successfully implementing Advanced Meter Infrastructure (AMI) capabilities and related Meter Data Management Systems (MDMS) is even more challenging than a typical utility project. While AMI systems are swiftly gaining traction in the industry through regulatory mandates, “green” power initiatives, and pure business case benefits, many of the vendors and technology providers have solutions that are still evolving and are in their infancy compared to more established utility information systems. An AMI project involves much more than selecting a vendor and waiting for the technology to be deployed. AMI projects require utilities to follow an excellent system implementation and integration process due to challenges related to AMI’s inherent complex technology, the lack of depth in many vendors’ project services, and the integration points across other enterprise IT systems. Therefore, a successful project requires success in three key arenas, Technology, Implementation, and Integration.

Technology Success

An in depth review of success factors related to AMI technology itself must lead to analysis of specific vendor solutions. Therefore, this discussion will be confined to examination of risks that are more general and common among multiple AMI technology providers. The solutions provided by technology vendors continue to expand quickly, driven by regulatory mandates, “green” power initiatives, and pure business case benefits. AMI has been the fastest growth segment

of utility spending over the past few years, and the trend is likely to continue or even accelerate as more states follow the lead of Texas, California, and the Ontario province. Such growth translates to heavy investment by vendors, so capabilities are hardly static, and weak points in solution offerings continue to be addressed.

Rapid growth environments attract companies interested in growth and create new ideas, new approaches, and high energy. Most rapid growth environments eventually reach a consolidation point, as winners in the market consolidate the smaller players and absorb niche elements of the solution. The AMI space is no exception, and merger and acquisition announcements have been common for the past year. This growth also places strain on technology companies and even companies with reliable delivery records may begin to show the struggle of multiple, simultaneous implementations and the difficulty in finding people in manufacturing, delivery and services with sufficient skills to support multiple clients.

Issues of scale are also of concern to larger investor owned utilities (IOU). AMI solutions that work well on a co-op or municipal scale can have issues scaling to million meter utilities. Communication networks have little issues with scaling, but the head-end is an area of concern if a technology provider does not have existing clients of IOU size.

Therefore, utilities are wise to clearly define their needs in the request for proposal process to a greater degree than normal, and carefully examine the past market success of responders. Time developing detailed requirements up front will eliminate problems down the road. It is also essential to understand the technology provider’s development roadmap, and when various capabilities are anticipated to come on line, and then monitor that roadmap during project execution. While it is acceptable to have some capability in the “to be developed” category, having more than 10% is clearly a major project risk factor.

Implementation Success

Implementation success for AMI and MDMS projects is much more difficult to achieve than technology success, and should be the focus of a utility about to embark on the AMI journey. Common challenges for AMI projects include failure to meet schedule milestones, failure to meet utility expectations and requirements, poor coordination of necessary implementation tasks, and poor readiness to accept the organizational changes that AMI systems force upon a utility.

Technology providers are companies that supply the AMI system, which generally has three components. These are the smart meters, the communication network, and the software that manages the system and collects data, also known as the “head-end”. Many of these companies have evolved from meter manufacturers who then over time offered automatic meter reading (AMR) capability

of collecting data from energy or water meters and transferring that data to a central database for billing and/or analyzing. AMI is generally distinguished by the characteristics of fixed communications network and adding two-way communication capability with the meter end point. Further AMI sophistication allows for demand side management through home area networks (HANs). In general, AMI capability and data provides the foundation for the future "smart grid".

Technology providers continue to grow their business by offering project implementation services or system integration capability around their solution. The robustness and maturity of these services can be more important to project success than the technology itself. The hazard for utilities is to under value this aspect of their AMI project. Consistently in our industry, project success is not a given. Studies show that as many as 80% of projects fail to meet their technical, cost, or schedule objectives. Some 30% of

projects are cancelled and approximately 50% exceed their original cost estimates. AMI systems are not immune from these metrics.

Project implementation services that are essential for AMI implementation success include project management, system engineering, test engineering, and change management. While each of these services merit in depth discussion, a few major elements and lessons learned in each of these areas are provided below.

Good project management is a key to AMI implementation success. More than other utility projects, AMI project managers (PMs) for both the utility and the AMI vendor need to be seasoned and very experienced due to the system complexity, rapidly evolving technology, and complex integrations with other utility IT systems, including systems responsible for billing. PMs need organizational and operational knowledge, hard and soft project management skills, experience in managing

the iron triangle of scope, cost, and schedule, and skills in mitigating risk and guiding the vendor.

Systems engineering is a key partner to project management in ensuring success, and a critical part of system engineering is requirements management which includes an upfront gap analysis, development of more detailed AMI or MDMS requirements, and tracking those requirements through the design process and ultimately the testing and verification process. The requirements analysis allows for a more detailed look at what the system can and can't do, and what are the real capabilities behind the marketing brochures and sales cycle. That analysis has led to significant surprises in AMI deployments, but it is far better to identify any gaps between the initial solution and utility expectations as fast as possible, so corrective action has the least cost and biggest window of time to be fixed.



WiMetry™ Delivers Innovative Smart Grid Communications

Increased efficiency benefits your business and the environment.

- Advanced electrical metering
- peak load monitoring
- demand response and more

This next generation AMR/AMI delivers Cost Effective Cellular communications without replacing existing meters.

800-992-7774 www.calamp.com

CalAmp®
© 2008 CalAmp - All rights reserved.

Another very important part of AMI implementation services is test engineering. A mature test process involves continual verification of the system through gradual build up and deployment, and trying to test as much as possible as soon as possible. A “big bang” approach of verifying results too far down the road is a recipe for disaster. Most AMI projects have a field trial prior to full scale deployment, and the field trial’s primary goal is to verify one or more vendors AMI systems ability to achieve the benefits identified by the AMI business case and to meet the functional and performance requirements agreed to in the statement of work (SOW). A secondary goal of field testing is to provide the utility hands-on experience with a vendor’s AMI system. Successful execution of field testing is typically a contract gate for proceeding with mass deployment. Tools that analyze and display system performance data are quite valuable in testing the solution and continue to provide valuable data while deploying the solution, particularly in communication of results and keeping stakeholders in the loop. Figure 1 shows an example of such a test metrics tool, which measures various types of AMI data for availability and accuracy to support the field trial and ultimately deployment.

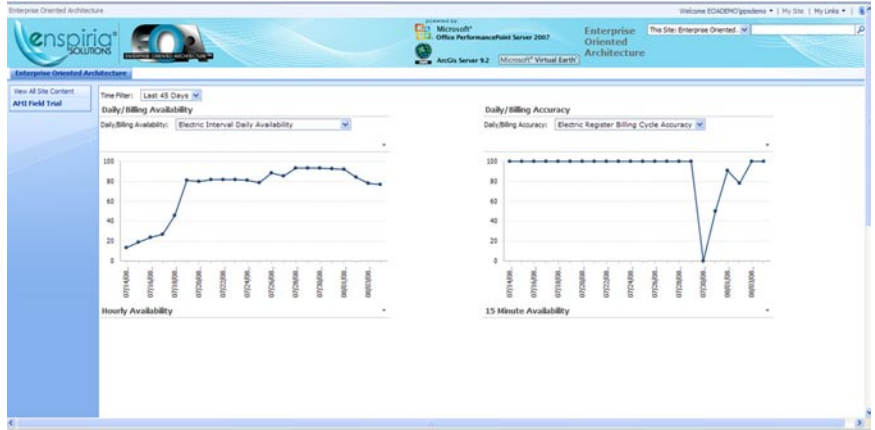


Figure 1: Field Test Metrics Tool

Finally, change management to ensure organization acceptance is critical. AMI and MDMS projects touch multiple constituencies in a utility, and effective change management facilitates the realization of identified benefits and manages this change. A comprehensive AMI Change Management Plan is needed to mitigate risks and ensure AMI is accepted and that the utility is positioned for long term success. The plan should focus on ensuring that employees can remain productive during the implementation. Successful change management programs start early, communicate frequently even when the answers are unknown, and self monitor to adjust activities as needed.

Reducing Implementation Risk

The lure of reduced acquisition costs can lure utilities in reducing attention to proper implementation services. Since so much of the cost is in hardware, proposals may offer

project management, system engineering, or testing services for a small price or even at no apparent price. It is very important for utilities to perform the due diligence and ascertain the quality of the services that a technology provider has. If the utility does not have the expertise or a proven track record of managing the details of successful implementations, they may want to consider having a consultant who specializes in looking under the covers to assess the maturity and capability of the technology provider implementation and SI services.

Lastly, there are several ways for utilities to reduce their risk in implementing AMI and MDMS. These include verifying the service capabilities of the technology provider in depth at the proposal stage, teaming with the technology provider so that the utility can leverage in house SI capabilities, obtaining SI consultants to monitor or supplement the team, or turn to third party system integration service providers.

Integration Success

Another challenging aspect of AMI projects involves the interfaces and integrations with other utility IT systems. Most implementations initially ignore the valuable integrations between AMI and other utility IT systems. While the core AMI benefits of meter reading and the billing function are clearly critical, planning for other IT integrations early in the project life cycle facilitates ease of unlocking those benefits of an integrated utility IT suite.

Utilities need to independently, or with assistance from third parties, examine integrations because most technology providers have limited or no experience in this area. Integrations with the other utility IT systems such as Customer information Systems (CIS), Geographical Information Systems (GIS), Outage Management Systems (OMS), Work Management (WMS), or Mobile Workforce Management (MWM) have valuable operational benefits.

Enterprise Vision and System Architecture

To ensure integration success, an enterprise vision is necessary and that vision needs to be translated into a concrete enterprise system architecture. That architecture will ensure that the barriers between such disparate systems as AMI, GIS, OMS, CIS, WMS, etc. are broken down thereby increasing operational efficiency. Good enterprise integration allows accurate exchange of information between different systems such that the integration appears seamless and that information residing in any one system can be leveraged by other systems, thereby optimizing business processes.

Utilities at the forefront of smart grid activities are also looking at integration frameworks, such as Enspira’s Enterprise Oriented ArchitectureSM (EOA), that combine dashboards for display of information appropriate by job role, business intelligence, and a graphical capability to promote efficiencies and capabilities that could not be achieved before. This integration framework

is extensible and scalable, and provides a common look and feel across the enterprise, as shown in Figure 2.

Integration Priorities

The primary interface for any large scale AMI system is the Meter Data Management Systems (MDMS), and the MDMS forms an integral part of many AMI implementations. MDMS helps the utility process and manage meter operations data as well as meter read data. MDMS provides a single repository for this data with a variety of analysis capabilities to facilitate the integration with other utility information systems. The interface with CIS for billing purposes is through the MDMS, and synchronization between CIS, MDMS, and the AMI head-end is necessary to ensure that premise information, customer information, and billing data is coordinated seamlessly.

The most valuable aspect of integrating AMI into the utility suite is the real-time or near real-time information that AMI provides through interval data. Having interval data provides insight and capabilities that were difficult to achieve before, and allows operational improvement that can directly

impact utility performance indices. The AMI to OMS interface is a priority since AMI can help significantly to reduce a utility's System Average Interruption Duration Index (SAIDI). Other interfaces allow consumption information to influence system planning and thereby create more efficient distribution networks based on real usage at a resolution of 15 minutes to an hour, and not just monthly reads. Interfaces with GIS allow spatial display of AMI data over a service territory that make can make programs such as theft detection more effective.

Scalable and Extensible Architectures

Utilities should look beyond old point-to-point integrations where possible and embrace techniques that enhance this data sharing between applications. With the revolutionary addition of AMI's real-time information into the utility IT environment, the time is ripe for more scalable and extensible architectures such as an enterprise service bus (ESB) approach that connects individual applications through publishing messages to a bus and subscribing to receive certain messages from the bus. Studies have shown that

ESB approaches reduce the cost of new interfaces by much as 50%, and the cost of maintaining that interface by up to 80%.

Summary

The youth of AMI technologies and the associated vendors' inexperience present a risk to implementation that utilities ignore at their peril, particularly given the central nature of AMI systems in the utility revenue stream. A successful AMI project emphasizes the classical system integration skills of project management, system engineering, test engineering, and change management and recognizes that AMI involves much more than selecting a vendor and waiting for the technology to be deployed.

Rather than wait to examine the benefits of AMI integration, an early look at the enterprise architecture and how AMI will fit into it will pay dividends in reduction of functionality gaps and ease of future scaling. The integration of AMI derived real-time data into the enterprise for operations and planning purposes is revolutionary, and utilities that take advantage of it can create real improvements in performance metrics.

Following these guidelines and lessons learned from past implementations, utilities can achieve the ultimate vision of a successful AMI project that meets core business requirements and positions the utility for the smart grid of the future. ■

About the Author

James Ketchledge, PMP, is the General Manager for Projects at Enspira Solutions, where he manages the project management office and directly leads AMI implementation and integration projects. He has 22 years in systems/software engineering and 11 years of project management experience. He holds Masters and Bachelor degrees in electrical engineering.

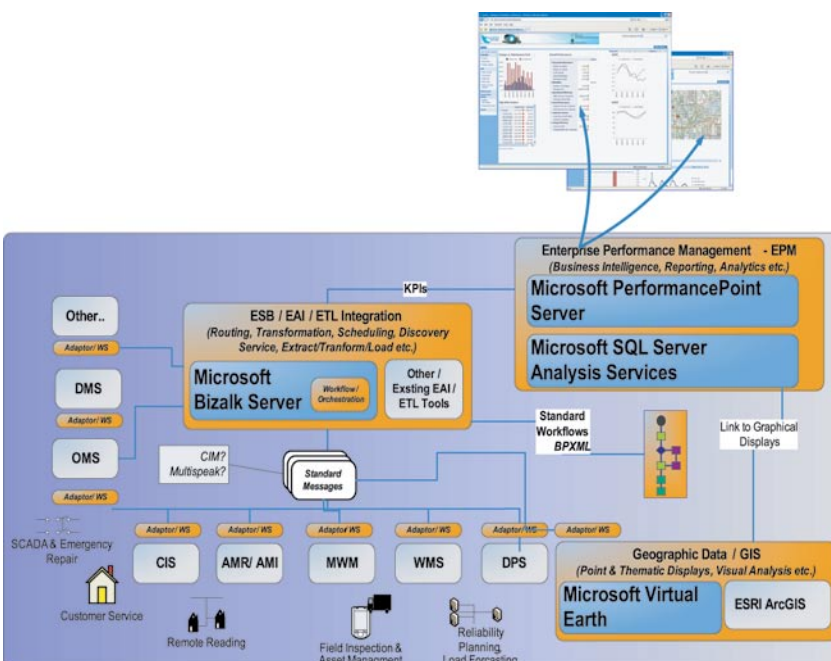


Figure 2: An Integration framework facilitates unlocking AMI benefits