

# Network Management Newsletter

## Issue 1/2010



Dear readers,

This past year, in spite of the biggest economic slowdown in recent memory, the power industry continued to undergo one of the biggest transformations in its history with the advent of the Smart Grid. However you may define it, the smart grid movement took giant strides over the last year in transitioning from concept to reality, from talk to action. Everywhere I go, I hear from many of you about new initiatives that are underway that will upgrade and improve your networks and the grid at large.

ABB remains at the forefront of the movement to modernize the power grid, and we have also seen a shift from planning to implementation over the past year. The economy still has a significant effect, of course, but we are seeing companies start to make concrete, innovative new project plans. These plans and the larger smart grid movement are leading to more discussions about the importance of network management.

ABB is involved on many levels around the world in modernizing the grid and making a difference with our network management solutions, whether in developing nations or in the West. In this issue of the newsletter, for example, you can see where ABB is helping with a new comprehensive network

management program in Ghana (see page 7), while also signing a new agreement with National Grid, one of the largest utilities in the U.S., to implement a new distribution management system (see page 8).

Additionally, ABB is actively involved in talking with utilities about smart-grid compliant product and network management solutions. Whether it's at a major T&D trade show like DistribuTech where ABB can personally demonstrate new product offerings (see page 2) or at major forums to discuss larger issues like the IEEE PES Smart Grid technology conference and UWIG Workshop on Wind Forecasting Applications to Utility Planning and Operations (see page 4), we're there.

We hope you enjoy the newsletter, and that it gives you an idea of the scope of capabilities that ABB can offer to you. As always, we hope to continue our interactions with you, our customers and partners, and we welcome your feedback and suggestions.

Jens Birgersson  
Business Unit Manager Network Management

# ABB's End-to-End Demo Steals the Show at DistribuTECH 2010

DistribuTECH celebrated its 20th year anniversary, this year in Tampa, Florida, as one of the most important and well attended T&D trade shows for electric utilities in North America. DistribuTECH covers automation and control systems, energy efficiency, demand response, renewable energy integration, advanced metering, T&D system operation and reliability, power delivery equipment and water utility technology. Over 5700 industry professionals attended the nearly 60 technical sessions and the large exhibit floor that included over 275 exhibitors.

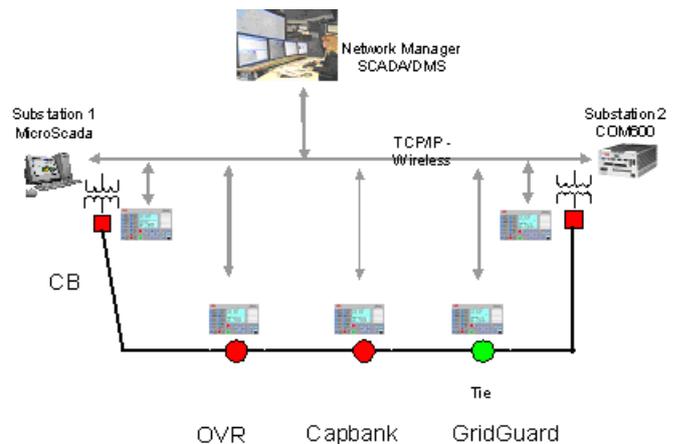
At DistribuTECH this year, ABB focused on helping our utility customers establish a vision that meets their end-to-end distribution grid management needs. The ABB booth was setup to simulate the distribution operations of a utility from the control center to substation to the feeder and the automated equipment that enable intelligent isolation of faults and restoration of service on the distribution network.



ABB booth setup to represent utility distribution operations

The end-to-end scenario demonstrated included integration of Network Manager for control center operation with MicroSCADA for substation automation and ABB feeder automation device, COM600. In addition, Network Manager monitored and controlled an ABB switched capacitor bank. The ABB devices in the booth included a circuit breaker, a recloser, a capacitor bank, and an automated switch.

The communication was established via a set of wireless radios using WiMax technology. Visitors observed the real time system model in the control center as well as in the substation and on the feeder. Network Manager was setup to monitor status and analog points and control all the devices. In addition, autonomous field automation actions were reflected in the network model in real time.



Integrated fault isolation and service restoration scenario

One of the most intriguing parts of the demo was the fact that the overhead lines in the booth were setup with lights that would indicate in real time their energization status. As devices would operate the lights would change to indicate which line sections were carrying power. This way, visitors of all levels of experience could visualize the benefits of fault isolation and restoration.

ABB showcased hands-on demonstrations and highly visual displays to help answer questions such as:

- What options are available for managing my distribution grid?
- How can we best implement communications, automation, and restoration technologies to improve grid reliability, capacity and efficiency?
- What security challenges will we face as the smart grid develops, and how should we address them in our smart grid strategy?

The booth had a high level of traffic and received great feedback from visitors. Many visitors appreciated the fact that the apparatus displayed was interconnected to demonstrate the interaction amongst them. Overall, this was a great industry event for ABB and our customers.



Many visitors came to the ABB booth to see the Smart Grid in action

# ABB in the Forefront of Smart Grid Technology Forums

## Innovative Smart Grid Technologies Conference and Wind Integration Workshop

Network Management has been a leading ABB unit in smart grid innovation and application of advanced IT and communications technologies to solutions for the electric grid. During the first quarter of 2010, there were two major international events dedicated to Smart Grid:

1. The IEEE PES Innovative Smart Grid Technologies (ISGT) Conference, hosted by the National Institute of Standards and Technology (NIST) at their headquarters in the Washington DC area in January.
2. The UWIG Workshop on Wind Forecasting Applications to Utility Planning and Operations held in Albuquerque, NY in February organized by Utility Wind Integration Group (UWIG).

ABB Network Management actively participated in both events and presented ABB's interest and leading position in smart grid technologies and solutions.

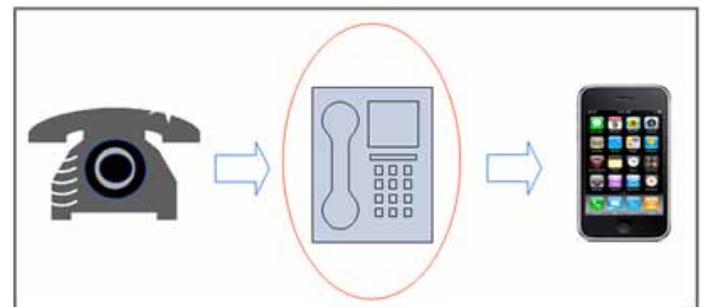
The ISGT was a successful and informative international event. Although its planning had started only a few months earlier, it was attended by more than 700 participants from industry, academia and government including FERC Commissioner Philip D. Moeller and top representatives from US Department of Energy (DOE), FCC and NIST.

The conference started with a Smart Grid introductory "boot camp" session that included the development of the business case, the key standards, and a review of representative projects and organizations. The opening sessions included Standards, Smart Grid Implementation, Smart Grid Load and Energy Management, and Smart Grid Security and Reliability Management. In the Standards session, the speakers discussed the wide scope of smart grid technologies and the importance of standards required for the success of the initiatives. It was argued that we need to adapt and use the existing standards as much as possible before creating new ones. Major on-going standards activities were discussed. The NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0 was pointed out as the current framework for establishing Smart Grid standards.



Panelists discussed the value of the smart grid

ABB presented the first paper at the Smart Grid Security and Reliability Management session in the opening paper session. This paper titled, "Smart Grid – A Reliability Perspective" presented a critical review of the reliability impacts of major smart grid resources such as renewables, demand response and storage and observed that, while some of these resources have major negative impact on grid reliability, an ideal mix of these resources leads to a flatter yet growing net demand that eventually accentuates reliability issues further. An architectural framework to meet these reliability challenges was presented. This presentation was well received and the follow up discussion and questions and answer went beyond the allocated time. ABB also chaired the session on Smart Grid Implementation.



ABB's Analogy for the role of architecture in quantum leap advancement of smart grid reliability

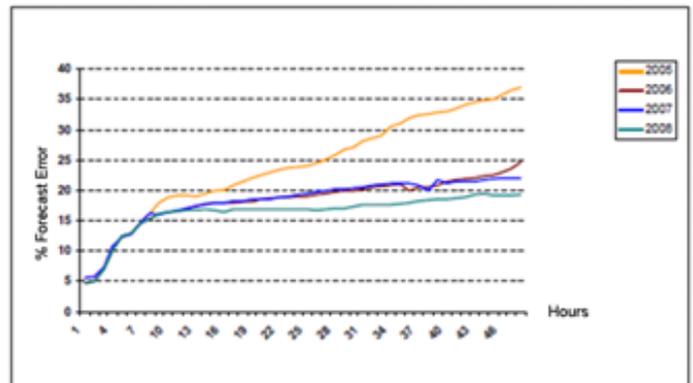
The rest of the three-day meeting included several informative specialized presentations and panel sessions covering various aspects of the smart grid including security, reliability, automation and control, integration of renewable resources and demand response, architecture and project implementations. There was also a panel of consumer advocates who discussed issues which were helpful to understanding some of the social hurdles in the progress of smart grid initiatives such as smart metering and demand response. In addition to our presentation on day one, ABB actively participated in discussions relevant to our markets and technologies at various technical sessions.

The UWIG Wind Workshop was smaller but well represented by major ISOs/RTOs and System Operators from around the world as well as leading technology vendors especially those in wind power forecasting and government agencies such as DOE and NOAA. There was a lot of interest in dealing with the two main characteristics of wind resources namely variability and uncertainty.

The operators presented their current and foreseen wind integration issues. The characteristic spectrum of the wind induced problems was very impressive. For example, for some systems wind induced cycling of their large units was a major problem while for another system with the same level wind penetration, ramping was the main issue. The vendors and research organizations presented on their forecasting tools and research results.

It appeared that none of the methods and tools is satisfactory yet, especially for forecast horizons beyond a few hours. This problem was attributed to:

- Inadequate methodologies
- Insufficient data.



Forecast error significantly increases beyond the first few hours (Source: REE)

Responsible government agencies such as NOAA were asked to expand meteorological stations and provide more three-dimensional measurements. In a separate session for vendors, progress in the integration of wind into energy and market management systems was presented. ABB projected its leading position in this area by presenting our understanding of the industry needs and our solution approach while highlighting latest development activities and results.

# UHF Radio solution successfully implemented at Technische Werke Kaiserslautern

**Technische Werke Kaiserslautern (TWK) is a German multi-service utility offering electricity, district heating, water and local traffic in the Pfalz area. Due to the discontinuation of German Telecom leased lines in 2009, TWK had to replace the affected communication infrastructure. On the application side TWK uses ABB MicroSCADA as SCADA system for the control of their water network outside the city area.**

Considering the high system availability, the customer decided on a radio solution and compared different solution providers. Based on the advanced features of the ABB radio, the strong system know-how and the advantage of one sub-supplier for an integrated SCADA and communication system, TWK decided to implement a communication system based on around 30 AR400 radio equipments from ABB.

After a topology analysis based on a site survey, the radio network was planned. Subsequently, the system was implemented with active participation of the customer. System adjustments were necessary during the implementation caused by existing infrastructure and already implemented radio networks.

Mr. Herzer (Protection-, IT- and SCADA) from TWK stated:

“I am very pleased by the cooperation with ABB communication. Despite unexpected technical difficulties caused by the different system elements, the project was implemented successfully with a second frequency. ABB’s support in the project was excellent. Especially, the coordination of all involved ABB departments through our project partner in ABB Switzerland was convincing for us.”



# ABB wins comprehensive Network Management order in Ghana

## New National Control Center SCADA/EMS and communication to secure the reliable transmission of electrical energy.

Volta River Authority (VRA) in Ghana has placed a comprehensive order with ABB to supply a new Energy Management System (SCADA/EMS) and communication equipment. This system will help to assure the safe and reliable supervisory control of the National Grid Transmission System of Ghana. ABB will supply, deliver, install and commission the SCADA/EMS system for the new National Control Center, together with Remote Terminal Unit equipment (RTU560) for nearly 50 substations, as well as Fiber Optic Terminal equipment (FOX 515) and Power Line Carrier (ETL600) communication equipment between the Control Center and the substations. The SCADA/EMS software includes advanced functions for Network Analysis and Optimization, Automatic Generation Control, Energy Interchange Scheduling and Transaction Monitoring. The order also includes the supply of ancillary equipment such as; Uninterruptable Power Supply units, Diesel Generator, and CCTV Surveillance equipment. Comprehensive training in the manufacturing units and in Ghana on the software and equipment to be delivered is also an important part of the project to ensure a know-how transfer for the future maintenance of the system during its lifetime.

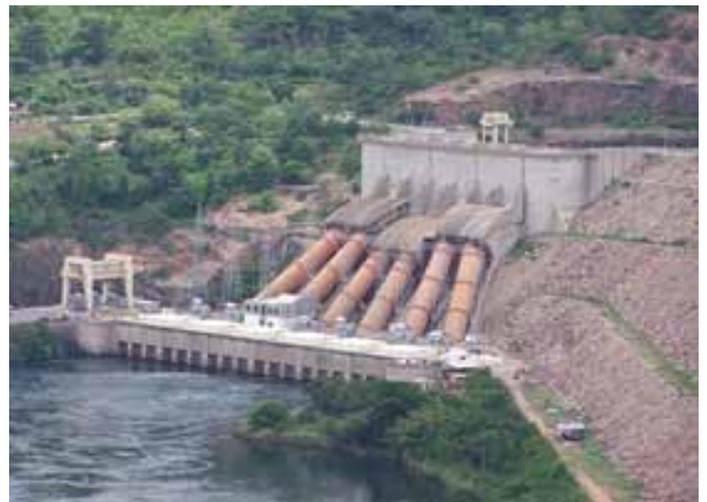
The project is expected to be completed in 19 months.



Peter Leupp, head of ABB's Power System Division says, "These installations will enhance the capacity of the power grid to deliver reliable, efficient and high-quality electricity, and minimize network losses. ABB has provided communications and supervisory control equipment to VRA for over 20 years, and we are proud to be selected for this important project."

The Network Manager SCADA/EMS system is essential for the secure and stable operation of the national grid. This delivery is a key component in the World Bank financed Coastal Transmission Backbone Project for the West African Power Pool to facilitate the supply and exchange of power between the countries in West Africa.

ABB is the world's leading supplier of high-end SCADA/EMS/GMS/DMS and Market Systems, and has more than 400 installations worldwide.



1200 MW Hydro Power Plant at Akosombo

# National Grid selects ABB Network Manager™ DMS

## ABB's industry-leading distribution management solution to be implemented in the Northeastern US

ABB received an order from National Grid for its industry-leading ABB Network Manager DMS. National Grid, a leading energy utility, will deploy Network Manager DMS to increase its distribution system reliability and efficiency and improve customer service to 3.3 million customers in Massachusetts, New Hampshire, New York and Rhode Island.

Last year, National Grid contracted ABB for the implementation of Network Manager SCADA/EMS for the management of its transmission assets. The Network Manager DMS solution will complement the Network Manager SCADA/EMS, providing National Grid with a modern integrated platform for managing its transmission and distribution systems.

"National Grid is committed to continue our plans to enhance our service and improve customer reliability" said Christopher Root, senior vice president, Operations and Maintenance, U.S. Electricity Operations for National Grid. "These systems are a core part of improving our operations now and in the future."



ABB Network Manager DMS is an operations management system designed to help utilities reduce operating and maintenance costs while enhancing customer service. It provides advanced network modeling and management, integrated switching and tagging, trouble call and outage management, crew management, and historical archiving and reporting. Network Manager DMS offers integrated advanced applications, such as fault location, unbalanced load flow and simulation mode, as well as interfaces to other information systems that permit organizations to leverage time-critical data across the enterprise.

"We are very excited to be working with National Grid on so many levels as they invest in the grid operations platform of the future," said Salim Khan, senior vice president and general manager of ABB Network Management in North America. "They are a true industry leader, and we are confident that Network Manager will supply the operations and customer service benefits they are seeking."

National Grid is an international energy delivery company. In the U.S., National Grid delivers electricity to approximately 3.3 million customers in Massachusetts, New Hampshire, New York and Rhode Island, and manages the electricity network on Long Island under an agreement with the Long Island Power Authority (LIPA). It is the largest distributor of natural gas in the northeastern U.S., serving approximately 3.4 million customers in Massachusetts, New Hampshire, New York and Rhode Island. National Grid also owns over 4,000 megawatts of contracted electricity generation that provides power to over one million LIPA customers.

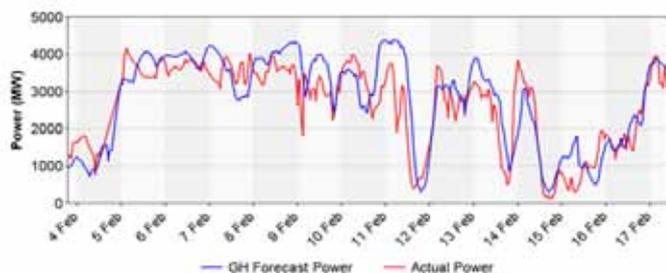
# Enhanced Wind Farm Management in SCADA/EMS

ABB Corporate Research, in collaboration with BU Network Management, has completed a comprehensive set of enhancements for the Network Manager SCADA/EMS product to meet the emerging requirements associated with the operation of Wind Farms.

In the last decade, the commissioning of wind power generation facilities (wind farms) has accelerated considerably, and continued growth is expected in many parts of the world. Although many governmental and non-governmental organizations expect that wind power will continue to grow and become one of the mainstream technologies for energy supply, there has been little development in the SCADA/EMS industry to address the particular requirements associated with wind generation in power system operation.



Even though the wind power generation technology has reached a high level of reliability, the variability and intrinsic unreliability in wind power prediction is still a concern, especially in areas of large penetration of wind power.

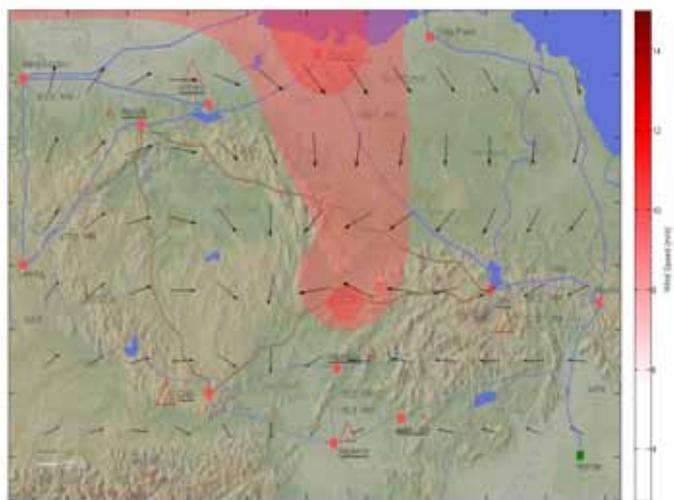


The main goal of this R&D project was to enhance the existing Network Manager applications towards better integration and management of wind power at the transmission level. The project was focused on the following applications: Contingency Analysis, Reserve Calculation, Automatic Generation Control, and Short Circuit Analysis.

These functional enhancements include underlying improvements in wind farm modeling, integration with wind power forecasting engines, and control infrastructure.

A related enhancement involves the improved visualization of weather data associated with wind farms, primarily wind speed and wind direction. These visualization enhancements address both the real-time and the forecasted near-term operating conditions at the different wind farm sites.

A major objective of these visualization enhancements is to provide advanced warning of impending weather changes that may significantly affect the power output of the wind farms.



Enhancing the EMS applications to become more aware and responsive to wind power variability enables the Network Manager product to be more competitive on a dynamic and ever increasing segment of the power market, i.e. integration of renewable generation resources.

These product enhancements give ABB an advantage in the SCADA/EMS/GMS market by being one of the few suppliers offering wind integration solutions for power system management. They also strengthen ABB's position as a company devoted to promoting renewable energy.

# Product News for the RTU

**The RTU560 offers the IEC 61850 client and server functionality; therefore, the RTU560 is the ideal solution for various applications:**

## RTU560 and IEC 61850

The IEC 61850 capabilities of the RTU560 have now been completed. The RTU560 combines the IEC 61850 station bus, direct inputs and outputs, and serial connected IEDs. Since Release 9.5, the RTU560 supports IEC 61850 client and server applications. Additionally, all required tools for the IEC 61850 engineering and analysis of the communication network for the IEC 61850 are now available within the RTU560 product scope.

## RTU560 as IEC 61850 server

As an addition to the IEC 61850 client application, the RTU560 now supports the IEC 61850 server applications. With this function not only data from direct inputs and outputs but also data from IEDs which do not support IEC 61850 can be provided via the IEC 61850 station bus,.

The RTU560 allows conversion of non IEC 61850 IEDs to fully participate in the IEC 61850 environment including bay-to-bay (GOOSE) communication.

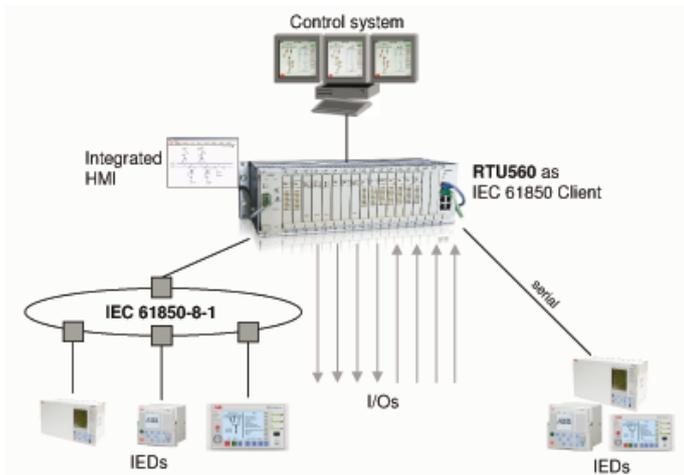
Distributed RTU architectures can also be realized with the IEC 61850 server functionality.

The RTU560 is the ideal gateway to the control center through the implementation of the IEC 61850 client. The RTU560 allows the combination of traditional protocols like IEC 60870-5-103 and the IEC 61850 station bus. With the acquisition of parallel inputs and outputs, PLC and archive functions complete the portfolio. For local monitoring and controlling, the RTU560 offers an integrated Human Machine Interface.

## RTU engineering and IEC 61850

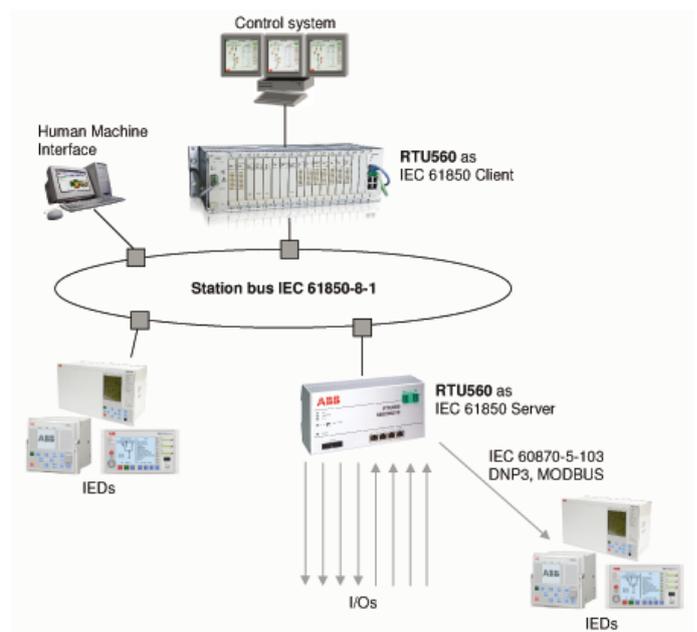
In order to fully support the IEC 61850 engineering process we also enlarged our tool portfolio. In addition to the well known RTUtil, which can be used to create Instantiated IED Description (IID) files, we now have also RTUtil61850 (Communication Configuration Tool (CCT)) in our offering. RTUtil61850 can be used to create System Configuration Description (SCD) files.

The tool "ITT SA Explorer" is also part of the tool portfolio of the RTU560. It is used to analyze IEDs and the communication between them. The data exchange including GOOSE messages is displayed in clear text by the "ITT SA Explorer". The "ITT SA Explorer" is the fundamental tool to commission and test IEC 61850 systems. An additional function is the comparison of SCD configurations with the engineered data of connected devices.



## RTU560 as IEC 61850 client

The IEC 61850 client implementation for the RTU560 has been available since 2007. Since then, the RTU560 has been deployed in many projects all over the world with IEC 61850 client functionality.

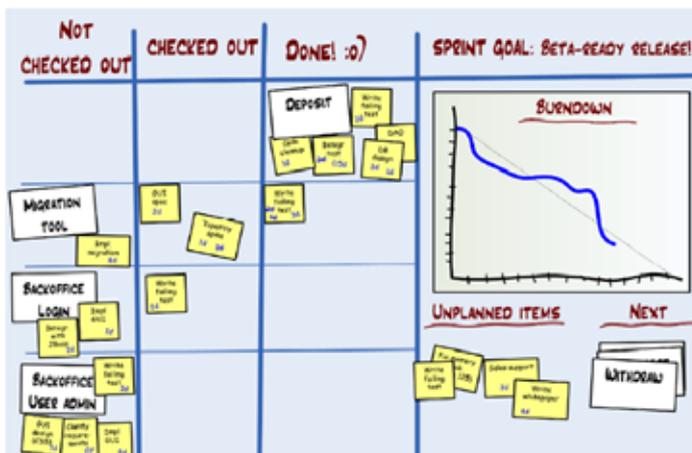


# Successful projects using Agile and Scrum

## What is Agile and Scrum?

Agile and Scrum are being introduced as ways to manage software development and integration work at Network Management, but what does it mean?

Agile is the common definition of a collection of iterative software development methodologies, founded on recognized methods such as Lean manufacturing and Six sigma. Scrum is a specific development method often used within Agile projects. Scrum projects make progress in a series of sprints, which are time-boxed iterations no more than a month long. At the start of a sprint, team members commit to delivering some number of features that were listed on the project's product backlog. At the end of the sprint, these features are done--they are coded, tested, and integrated into the evolving product or system. In addition, a sprint review is conducted during which the team demonstrates the new functionality to the product owner and other interested stakeholders who provide feedback that could influence the next sprint.



Scrum relies on a self-organizing, cross-functional team. The scrum team is self-organizing in that there is no overall team leader who decides which person will do which task or how a problem will be solved. Those are issues that are decided by the team as a whole. The team is cross-functional so that everyone necessary to take a feature from idea to implementation is involved. Scrum teams are supported by two specific individuals: a Scrum Master and a product owner. The Scrum Master can be thought of as a coach for the team, helping team members use the Scrum framework to perform at their highest level. The product owner represents the business, customers or users and guides the team toward building the right product.

See <http://www.mountaingoatsoftware.com/scrum>

## The Agile Gassco delivery project

Since the beginning of 2009, the Gassco NewPMS project has been running a large software delivery as an Agile project and using Scrum as the development method. The project will result in an integrated SCADA/PMS (Pipeline Monitoring System) at the Gassco site on the Norwegian west coast. The NewPMS project includes Gassco, ABB and Atmos International. Atmos International provides the pipeline monitoring system which is an application package used by Gassco to control and optimize gas transportation from the Norwegian continental shelf to Great Britain, Scandinavia and the continent.

The project kick-started with an Agile course where both ABB and Gassco team members participated. The delivery was split into about 20 three-week-long iterations and a backlog containing the entire project scope was set up. From there we started the iterative development phase that is still going on. Each iteration starts with a planning session between ABB and Gassco where a number of stories are chosen to be implemented. Gassco decides the relative priority of the stories and ABB commits to implementing as many stories as the number of resources in the team permits. During the iterations there are scheduled technical review meetings between ABB and Gassco where ABB can receive feedback and Gassco can influence the development in progress. Each iteration ends with an installation of the newly developed software at the Gassco site. All new features are tested by Gassco and a story is not ready and closed until it is approved by the Gassco project team.

Up to this date, a large number of stories have been developed and approved by Gassco. Among these are: functionality to integrate third party vendor components in WS500 and DE400, replacing DE400 Forms with modern .NET grids, a hierarchical browser of the data model and DE400 single sign-on.



## Early experiences using Agile and Scrum in Network Management

Apart from the Gassco project, a number of other development projects have been run with Agile and Scrum internally. Where there has not been an end customer to take on the role as product owner project managers, technical leads and product managers have served as the customer representative.

One of the most evident benefits we have noticed is that team members appreciate and enjoy the empowerment invested in them by the methodology. When evaluating any of the ongoing projects further there are also a number of areas where Agile projects seem to perform better than traditional ones, and especially provide:

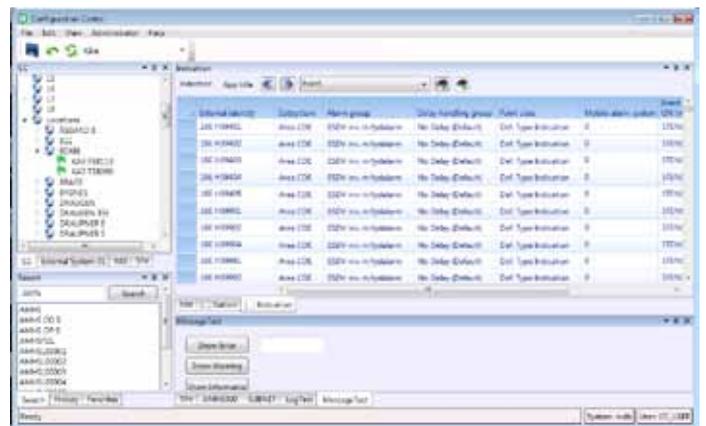
- Good progress control
- Early and iterative quality assurance
- Ability to adjust the functional scope depending on evolving customer/product needs
- Efficient development teams that are focused on the task

The primary, yet simple, key to success is perhaps that Scrum encourages and facilitates communication between team members, both vendor and customer. With an open and honest atmosphere it is easier to make the best of change and unexpected events that inevitably will come our way.

Based on the positive experience in this project so far, the use of Agile and Scrum can be considered in future software and delivery projects.



The Scrum wall



# ABB Ethernet solution successfully launched

## ABB extends its fiber optic communication solution portfolio with the AFS IEC 61850 Ethernet platform.

The AFS platform enhances ABB's product portfolio with a packet-switched solution for distribution networks, in-plant communication and substation automation applications. In addition, the AFS product family supports the stepwise introduction of Smart Grid applications, such as integration of renewable energy sources, advanced distribution automation solutions and similar applications.

The main focus of the solution is the specific utility requirements in compliance to substation standards (e.g. IEEE1613), extended temperature rating, fanless design, AC/DC power supply, redundant power supply and scalable design with up to 28 fiber optic ports. Furthermore, integration into the ABB substation system, as well as wide area communication solution, has been considered.

This solution enables utilities to build up an efficient communication network including different technologies like VHF/UHF radio, GPRS/UMTS and Ethernet. The switch family will be enhanced with the ABB Router AFR and the AFF Firewall solution.



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