Bayer Technology Day
800xA – Overview and Technology Update
What’s new
Business Development Manager

AJ Smith
Business Development Manager – 800xA Evolution

- Help customers plan system evolution
- Inform customers about System 800xA
- Nurture greater satisfaction of System 800xA users
- System 800xA ombudsman
  - Be “Voice of the Customer”
  - Aggregate customer issues and requests
Communications

Users Webinar

- Quarterly web series
- Demonstrate features or best practices
- Provide news on 800xA related topics and promotions
- Get feedback from customers

Previous webinar – Jan 27, 2014
- Topics: My Control System, Alarm Management
- Topics: Advanced Graphics, Cyber Security
- Recorded

Next Webinar – July 28, 2014
- Topics: Wireless Solutions, Report Configuration
Communications System Newsletter

- Published quarterly
- Provide news & links to 800xA related topics and promotions
- Link to webinars
  - Follow up to issues raised

March 2014

For a limited time save 10% on either Alarm Operations or SMS and e-mail Messaging. Save 15% if you order both features. Use code WEB1-2014 with your order. Act fast, this offer won’t last long.

>> Get the purchase instructions and details to take advantage of this offer

Windows XP support stopping soon, will it stop you?

Windows XP support ends on April 8. What does this mean for your critical operations? Your control system and workstation software may be affected and now is the time to develop an upgrade or evolution plan. Be prepared, read our FAQ on Windows XP end of support.

>> Windows XP EoL: Your critical operations at risk (FAQ)

As the underlying platform for your system moves through its lifecycle, ABB is committed to protecting your investment in System 800xA. Read more about our Lifecycle Policy for control systems.

>> Let us help with your migration from Windows XP
Communications
800xA Mailbox

800xA.Evolution@US.ABB.COM

Inquiries: features, best practices, promotions
Comments: new features requests, problems, other feedback
System 800xA
The Basics
System 800xA – Our customers Collaboration System

- Welcome to The Power of Integration!
Promoting Collaboration
One common automation platform – System 800xA

- Integration platform with
  - Connectivity to plant systems, applications, control systems, I/O and fieldbus technologies
- Allows for simultaneous execution of various applications
  - Process automation, process electrification, power distribution, power management, safety...
- Pre-integrated, common value added applications and services

System 800xA removes barriers and promotes collaborative production automation!
Aspect Object Technology – Device/Unit Centric Information

- Aspect Objects provides
  - Faceplates, Graphic Symbols
  - Alarm management
  - Trend, History
  - Drawings
  - Instructions
  - Pictures
  - Etc….
System 800xA Extended Automation
System version history

Current Version
System 800xA SV5.1 FP4

Next Version (Release Date: July 2014)
System 800xA SV6
Life Cycle


SV5.1: Windows 7, 2008 Server (EOL – 01/14/2020)

System 800xA
Current Features and Capabilities
<table>
<thead>
<tr>
<th></th>
<th>SV3.1</th>
<th>SV4.1</th>
<th>SV5.0</th>
<th>SV5.1</th>
<th>SV5.1 FP4</th>
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</thead>
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<tr>
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<td>Windows 2000</td>
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<td>Windows XP</td>
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<td>20 operator and engineering workplaces</td>
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<td>12M stored events</td>
<td>12M stored events</td>
<td>12M stored events</td>
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</table>

**Extended Automation Features**

- Personalized Workplaces
- Function based Engineering
- Log Over
- SFC Viewer
- Bulk Data Engineering
- Integrated Documents

- Synchronized History Logs
- Compact Flash to start controller that has lost memory
- System Checker Tool
- Windows Remote Desktop support for remote clients
- Function Designer

- Online upgrade of AC800M firmware
- Multi User/Distributed Engineering
- Large Screen and Multi Screen
- Alarm Hiding
- Over/Under Range for Analog Outputs

- PG2 Graphics
- Server Virtualization
- Acknowledge all graphic alarms
- System Configuration Console
- Wide Screen Workplaces
- Task Analysis Tool
- Security Update Tool for MS Patch Updates

- Thin Clients
- Audit Trail
- Digital Signature
- SMS Messaging
- Re-Authentication
- Double Authentication
- Calculation Engine
- MS Excel Data Access

- SAP/PM Integration
- Default maintenance Workplace for Asset Optimization
- Load Evaluate Go
- Alarm Shelving
- Alarm Grouping
- Alarm Analysis
- Snapshot Reports
- PLC Device Library
- Point of Control

- Harmony Connect
- Melody Connect
- Asset Optimization
- PLC Connect
- OPC Client Connection
- Redundant Profibus
- Drives Integration
- ODBC Connection
- FF Support

- Redundant HSE for FF
- SIL 2 Integrated Safety
- DCI Connect
- MOD Connect
- Freelance Connect
- INtools Integration
- SIL 3 Safety
- Electrification Integration
- Satt IO interface to AC800M
- Asset Monitor triggered by A & E data sources
- Control Loop Asset Monitor
- System Status Asset Monitor
- Counter Check Asset Monitor
- Heat Exchanger Asset Monitor
- FF Alarms & Events

- Wireless Hart
- Profinet, Ethernet IP, DeviceNet
- MOD5, Advant Fieldbus 100
- Integrated Video

- Harmony Connect
- Melody Connect
- Asset Optimization
- PLC Connect
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- Wireless Hart
- Profinet, Ethernet IP, DeviceNet
- MOD5, Advant Fieldbus 100
- Integrated Video
Integrated view of equipment and systems
Powerful workplaces with embedded functions

- Navigation Display
- Operator Note
- Video Group Display
- Faceplate
- Trend Display
- Alarm List
- Documentation

✔ The most feature rich operator interface available
✔ All information in one window
✔ Switch information context with just one mouse click

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June 12, 2014 | Slide 14
System 800xA 5.1 Feature Pack 3
Tab Navigation with Alarm Status

Indications for alarms and shelved / hidden alarms (for ex.)

Status “bubbles” up to the top automatically

Support for display levels – important for High Performance HMI designs:
Lvl 1: Overview
Lvl 2: Area
Lvl 3: Unit

Alarm status and color definitions can be referenced

Can now be configured to indicate if alarms exist “on” the graphic as well as status like shelved alarms
Hardware Status and Tag Navigation – 5.1 FP 4

- AC 800M hardware Status and Navigation
- AC800M status for operators @ a glance
- Graphic elements available on hardware components for building system status graphics
- Navigation to affected application/tags
- Automatic configuration using a “Configuration Uploader”
System 800xA 5.1 – Feature Pack 4
Operator Effectiveness Improvements

- Embedded Video System
  - Improved decision support
- High Performance Graphic Elements Library
  - Improved situation awareness
- Mobility guide and workplace
  - Power of 800xA in the palm of your hand
Streamlining the Operator’s Working Situation
Built in Alarm Management – Alarm Analysis

No of: Active, Unacknowledged, Hidden, and Shelved alarms
Alarm rates and Average, Max number of alarms per hour
Average time to acknowledge alarms
Percentages of alarms above Acceptability level (user defined)
Percentages of alarms above Intense level (user defined)
20 most frequent alarms
20 alarms that were active for the longest time
20 still active alarms that were active for the longest time
Runtime distribution of alarm priorities
KPIs stored in history - reporting
ABB Enterprise Alarm Management - AlarmInsight
Enabling integrated alarm management
Operator Effectiveness
Snap-shot Reports (SV5.1)

- Provides online report aspect that finds and presents data matching configured criteria
- Examples:
  - New or changed operator notes
  - MV, OUT and SP values for all loops
  - All loops in manual
  - All updated aspects in last hour
  - All forced signals
  - IP addresses on system nodes

Benefits:
- Better change management
- Reduced time for shift handovers
- Shorter maintenance stops
### Distillation Process Variables

<table>
<thead>
<tr>
<th>Object Name</th>
<th>Object Path</th>
<th>IN.VALUE</th>
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### Distillation PID Set Points

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System 800xA 5.1 – Feature Pack 4
Application Change Management (ACM)

- Version control service used for 800xA applications
- Configuration management service designed to handle versions across multiple 800xA Systems
- Saves multiple versions of the objects with access control and activity log
- From 800xA, Check-in / Check-out Applications, Libraries, Procedures… and compare with previously saved versions
- Browse ACM Server for previously saved versions and “Get Latest” / “Revert Back”
- Detailed Comparison with what’s currently running in the ‘production’ system
- Baselines can be created to save all current versions at one time.
Enterprise asset management
Much more impact than just field devices
System 800xA– Asset Monitor Portfolio

- **3rd Party Integration AM**
- **Plant Performance AM**
- **Plant Equipment AM**
- **Machine AM**
- **Electrical Equipment AM**
- **Control Network AM**
- **PC, Software & Network AM**
- **Field-device AM**
- **Basic AM**

### 3rd Party Integration AM
- Condition Monitoring Tools (SystemOne, PumpExpert, …)
- RealTime Production Intelligence AM
  - Plant-wide disturbance
- Heat-exchangers, …
  - Control loops, …
- Pumps, compressors, …
  - Motors, Control loops, …
- IEDs, Motor controllers, motor starters
  - LV, MV Drives
  - Switches, …
- ABB Harmony
  - ABB AC800M
  - ABB Melody
- Servers, Clients
  - Switches, Printers, …
- HART, Profibus, Fieldbus FOUNDATION
  - ABB devices
  - 3rd party: Metso, Yokogawa, E&H, …
- High/Low Limit supervision for signals
  - Runtime check, event counter
  - OPC Quality & Boolean check
Promoting Collaboration
Integrated Process Control and Safety

- Same operations interface and engineering
- Centralized Historian and Data Archiving
- Plant-wide Sequence of Events
- Process control and safety running in separate controllers
- Process control and safety in the same HI controller
- Common system therefore reduced spare parts, training etc…
- Common, integrated asset management strategy
Safety Systems – New Offering
Independent High Integrity (HI)

- HI Hardware
  - TUV certified SIL 3 controller (single)
  - 24 VDC DC I/O and 4-20 ma Analog inputs
- Control Builder Safety
  - IEC1131 languages
  - Access control and override control
- Certified Libraries
  - Safety and Supervision
  - Application (F&G, BMS)
- Connectivity and Interfacing
  - ABB Control systems
  - 3rd party software and control systems
- Diagnostics / Audit Trail

Small Independent HI system with engineering and DCS
Promoting Collaboration
Integrated Process and Power Automation

One unified approach to increase productivity and decrease downtime and maintenance cost
800xA Electrical Integration
All equipment controlled & operated in one environment

Benefits
- More efficient and informed operations
- Condition monitoring reduces downtime

- Reduced Engineering Cost
- Reduced Construction and Cabinet Cost
- Faster Project execution
- Late change flexibility
- Freedom of choice for device types

Common, integrated asset management
Plant-wide Sequence of Events for better root cause analysis
Same operations interface for shared information and knowledge
Centralized Historian and Data Archiving

Fieldbuses
LV Switchgear, Drives, Motor Controller
MV Switchgear, MV Drives
Protection & Control IEDs
System Servers
IEC 61850

Process Automation    Process Electrification    Power Distribution

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Integrated Process and Power Automation
Electrical Integration – IEC61850

System 800xA

Client/Server network

Engineer Workstation
Operator Workstation

Control network

PMS Application

IEDs for Bay Protection, Generator Protection, Transformer Protection, Motor Protection…

Horizontal Integration

Up to 80 Per Network

Vertical Integration

IEC61850 OPC server

IEC61850 GOOSE

IEC61850 network

AC 800M “IED”

IEC61850 MMS

Firewall to Enterprise Layer

Workplace

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Slide 29
Remote Operation
Using Multi System Integration

- Operate one or several 800xA systems remotely
- Full operational access
- Remote desktop access from any office
Operator effectiveness in a box

Extended Operator Workplace

- EOW-x2 and EOW-x3
  - A base for collaborative plant operation
  - Transforms control rooms to collaboration centers
  - Managers and engineers can now easily create powerful collaboration environments using packaged solutions
  - Packaged preconfigured workplaces, including everything from software to screens and operator desk

- The EOW products includes
  - Software: Extended Operator Workplace, Operator Workplaces, Video-clients and input channels, CAD viewers
  - Hardware: Operator desk, Video Camera, Screens, Multi-client keyboard
  - Packaging & freight included
Virtualization in 800xA
Better utilize physical HW

- Replace physical Server HW by redundant pair of ESX Servers
  - Less HW, space and cooling needs for Server Cabinets
  - 800xA Server Computer become HW component independent
  - Centralized administration and deployment via vCenter client

Non-virtualized large 800xA system

Virtualized large 800xA system

This is for the server hardware only.
Consider communication hardware, installation cost, ...
System 800xA 5.1 – Feature Pack 4
Virtualized Clients

- Support for ESXi 5.1
- Virtualized Client capability in addition to 800xA Servers
- No 800xA SW on physical client machines
- Easier to install and maintain

The entire 800xA system can literally be virtualized!
800xA Unleashed

Wireless

- Wireless Routers added to 800xA’s portfolio
  - Remote clients on PCs, Tablets, Smartphones
  - Operator Clients w/network redundancy
  - Controllers w/network redundancy
- WirelessHART Field Instruments from ABB
  - Battery powered and Energy Harvesting Wireless Transmitters
  - Field Key Adapter for getting diagnostics from 4-20ma transmitters

the power of 800xA – unleashed!!
Integrated Device Management

- Each device type object includes aspects for:

  - Product Documentation
  - Configuration
  - Commissioning
  - Operation
  - Maintenance Management
  - Parameterization
  - Asset Monitoring
  - Diagnosis

Adding a device in System 800xA, you get everything you need for Device Management, Engineering, Commissioning, Asset Optimization and even Documentation!!
System 800xA 5.1 – Feature Pack 4
EtherNet/IP – 5.1 FP4

- Support for native Ethernet/IP devices
  - Reads and writes data to Ethernet/IP devices (I/O, drives, MCCs, etc.)
  - Peer to peer communications with Allen Bradley / RS PLCs
- Supports master redundancy
  - Full support for Online Upgrades

EtherNet/IP is the most popular industrial ethernet protocol for PLCs world wide!
(Source: IHS/IMS I/O study)
User Defined Protocol (UDP/IP and TCP/IP)

- UDP/IP and TCP/IP Communication Libraries
  - Similar to user-defined serial communications but on Ethernet
  - Uses built-in control network ports on AC800M controllers
  - Redundancy is handled by RNRP
- Example
  - End user engineered new interface to meet IEC870-5-104 for telemetry protocols (RTUs)

Q: Do you have an ethernet interface for ________?
A: YES!
System 800xA 5.1 – Feature Pack 4
S800 High Density I/O modules

- DI818 / DO818 - 32 channel 24V
  - TU818 (Screw Terminations)
  - TU819 (2-25 pin D-sub)
- DI828 - 16 channel 120V / DO828 - 16 channel Relay
  - TU851 (Screw Terminations)
  - TU852 and TU854 redundant MTUs w/25 pin D-subs

Approximately 20% space savings in typical project (approx. 70% digital signals)
System 800xA 5.1 – Feature Pack 4
Cyber Security

- Extended security options available
  - Industrial Defender enhanced connectivity
    - Exposes 800xA events for security analysis
  - Cryptzone SE46 Application Whitelisting in 800xA

Safe and secure operations
IS priority # 1
800xA History
Data Storage and Analysis

- Evolution of Information Manager
  - IM continues to be supported but emphasis is on 800xA History
  - Independent life-cycle from control system
- Scalable Historian
  - From embedded devices to DCS historian to MOM level historian
- Tightly integrated with System 800xA
  - Single point configuration – engineering efficiency
  - xA Workplace trending/data_and_event retrieval
  - Integrated testing with System 800xA
- High Speed Data Storage and Access Application Server
  - Remote and embedded Data Collection capabilities
    - allows for distributed deployment models
    - Firewall friendly and Cyber Secure – can sit above the control network
800xA History
Flexible system topology

- real-time values
- raw history + aggregates
- alarms and events
- calculations
- data access

Secured, Encrypted and Compressed data transfer

- Data collection
- buffer collection
- fault tolerant

Control Network
AC800 M
Advant
Harmony

Third Party Server(s)
3-rd Party 3-rd Party

Plant Operations Network
Combined CS + DCN

Connectivity Server(s)
Data Collector

Plant Information Network
Smart Client
Production Report
Event Report

800xA History

ODBC
OPC DA & HDA

Data Collector
DCN

Standalone DCN
ABB Enterprise Data Visualization – Smart Client

- A thin client user interface for System 800xA

  providing

- Real time data from System 800xA, System 800xA History and their integrated systems
- Trends, both current and historical for all data points
- Basic SPC information
- Basic Alarm analysis
- Customized reports in excel environment

  to

- Production managers, purchasing officers, planners, economists, environmental officers, etc

  in

- Office or home environment through intranet or internet with VPN connection to the production site
800xA Smart Client architecture

- 800xA Core
  - Controller
  - Controller
  - Controller
  - Aspect Directory
  - Data (Surrogate)
  - PG2 Displays
- SC Extensions
  - Browser/Search Provider
  - DA/HDA Data Provider
  - PG2 Provider
- System 800xA
  - 800xA Core
  - SC Extensions
  - History
  - Displays
- Smart Client Server
  - Security / Authentication
  - User/Role Management
  - Display Management
  - Data subscriptions
  - Data routing
- Ports: 80, 19131
- Panel Storage

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ABB Smart Client
Desktop Visualization – 800xA PG2 Graphics Integration
Power and productivity for a better world™