Kevin Kochirka, ABB Turbine Automation, June 29, 2016

Flexible turbine control retrofits
Webinar

Welcome
Speaker introduction

Kevin Kochirka

- Sr. Applications Engineer with ABB Inc.
- Kevin.Kochirka@us.abb.com

- Responsible for the development, enhancement and delivery of the Combustion Turbine Control System.
- Kevin has a BS degree in Electrical Engineering Technology and has over 25 years of experience with combustion turbines as a Controls Engineer, Project Supervising Engineer, and Field Service Commissioning Engineer. His experience is on various models of combustion turbines (ABB GT11s; GE Frame 5 & 7; Westinghouse 191, 251, 501; Siemens V84.2; Pratt & Whitney Power Pac and Twin pac FT4 and FT8 engines; and Rolls Royce Avon units)

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Question
What does flexible turbine control retrofit mean?

- **Flexible** is ability to adapt to different circumstances
- **Turbine** relates to all types of rotating machinery, combustion turbines, steam turbines, industrial turbines, hydro turbines, boiler feed pumps, blowers, gas expanders, and compressors
- **Control retrofit** is the upgrading or replacement of an existing control system
  - ✓ Hardware, layout of controls, cabinet designs, I/O placement
  - ✓ Operator flexibility on how to interface, HMI configuration
  - ✓ Controls related, operator adjustments, plant engineering design, automated control features.

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# Best practices for updating your control system
Consider these

- **Flexibility of the architecture platform**

- Flexibility of the Human Machine Interface (HMIs)

- Flexibility of the control system

  ✓ Flexibility benefits for existing customer

  ✓ Flexibility benefits for a new customer

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Symphony Plus architecture overview
Simple, scalable, seamless and secure

- Windows Based, Web-enabled HMI (Standard Windows Environment)

Evolution without Obsolescence
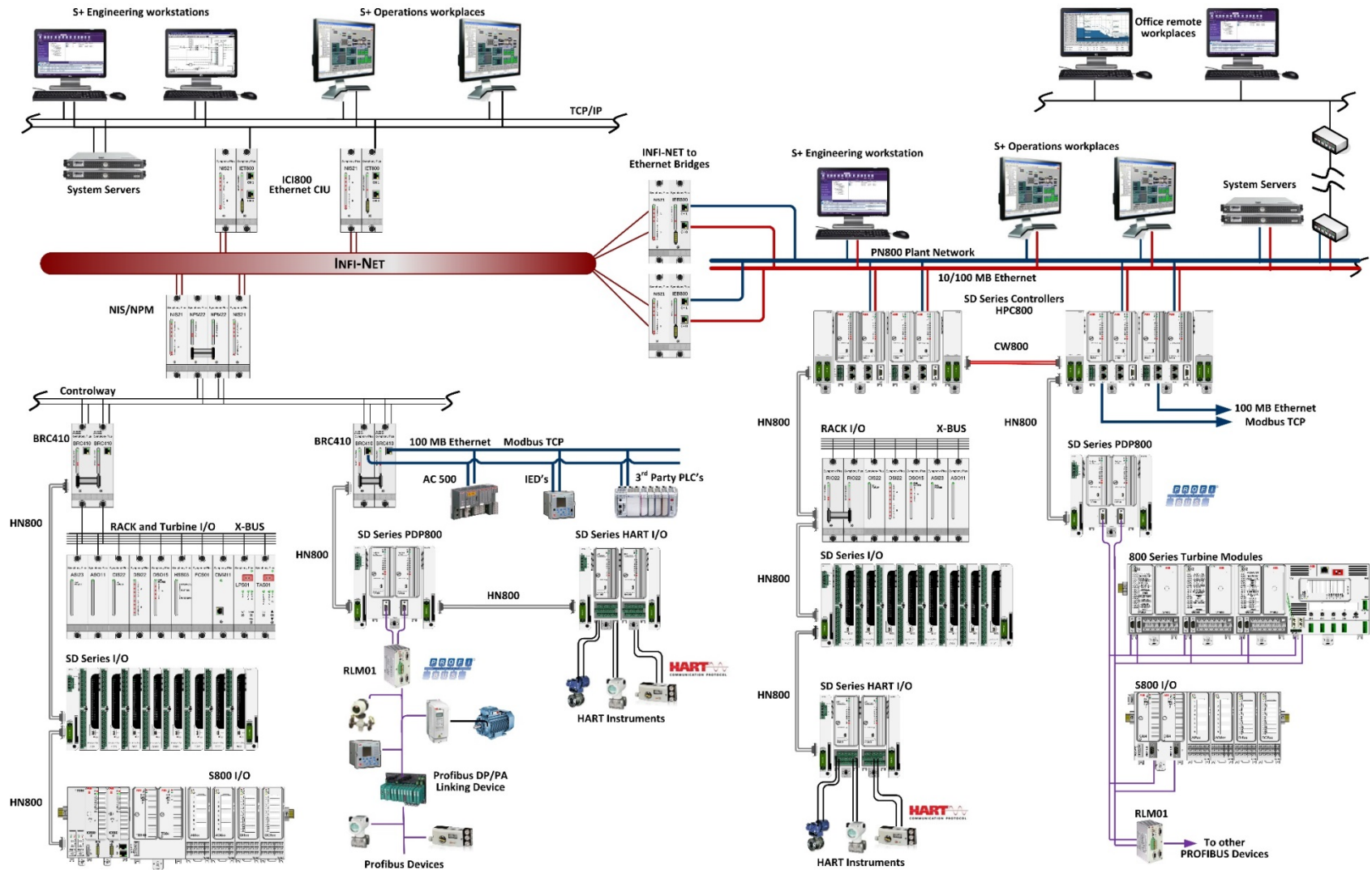
S+ Engineering
Programmed in Sama Type logic diagrams

S+ Engineering: Composer Harmony

- ❑ **Designed to operate on Microsoft Windows**
- ❑ **Server based; project resides in central location**
- ❑ **Supports Multiple users (10); network environment**
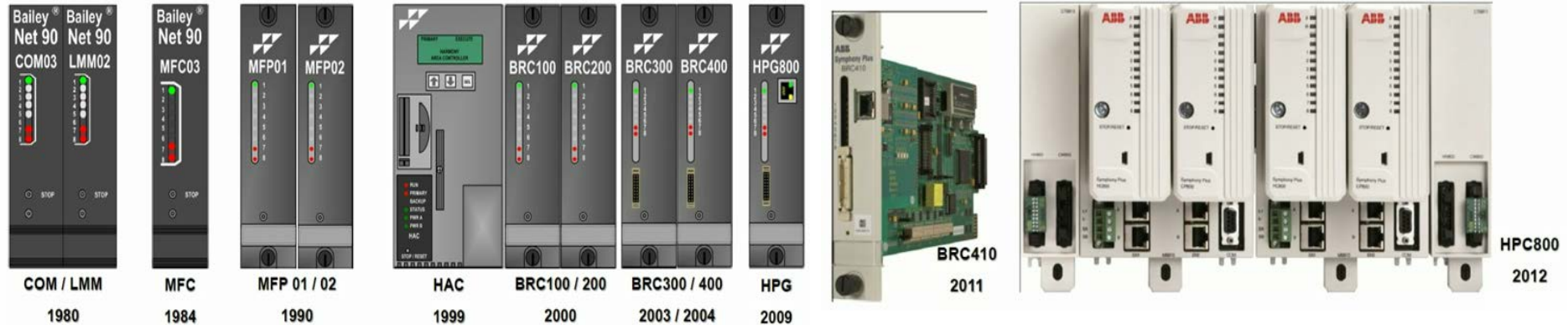- ❑ **Central Database; Edit with Excel**

- Visual environment for easy configuration
- View and Monitoring Logic
- Object Exchange
- Online Documentation
- Expedient Engineering and Commissioning work
- Macro / Template Construction Maintenance
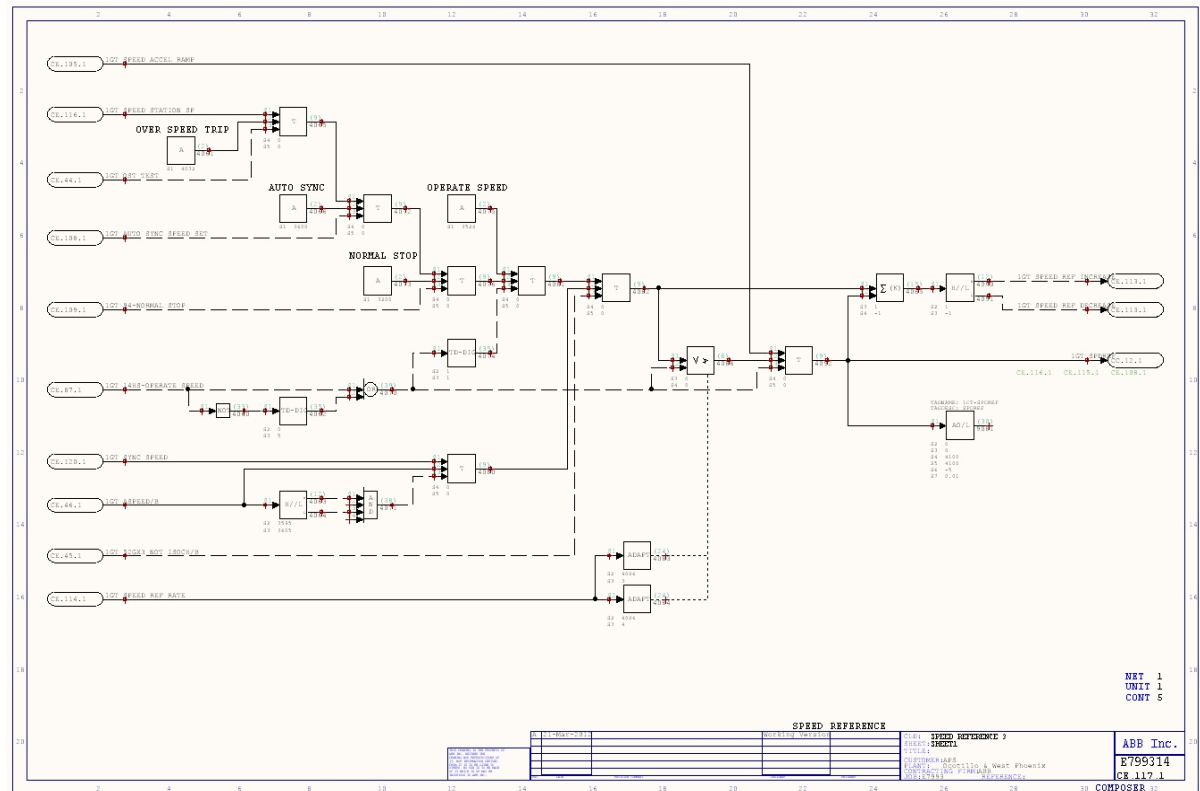
Symphony Plus heritage of controllers
## Evolution without obsolescence

- Extensive library pre-defined control algorithms
  - 200+ Function codes
  - Supports 'C' programming
  - Supports batch
  - User defined function codes

  - Downloadable firmware
  - 30,000 blocks per module
  - Reusable standard solutions

- 1980 configuration compiles and executes in a 2016 controller

Taking the next great leap forward

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Symphony Plus architecture overview
Simple, scalable, seamless and secure

▪ Windows Based, Web-enabled HMI (Standard Windows Environment)

Evolution without Obsolescence
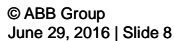
S+ Turbine product overview
Overall product portfolio

Utility Steam Turbines

Combustion Turbines

Auxiliary Steam Turbines

Industrial Steam Turbines

Hydro Turbines

Renewable

Harmony Turbine Rack

800 Series

Coming soon: SD Series

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S+ Turbine
Integrated turbine modules

- **SPTPS02 / TP800 – Speed input**
  - 2 out of 3
  - Overspeed Protection at the I/O
  - Surge Protection firmware

- **SPHSS03 / VP800 – Valve Positioner**
  - Servo valves
  - E/H converters
  - Position feedback

- **SPCMM11 / MCM800 – Vibration**
  - 4 Independent channels
  - Configurable probe types
  - On board relay outputs for alert and danger

- **SPTAS01 / AS800 – Auto Synchronizer**
  - Matches freq, voltages and phasing
  - On board synch check

Harmony Turbine Rack

800 Series
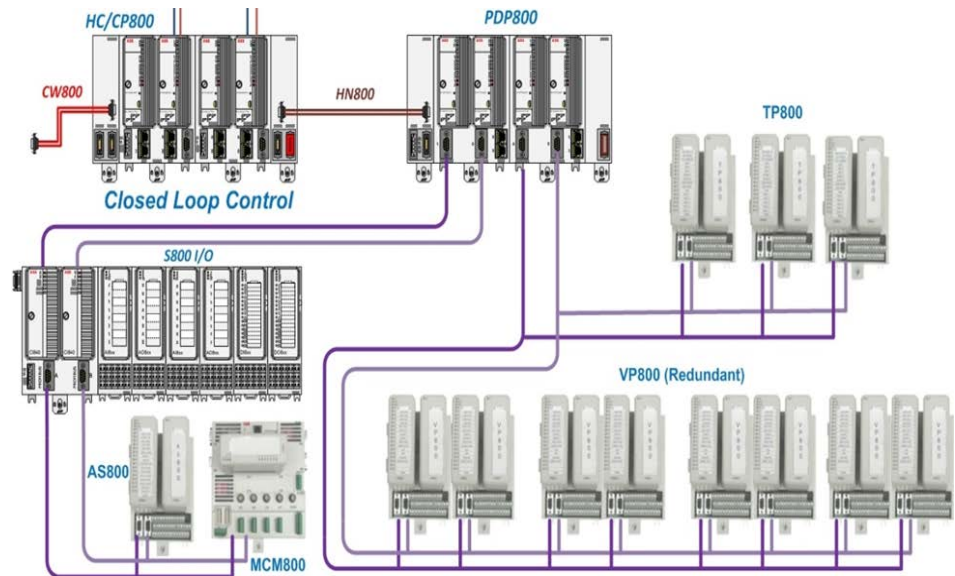
Symphony Plus: SD Turbine Modules
## General overview

TP01 / VP01 / AS01

Fast and reliable turbine control system
- Reduced footprint
- No gateways / protocols
- Native integration with plant controls
- Common engineering

- SD Series modules for turbine control
  - VP01 for valve positioning
  - TP01 for turbine protection
  - AS01 for generator Autosynchronization
- High speed / high accuracy electronics
  - Increased CPU Power
- Extensive functionality based on 30+ years of experience with Harmony Rack and 800 Series Turbine modules
- Fully integrated into S+ Control, S+ Engineering, and S+ Operations
  - Seamless HN800 based integration and communication
  - Dedicated function code within S+ Harmony (FC 248) for fast and efficient communication
  - Graphical faceplate window for user friendly configuration of parameters
- High reliability design
  - SD Series platform standard digital electronics and operating system

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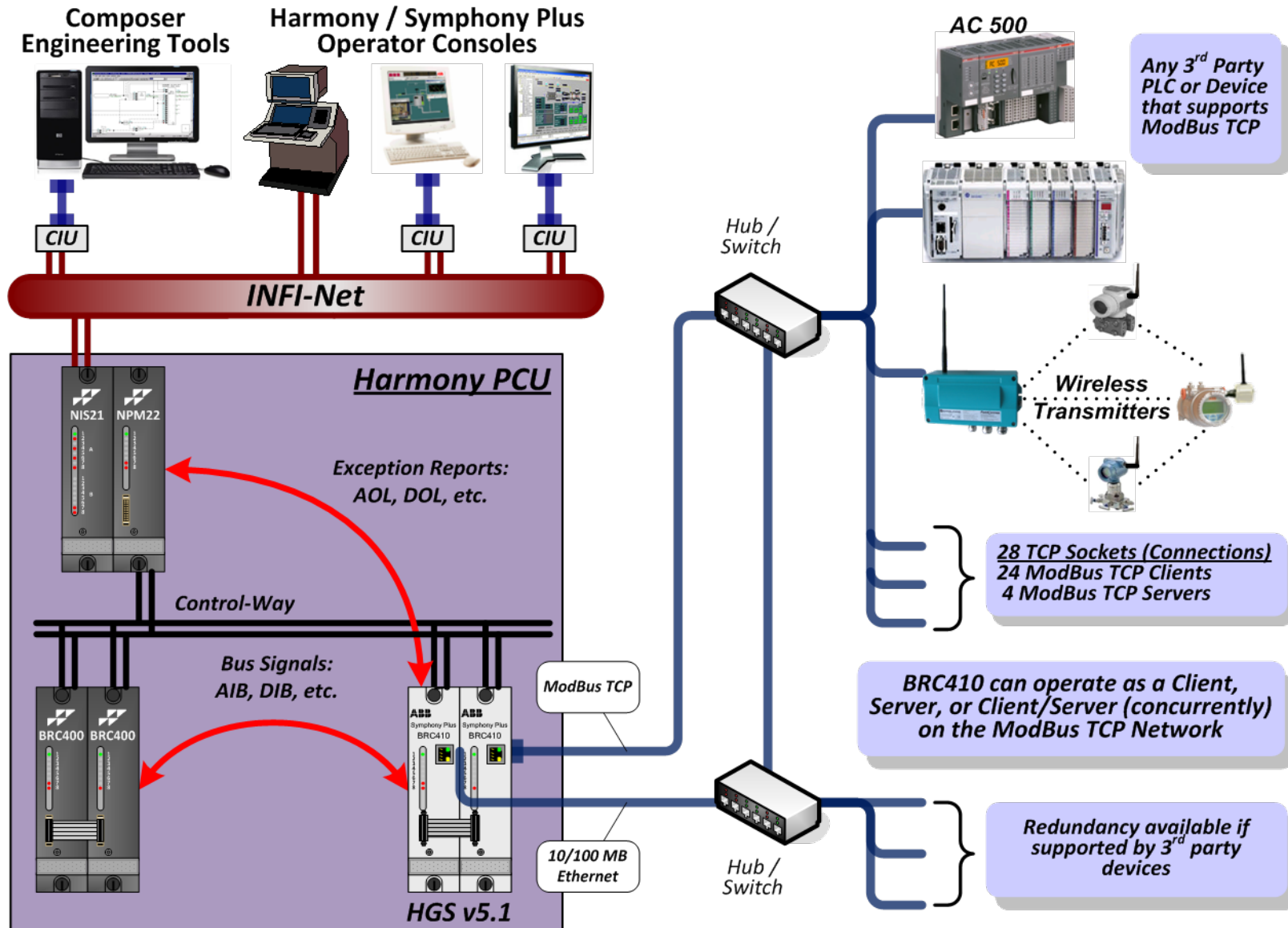# S+ Turbine product overview
Today's available TCS architecture
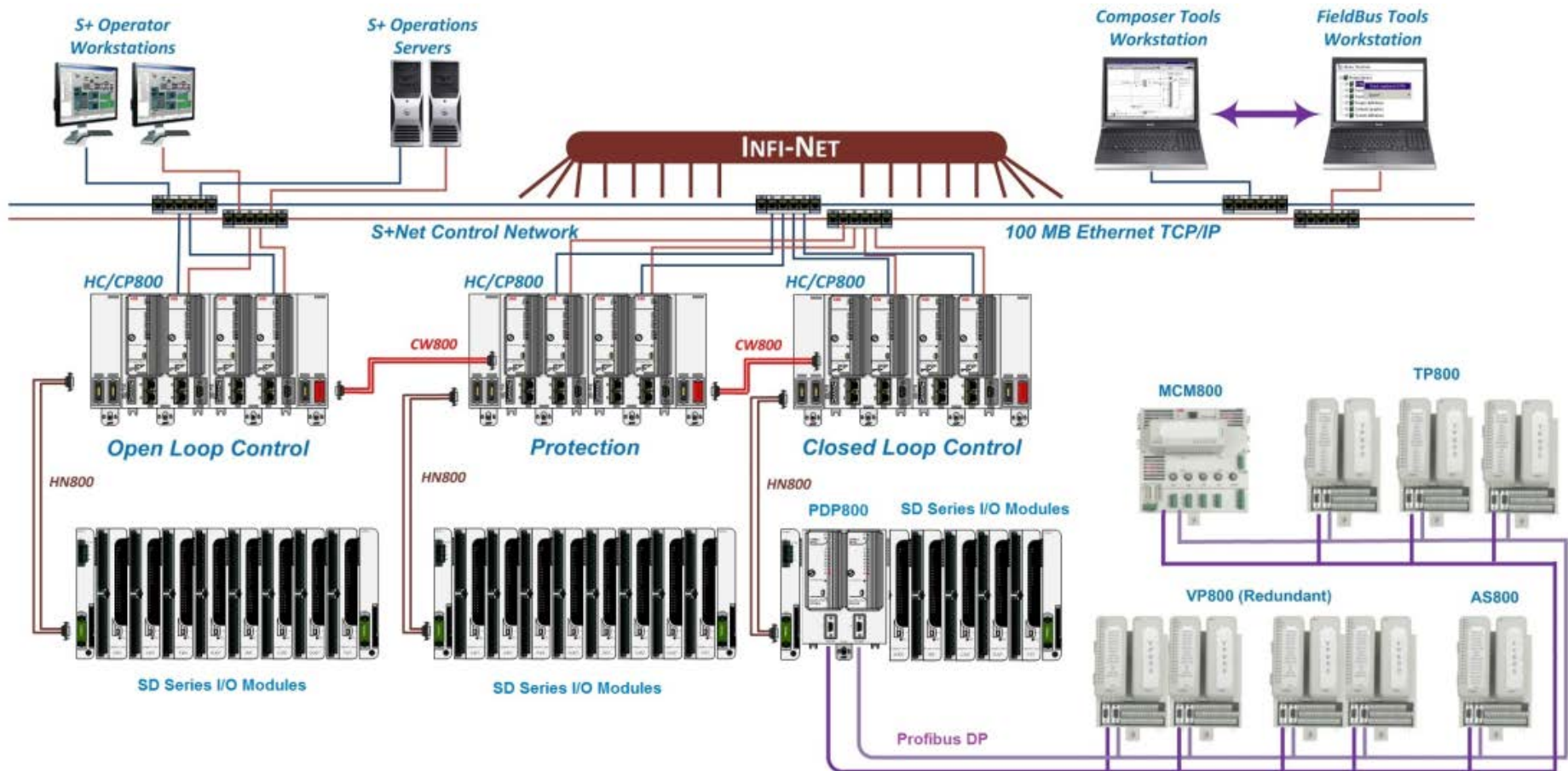
Note:

This architecture can have several variations depending on specific project requirements (performance, redundancy, safety standards, etc…)

Symphony Plus Control and I/O
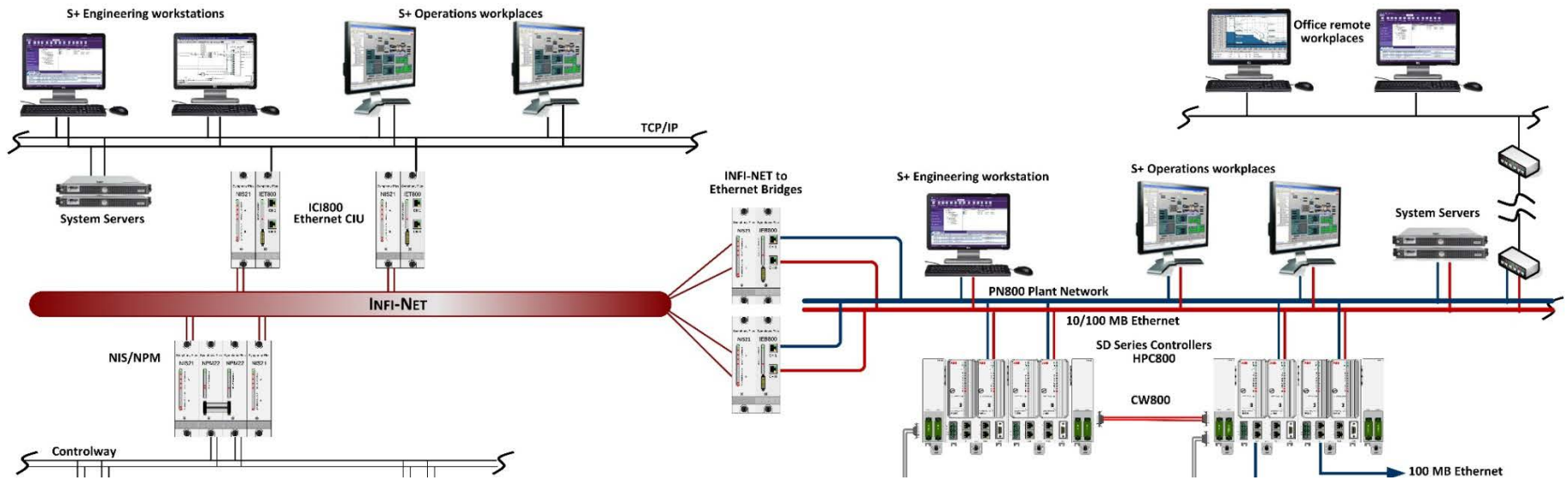## BRC410 redundant and flexible ModBus TCP interface

Best practices for updating your control system
Consider these

- Flexibility of the architecture platform

- **Flexibility of the Human Machine Interface (HMIs)**

- Flexibility of the control system

Flexible operator interfaces
Architecture

Flexible operator interfaces
Multitude of advantages

- Optimizing unit performance
- Operator access on multiple displays, interactive right click information
- Secure User profile recognition
- Suite of tools to select archiving, alarming, and maintenance
- Evaluating equipment health
- Extending asset life
- Multi users, separate Engineering & Operator actions
- Common database / graphics in one central location
- Central Engineering access to all controlling elements
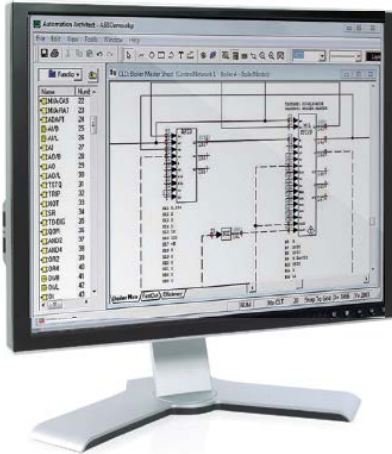- Active participation on major security standards committees including: FERC, NERC, ISA, IEC and ISO

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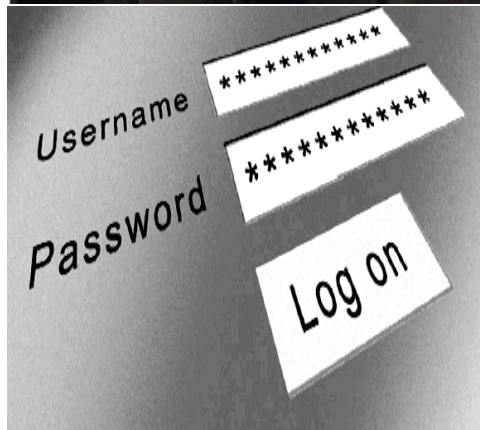
Flexible operator interfaces
S+ Engineering: Composer Harmony

Simplify design and maintenance with a unified engineering workbench

- MS Windows based tools suite for easy configuration of control applications, global configuration databases and system libraries
- Control Logic Templates (CLT) re-usable control solutions facilitate the best practice" standards
- "Monitor & Tune" mode displays live values from controller and provides tuning dialogs
  - "View and Monitor" Windows based web browser function provides remote "read only" view with live data
- On-line maintenance tools perform diagnostics, troubleshoot, and maintain operating Harmony system
- Remote desktop manager displays, VPN access
- Flexible ready made report templates (e.g. SOE, trip, operation, status, etc.)

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# Best practices for updating your control system
Consider these

- Flexibility of the architecture platform

- Flexibility of the Human Machine Interface (HMIs)

- **Flexibility of the control system**
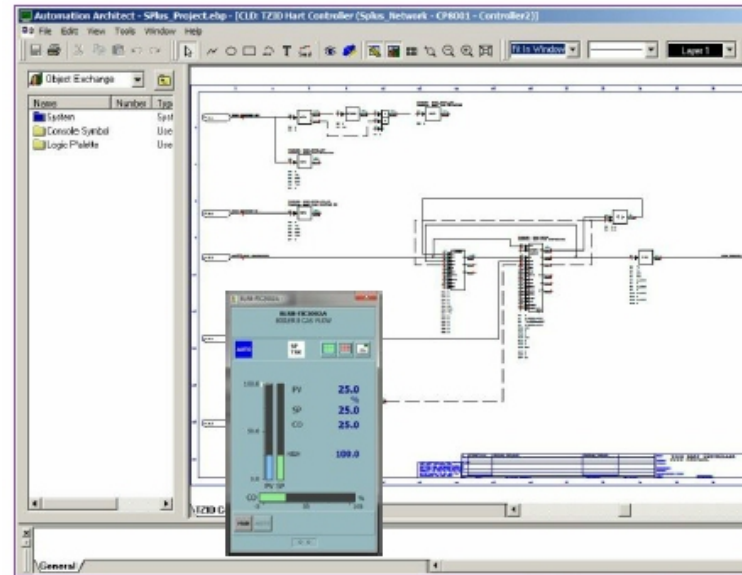
Engineering platform
An integral part of your DCS

- The engineering platform…
  - Is the backbone of the logic governing your plants' operations
  - Represents majority of your plant's intellectual property
  - Enhances the investment you have made in DCS components
  - Plays a vital role from startup and commissioning through troubleshooting and maintenance
  - Server / Client Architecture
    - Server hosts all data central location
    - Up to 10 clients connect to a single server
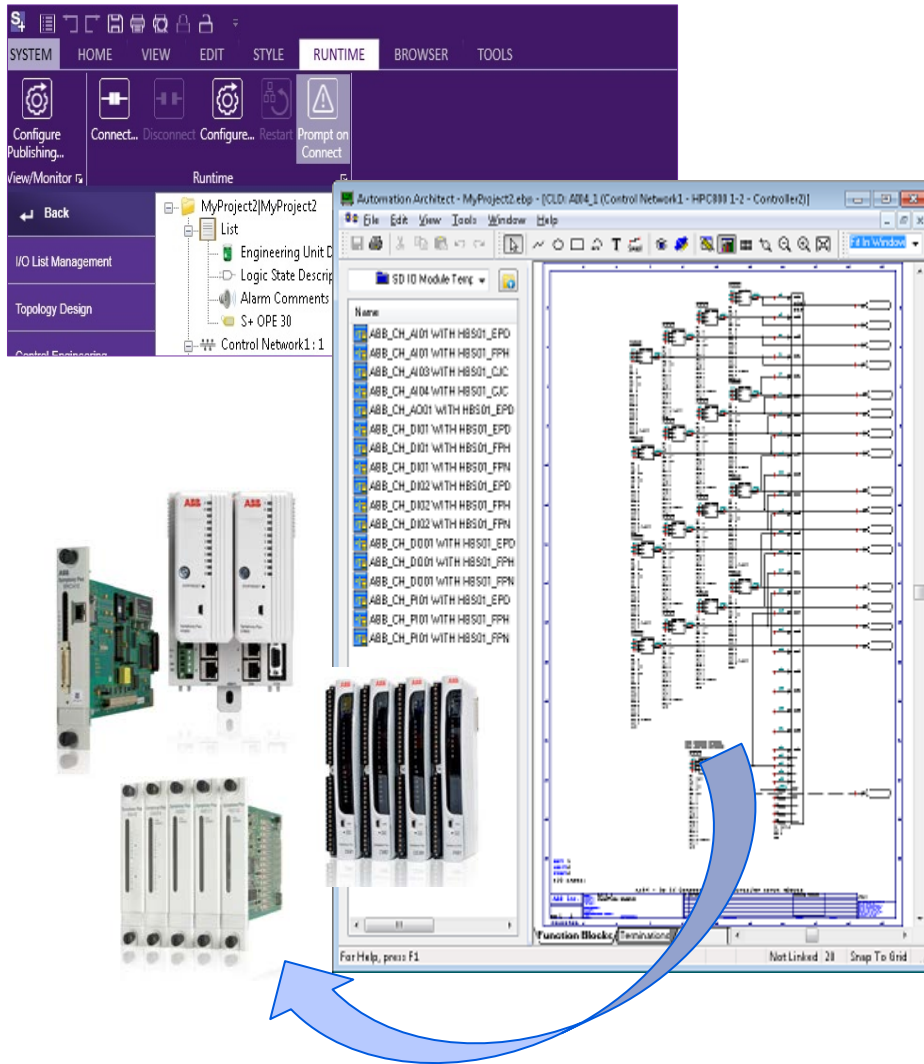 - Connects to Control Networks and HMIs

Control and IO

HMI
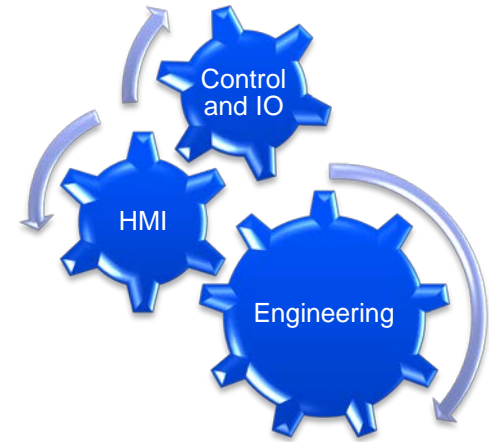
Engineering

Clients
(Engineering workstation)

S+ Server
(configuration server)

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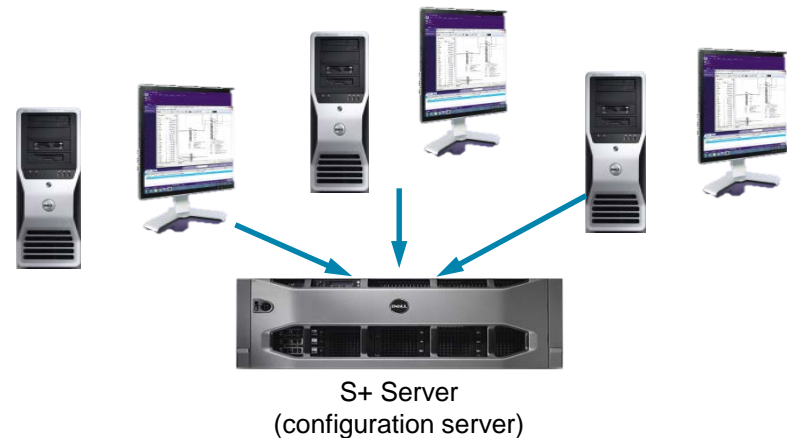
Flexible control system
Full throttle, complete openness

- Compatible with:
  - Symphony Plus Harmony Rack Series
  - SD (Symphony DIN) Series
  - S800 Series

- Compatible with S+ Operations and other ABB HMI platforms

- Efficient engineering platform to engineer, configure, administrate, secure, commission and maintain Symphony Plus / Harmony system

- Audit trail tracks all changes

S+ Engineering
Provides the ability to

Explorer
- Intuitive means of organizing and locating system configuration information
- Microsoft Explorer style left-pane menu provides hierarchical view of S+ System

Automation Architect
- Visual creation, editing, monitoring and tuning of control logic
- Drag and drop function codes from libraries right into the control logic document (CLD)

Control Logic Templates
- Reduce time and cost of implementing control strategy
- Minimize risk of errors and improve quality
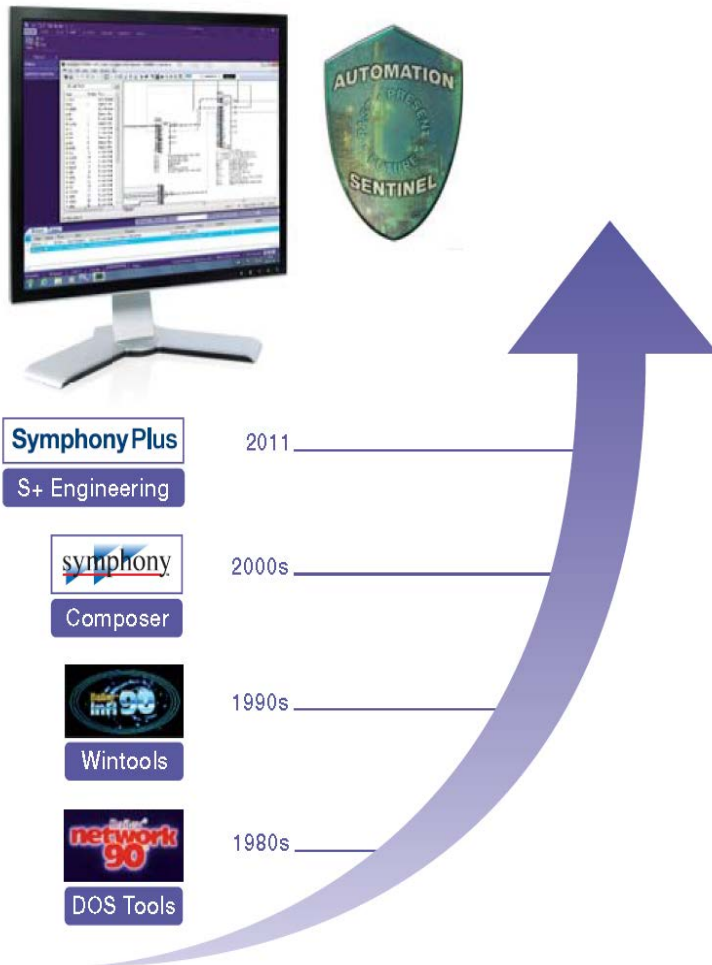- Preserve the IP invested in a control strategy for repeated use

Object Exchange (Library)
- ABB Standard library includes pre-defined function codes, shapes and symbols
- Define your own objects and save in a library
- Save time, reduce errors and share best practices between projects

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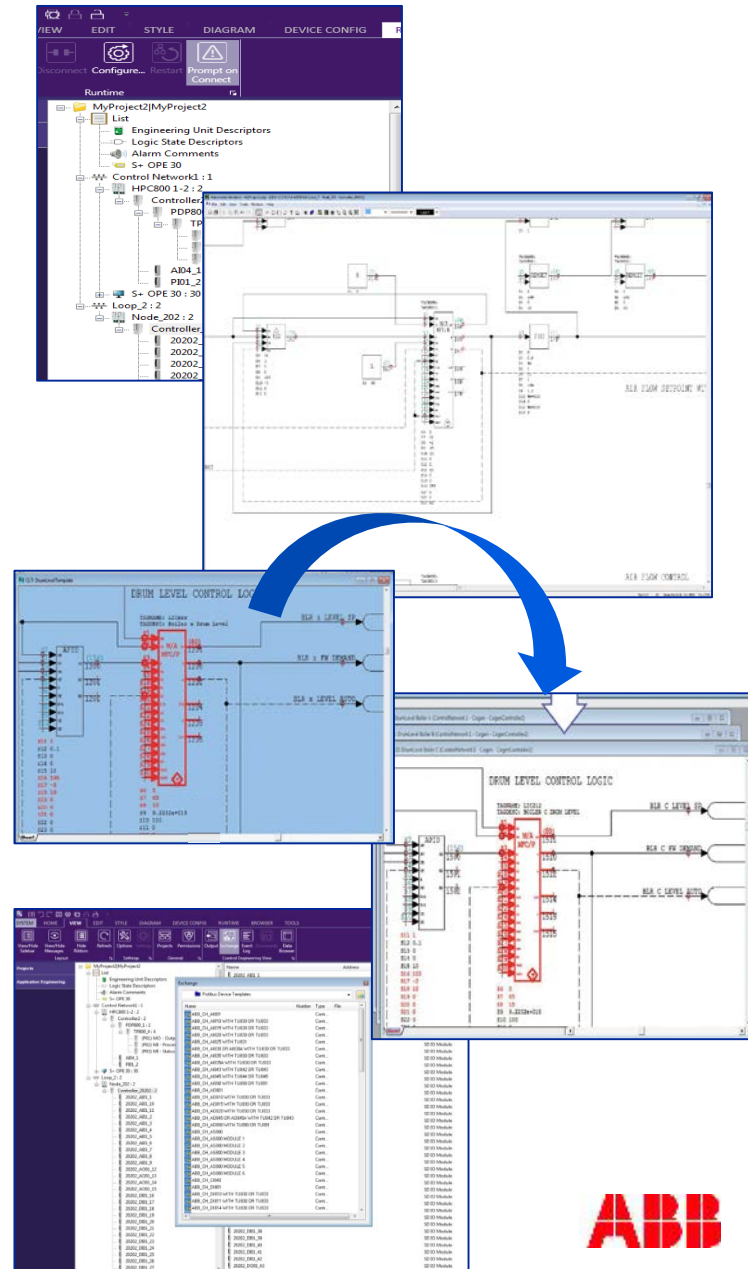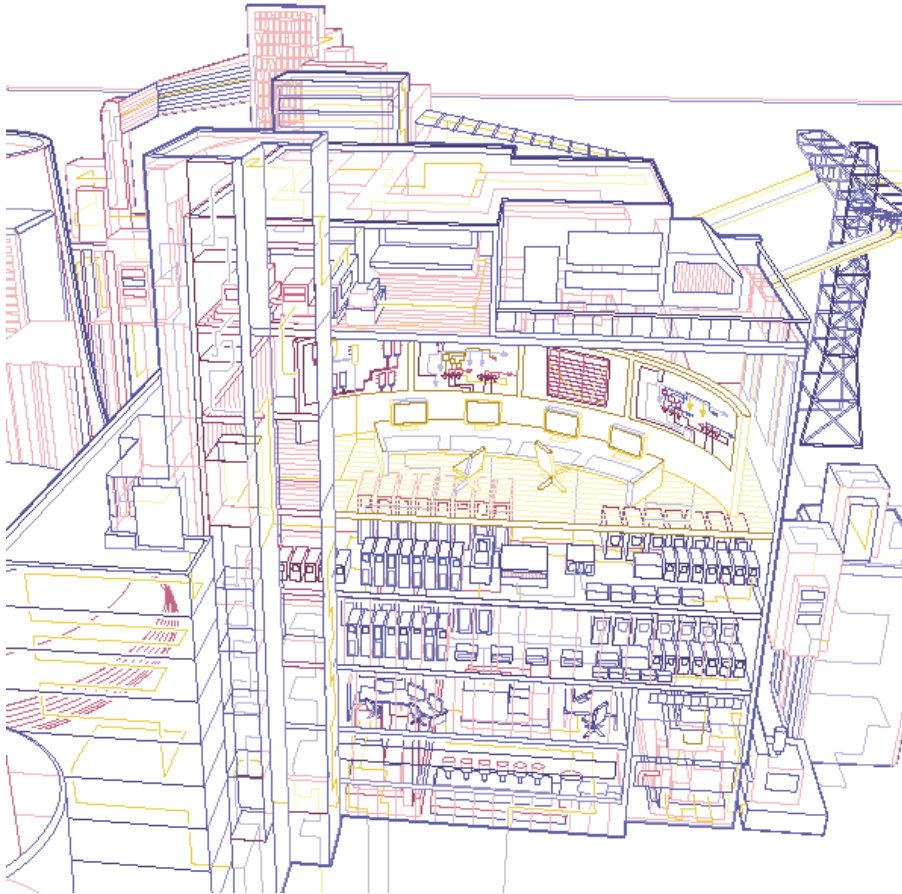
Flexible turbine control
Evolution without obsolescence

Simplify upgrades – Protect your Investment

- No need to write configuration from scratch when you upgrade your controllers to the latest SD Series or HR Series

- Easily upgrade your existing configurations in EWS or Wintools or Composer to the latest S+ Engineering

- Allows for continued use of existing SOP and knowledgebase without retraining and process interruption

- S+ Engineering supports S+ Operations, 800xA HMI (PPA) and previous generation Harmony consoles (PPB, CNT, VMS, PCView).

- No need to rip-and-replace!

Symphony Plus
S+ Engineering — 2011

symphony
Composer — 2000s

Wintools — 1990s

network 90
DOS Tools — 1980s

AUTOMATION SENTINEL

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Symphony Plus
Total plant automation

- **Simple** system architecture serves power and water's diversified plant fleet

- **Scalable** control platform to automate all areas within the plant

- **Seamless** integration of all plant devices and systems - automation and electrical, business and maintenance

- **Secure** and reliable control environment to prevent unauthorized access

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Questions?

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The recording will be posted on:

- http://new.abb.com/us/about/connection/webinars-on-demand

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