

SCADA Risks and Emergency Preparedness

A Practical Guide to Being Prepared for the Worst

2014 WWOA Annual Conference
3:30pm Wednesday October 8th, 2014



Presented by and

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Schneider
Electric

About the Presenter

Jeff M. Miller, PE, ENV SP



Jeff M. Miller is a *Water Solutions Architect* for Schneider Electric's Water Wastewater Competency Center. Jeff has a B.S. in Electrical Engineering and has worked as an engineering consultant and systems integrator for 25 years where he has delivered on over 30 wastewater treatment, 25 water treatment and 45 pump station projects ranging in size from small lift stations to 370 MGD treatment plants. Jeff is the co-founder and past chair of the NC AWWA-WEA Automation Committee and is also an active member of several national and regional Automation and Plant O&M related committees.

Are You a Gambler?

- How much do you put at risk?
- Do you know the rules?
- Do you know the odds?
- What would you do to better the odds?



- **What risks and threats do SCADA systems normally face?**
- **How can we prevent or mitigate these risks?**
- **When disaster strikes how do we recover?**



How come you don't have comfortable seats like ours?

SCADA IMPACTS

How Would the Loss of SCADA Impact You?

Health & Safety

Services

Resources

Financial

- Required data record keeping
- Personnel Safety
- Regulatory Compliance
- Uninterrupted production and delivery of safe water

How Would the Loss of SCADA Impact You?

Health & Safety

Services

Resources

Financial

- Business Continuity
- Process Automation
- Service Interruptions or Delayed Responses
- Water Quality Issues
- Customer Satisfaction
- Smart City Integration

How Would the Loss of SCADA Impact You?

Health & Safety

Services

Resources

Financial

- Additional manpower on loss of automation or data collection
- Overwhelmed maintenance staff
- Availability of backup or rented equipment

How Would the Loss of SCADA Impact You?

Health & Safety

Services

Resources

Financial

- Loss of Revenue
- Recovery Costs
- Waste
- Fines

SCADA

RISKS AND THREATS

Are You Prepared for Disaster?

- Fire, Earthquakes
- Extreme Weather
 - Flooding, Lightning
- Power Failure
 - Outages, Catastrophic Faults
- Security Threats
- Accidents
- Critical Failures



What is the Greatest Threat Your SCADA System Will Face?



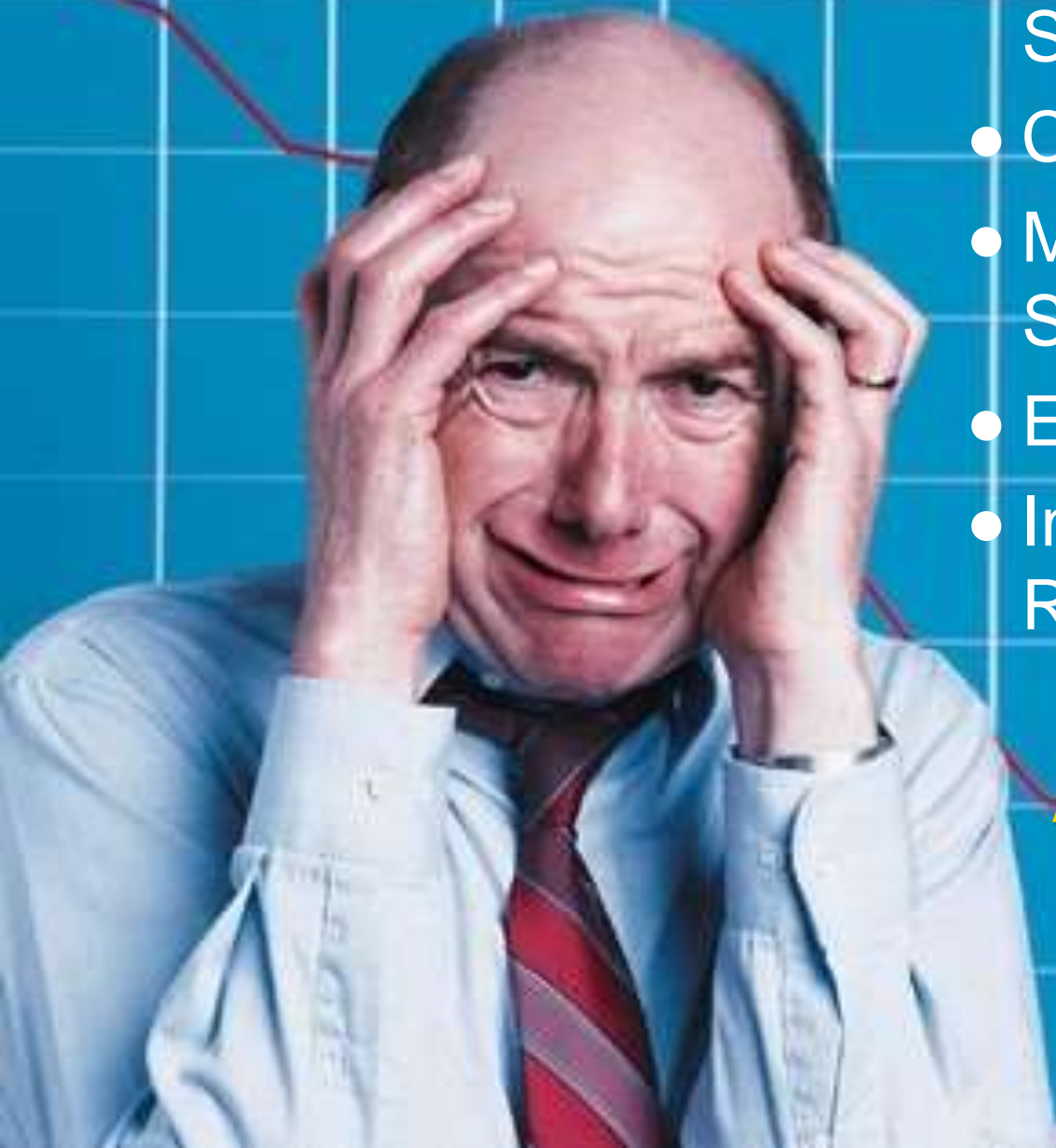
Beware ... Be Scared Be Very Scared



There's More?

- Lack of SCADA Specific Planning
- Cyber Risks
- Maintenance and Support Risks
- Environmental Risks
- Interrelated System Risks

AWARENESS IS KEY!



Cyber Security

● Vulnerabilities

- Hardware Access
- Wireless
- Cross-Network Connections
- External Network Connections
- Hardware Access
- False Sense of Security with Partial Solutions

● Threats

- Malware / Spyware / Viruses
- Unauthorized Access – Hackers, Vandals, Internal
- Unintended Cyber Events
- Operator Errors

Miscellaneous Risk and Threats

- **Maintenance & Support**
 - Version Control
 - Updates and Upgrades
 - Critical Parts Availability
 - Eg. RAID Hard Drives
 - Knowledge
 - Eg. Automation Logic
 - Staff Transitions
- **Environmental**
 - Below Grade Locations
 - Temperature Differentials
 - Condensation
 - Cutting Oil
- **Miscellaneous**
 - HVAC
 - Location, Location, Location
 - Conduit Entry

Threats to Wiring Infrastructure

Mitigation

- SPDs
- Pest Guards
- Equipment Location and Conduit Routing
- Multiple Path Communications
- Coordinated Power Distribution



Water Water Everywhere

A Tale of the Unexpected



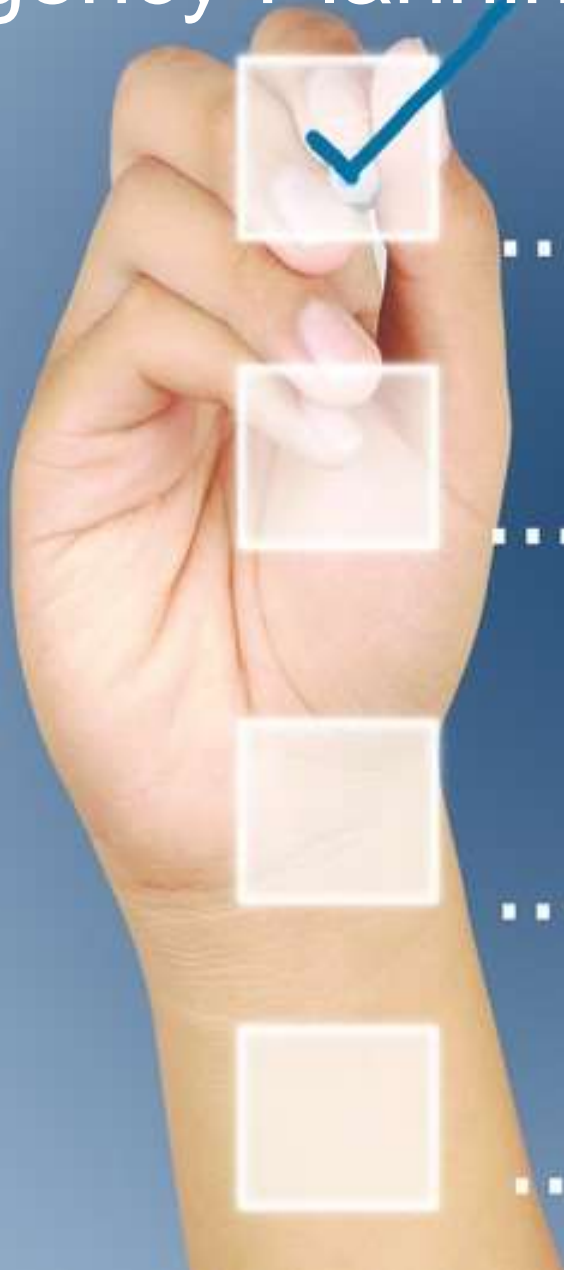
Corrosion Everywhere

Two Tales of A City



SCADA RISK PREVENTION AND MITIGATION

Emergency Planning



● Awareness Culture

● Risk Analysis and
Brainstorming

● Prevention and
Mitigation Plan

● Recovery Plans

Cyber Security

- Have a Plan
- Firewalls (sniffing)
- Access Control
- Unique Passwords
- Secured Equipment
- Achilles Certification
- Allow access or it may be accessed around protective measures



System Architecture Goals

- Redundancy
- Resiliency
- Prevention of Common Mode Failures
 - Separate Power Sources
 - Physically Separated Network Cabling
- Offsite Redundant or Backup Resources



Power Resiliency

● Backup Power

- UPS should last at least until Standby Generator Provides Power
- UPS with health status and annunciation
- Not easily disconnected but easily replaced
- Separated for redundant equipment
- Consider cooling circuits

- Beware of risks of routing fiber with power cables
- Protect equipment with SPDs



Installation Resiliency

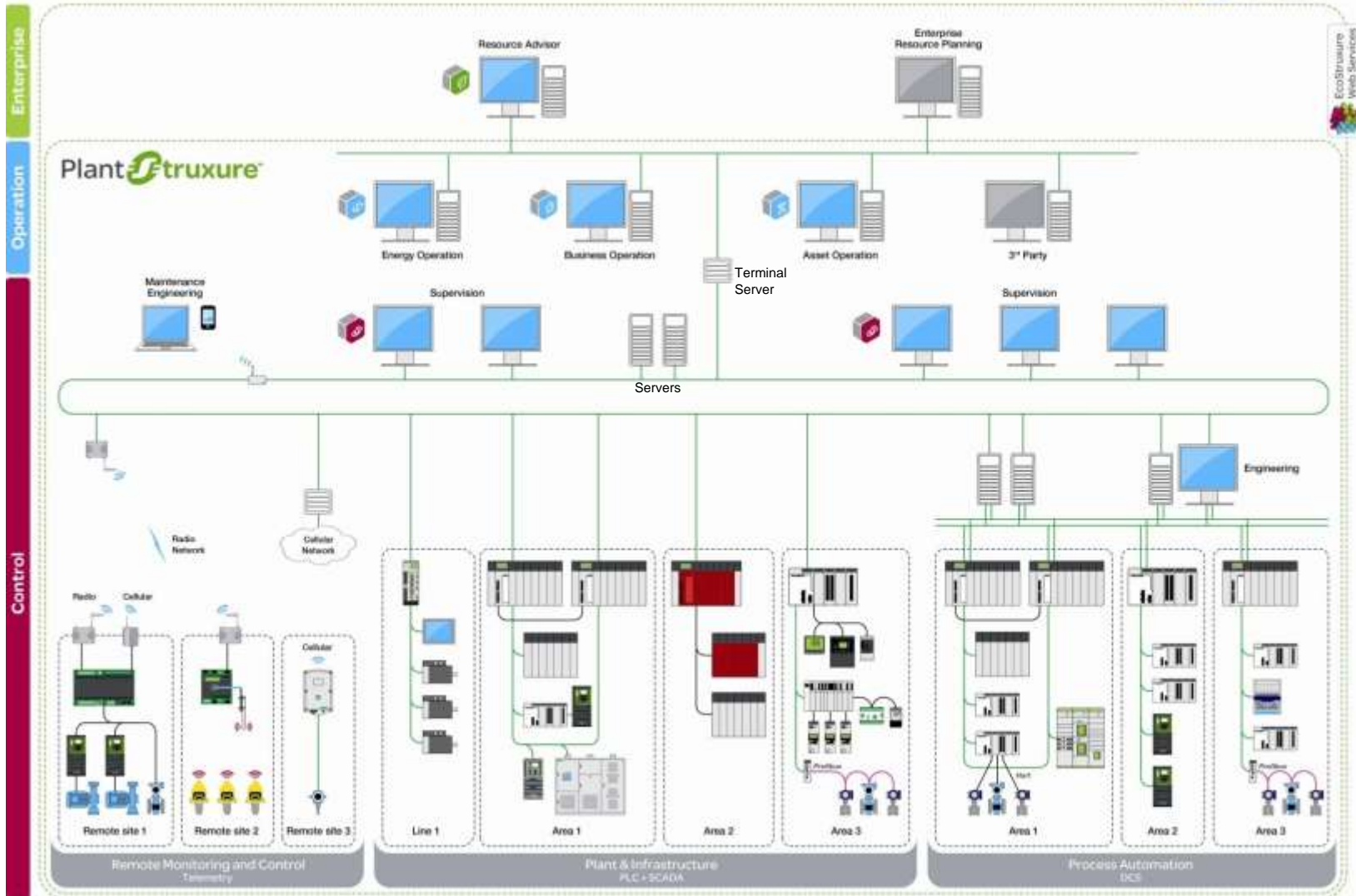


- Separate Terminal Cabinet
- No Conduit Leak or Contaminate Paths
- Appropriate Environment and Location
- Ensure Adequate Cooling if Needed

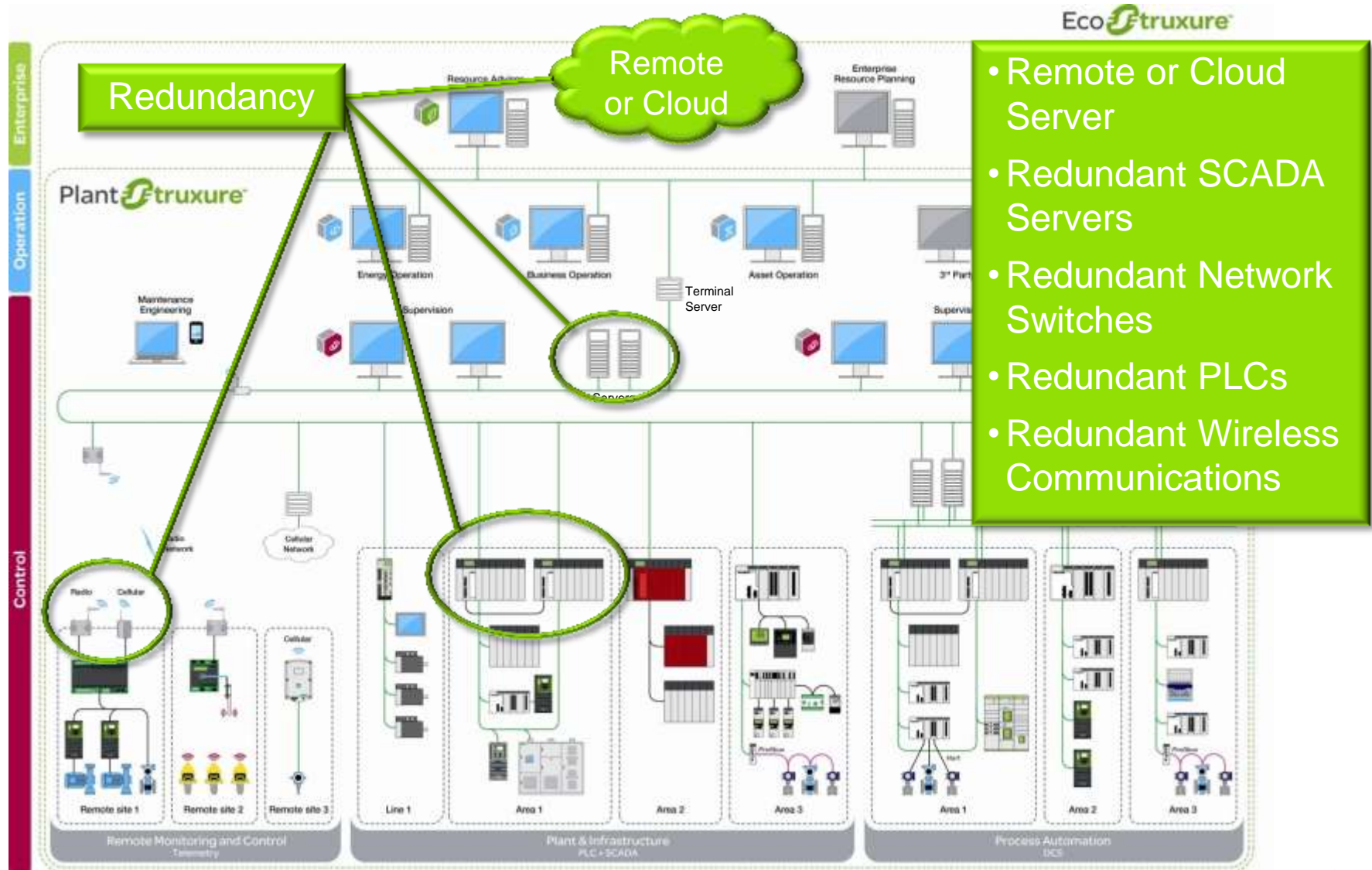


System Architecture

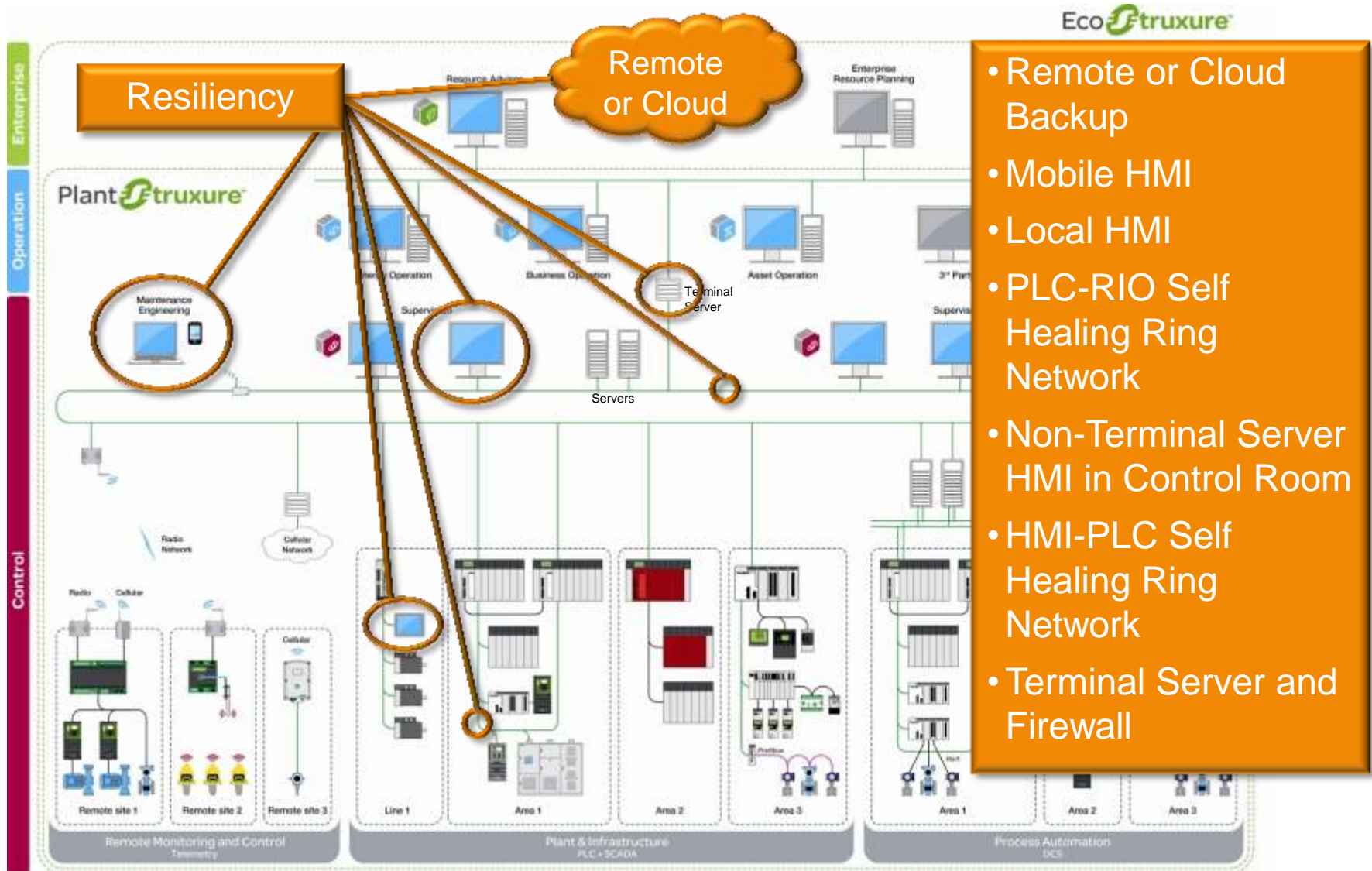
EcoStruxure®



System Architecture



System Architecture



Be Prepared!



Have a Plan

- SOPs / Contingency Plans
- Means of Alternate Operation
 - Manual Controls
 - Drills & Exercises
- Critical Components and Functions Identified
- Critical Spare Parts
- Version Control and Backup
- Accessible Documentation and References



Critical Parts and Tools

- Identified
- Available or Stocking Agreements with Suppliers or Others?
- Pre-Configured?
- Kept in a safe and secure location
- Everything needed to recover available?



Archival, Backup and Recovery

- Continuous?
- Auto Restore?
- Cloud Services?
- Multiple Copies of Latest Configuration?
- Offsite or Remote Storage
- Version Control
- Covert to Accessible Media Types!



Can you find your SCADA Guru?

- Emergency Contacts
- Informative Contacts
- Stocking Distributers
- Manufacture, Supplier, Representative
- Local and Corporate Technical Support
- Original Engineer, Designer, Installer, Contractor
- History of System / Component Contacts



What Threat You Will Face?



Questions?



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