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Appraisal of Exelon PPC Lifecycle Initiatives

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Abstract

Discussion about past experiences and transformation related to maintaining R*Time based PPC systems and supporting PPC initiatives at various stages of the Lifecycle.

- New PPC replacement projects
- Earlier Versions of R*Time server
- Systems recently introduced into production
- PPC replacements underway
- Systems that require “Refresh”

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The Evolution of PPC LifeCycle Planning at Exelon

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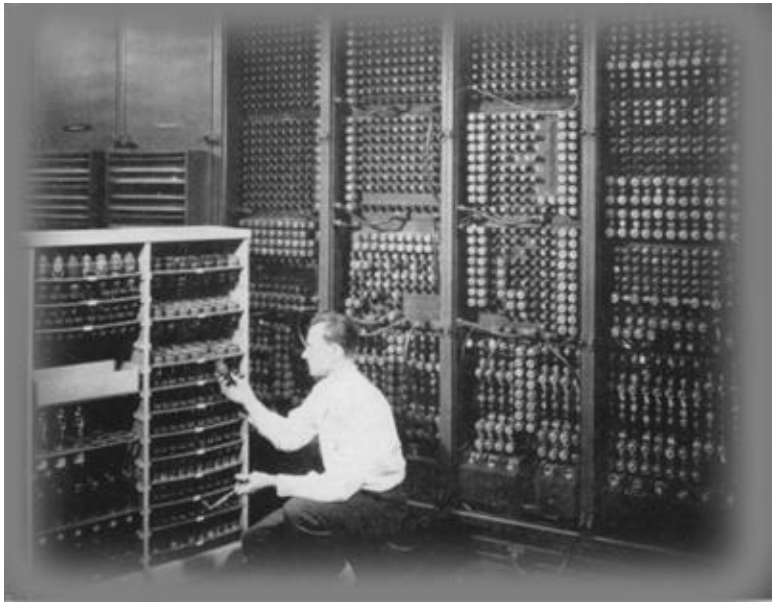
PPC Technology – Before

- 20-Year (Life of Plant) Life Cycle
- Unique Support Tools
- Non-Networked Systems
- Limited Access to Information
- Specialized Knowledge



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PPC Technology – Current

- **6-7-Year Life Cycle**
- **Standard Tools**
- **Data Integrity / Security**
- **Open Access / Information Sharing**
- **New Design Considerations – Viruses / CyberSecurity**
- **More “generalized” skills-set**

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Work Mgmt. / System Support – Before

- Error Tolerance
- “Quick” Non-Engineered Changes
- “In-House” solutions
- Non-Scheduled Work

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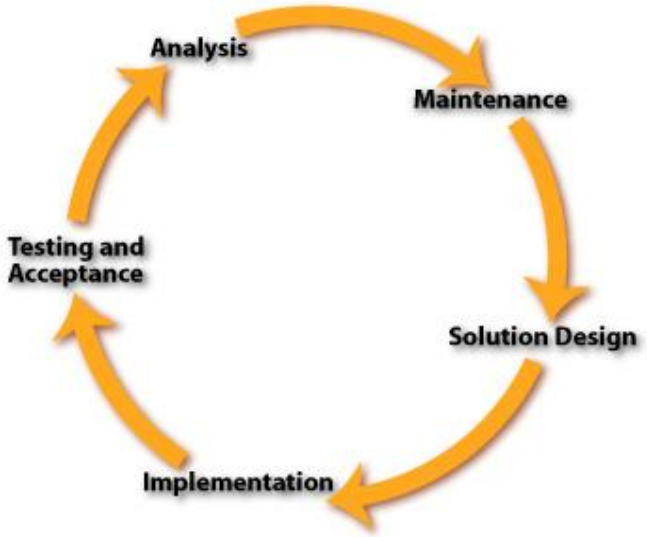
Work Mgmt. / System Support – Current



- Technical Rigor
- Engineered Configuration Control
- Automated tools for testing
- Reliance on Vendor for some enhancements
- Schedule Adherence
- Human Performance Tools

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Lifecycle Planning / Support Model – Before

- Individual Sites / Specific Needs
- Unique Design / Implementation
- “Ad-Hoc” Replacements / Enhancements
- “Bare-bones” SLA functionality / Only few data links
- Fixed system storage / program slots
- Long Life Cycle – “Run to Fail”
- Funding Available When Needed
- Mostly “In-House” support
- Single LAB system for multiple sites
- Source code control (binary image)
- Disaster Recovery…Internal Spare parts.
- Specialized tools to preserve system images / support.

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Lifecycle Planning / Support Model – Current

- Fleet / Centralized (common solutions)
- Design Once / Install Many
- Planned Replacements / Enhancements
- Added functions / New data interfaces
- Expanding storage needs, new applications
- Shorter Life Cycle (Vendor Driven – Hardware/OS)
- Internal Competition for Funding
- Internal support augmented by vendor support (maintenance)
- Multiple LAB systems
- Long Planning Process for Replacements
- Source code control more sophisticated – better tools
- Disaster Recovery…Commercially available tools and systems.

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LifeCycle Planning prior to PPC Replacement

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Typical Activities – Pre Project

- Gather current system failure data (to build business case)
- Identify system owners / stakeholders
- Validate software design specifications and test plans (Analysis/Design)
- Choose hardware (standardization / platforms)
  - Unix
  - Windows
- Establish LifeCycle Plan (strategy) AND communicate it.
- Service Level Agreements
- Define support strategy, support model
- Update Disaster Recovery Plans
- Identify Backup Strategies

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Lesson / Pre-Project

Problem identified:

LifeCycle Plan needs to be part of Plant Process Computer Projects early on.

Impact:

Failure to properly address LifeCycle issues early in project may lead to increased difficulty in planning for refresh options. Delayed transitions implies greater risk.

Lesson Learned: **Communicate Lifecycle plan early so expectations are set and issue is on "radar screen". It will be easier to make the business case.**

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Moving PPC Replacement into production environment

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Typical Activities – Moving to production

- Alarm Deadbanding (fine tuning)
  - Employing System Tools
  - Observation
- Training (Prior to deployment / Manuals / Procedures / Boot Camp)
  - Internal User's Group
- Database Issues (I/O)
  - Fine Tuning
  - Noise / Filtering (not evident until system in production).
  - Scan rates
- Site Specific applications
  - Features
  - HMI Interface
- SAT (TERs)
  - Maintain living "Issue Lists"
  - Pre-Define
- Maintenance Agreement
  - New Functionality / Updates / Patches

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Main Lesson / Move to production

Issue:

Issues with Plant Process Computers as it relates to PPC and I/O scan system replacements projects. Numerous post-production database configuration and I/O scan system issues as part of PPC Replacement projects.

Key Actions / Lesson Learned:

To identify processes and corrective actions that will reduce number of typical post production issues related to PPC and I/O scan system replacements.

1. **Proactively reduce the number of issues**
2. **Identify only meaningful alarms**
3. **More timely identification of issues**
4. **Establishing criteria address configuration issues in the database**

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Success Criteria / Move to production

- Reduction of issues related to typical post production issues related to PPC and I/O scan system replacements.
- Faster time to “steady state”. (reduction of nuisance alarms)
- Increased confidence in new PPC (by engagement/training)
- Establishing a plan for PPC cutover and handling “expected issues”.

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Post Production Support

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Post Production / Typical Activities

- Issue Resolution / Tracking
- Configuration control
- Pre-defined Maintenance Acitivities
- Comprehensive Maintenance agreeements
- Updating LifeCycle Plan
- Engaging Vendor Maintenance agreements Hardware/Software
- Dual Unit plants (retro-fit)

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PPC Refresh Considerations

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Main Reasons for PPC Refresh

- Degradation and obsolescence of the computer hardware platform, including disks, network interfaces, network infrastructure, printers, and end-user workstations due to continuous use and operation

- Obsolescence and discontinuation of support for the computer platform operating system software by the operating system vendor.

- Depletion of spare capacity / computer resources due to installation of physical plant modifications that require computer resources.

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A Modular Approach…

Replace Hardware

- Replaces all applicable hardware (unix servers, newer OS, PC components) Same applications, re-compiled to run for new OS
- Limited FAT (Factory Acceptance Test; using mostly existing procedures).
- Preserves existing set of tools; (with the exception of moving to the latest possible version of R*Time viewer client.
- Testing not tied to outage, will introduce new machine and conduct parallel run.

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Complete Refresh…

Full System Upgrade

- Replaces all applicable hardware (unix servers, newer OS, PC components (option))
- Upgrades version of R*Time software
- Applications re-visited and re-architected to make use of new functionality in R*Time version
- Database Conversion
- Full featured FAT (Factory Acceptance Test)
- Install would need to be tied to outage for extensive SAT testing.

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Summary / Conclusions

- Different concerns at different stages of LifeCycle
- Implementation Strategies to address issues
- Continuous improvement
- Vendor/Client engagement

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Discussion Questions

- What other factors have challenged your plant computer maintenance, upgrades, and replacement strategies?
  - How have these challenges been managed?
  - What strategies have been effective in addressing maintenance / refresh issues?