Managing Successful Automation Retrofit Projects

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Presenter –
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- Born in Bay St. Louis, Mississippi
- Received BSEE from Tulane University and an MBA from Wake Forest University
- Holds PE Licenses in Electrical and Control Systems Engineering and an NC Unlimited Electrical Contractor’s License
- Designed Robotics and Automated gauging systems for Babcock and Wilcox, Naval Nuclear Fuel Division (Lynchburg, VA)
- Held numerous Instrumentation Engineering and Production Management positions for Cytec Industries (New Orleans, LA)
- Designed Next Generation Manufacturing Equipment for Bristol Myers Squibb - Convatec (Greensboro, NC)
- Worked for Avid Solutions since 2000 as a Senior Project Manager doing various automation projects for numerous specialty chemical, paper, and mining companies.
This talk will focus on:

- Describing the “drivers” that greatly impact an automation retrofit project’s success
- Understanding that the control system selection is determined by the drivers and not the other way around.
- Recognizing Retrofit Project “Red Flags” and reducing their risk
- Discussing implementation techniques that can dramatically improve your project success rate.
Introduction – How many have experienced this??

Typical Retrofit Project Timeline:
- Attend Control System Vendor Dog/Pony Shows
- Pick Control System Vendor & purchase system
- Start Programming
- Encounter Problems
- Work around them, soldier on, get it done
- Struggle though startup
- Patch, tweak, and eventually make it work

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It is important to recognize that certain project drivers dictate the requirements of the control system. You cannot pick a system until you know what is required of it! You must know:

• The Stakeholders and their needs
• The Project and Schedule “Type”
• What your current system does and what the replacement NEEDS to do

THEN evaluate your control system options and choose the one best suited for your situation.
Identify Stakeholders and their Needs

This seems like a slide from….

But who ARE your Project Stakeholders???

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Identify Stakeholders and their Needs

The list may be more lengthy and their needs more mutually exclusive than you think! Consider:

- Upper Management
- Corporate Engineering
- Plant Engineering
- Production Supervision
- Production Operators
- Plant Maintenance
Stakeholders: Upper Management

- Could be the most challenging – they may not understand the technical details but they have tremendous influence on the final outcome.
- Vendors are increasingly marketing directly to this group – using special pricing, glitz, and abject flattery to get their product “speced in”.

What is a project team to do?

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Dealing with Upper Management:

• First understand what this group really wants:
  – Project must come in on time
  – Project must come in under budget
  – Plant downtime minimized
  – Plant running better than it was (ROI)

• Now show how the Team’s selection will accomplish these goals – and the glitzy vendor’s wonder system will not. USUALLY management will back the team.
Stakeholders: Corporate Engineering

• Generally much more technically savvy
• May be managing the project directly
• Major Interests:
  – Corporate Standardization
  – Minimum Plant Complaints
  …and if they are running the project
  – Project on time and on budget
  – They want the project to require a minimum amount of attention (as they usually have simultaneous projects going on)

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Stakeholders: Plant Engineering

• Generally very high technical capability
• May not be as interested in Corporate Standardization as much as Plant Standardization
• Minimal Plant Complaints
• Project on time and budget
• System that is easy to learn, easy to use, easy to maintain, is flexible, and …
• A system that WORKS!
Stakeholders: Production Supervision

• Want a system that makes more, higher quality product with less people
• Want the system installed with minimum transition time, minimum learning curve and minimum operator complaints
• They want a system that provides easy access to data/reports/graphics

Of all of the groups, this group is generally looking for pure system performance.
Stakeholders: Production Operators

This is probably the most difficult group to please, and is often the most overlooked. Ironically they actually USE the system more than all of the other groups combined.

• They want a system that is exactly like the old system, except that it is “better”.

• It is the definition of “better” that causes the problem – since “better” for one operator is rarely the same as “better” for another.
Stakeholders: Production Operators

Dealing with Production Operators:
• Get them involved early and often
• Have them review graphics – accommodate their changes whenever possible (and explain when you cannot)
• Provide simulator systems for training well in advance.
• Engage younger “techno savvy” operators as well as older, respected operators with extensive process experience.

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Stakeholders: Plant Maintenance

The role of the Techs will vary by plant. Some are very involved in the control system, others work only with the field devices.

- They may have strong opinions on the field digital bus networks – listen to them.
- Get the technicians training BEFORE the system comes on line, not as an afterthought (which is more often the case.)
Stakeholders: General

- Accommodating everyone is impossible
- Letting everyone be heard is imperative
- Explain the options and competing requirements and why one choice is made over another.
- When treated in this way most groups will tend to be more flexible and support the system.

*Ignore your stakeholders at your peril!*
What is your Project “TYPE”

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Retrofit Project Types

• In Kind Replacement
  Usually version upgrades, no real change

• Mostly the Same, but Different
  This is the most common. They want a new control system and they want it to do the same thing, but “better”. (Defining “better” is the issue!)

• Total Replacement
  This is either a completely new process or they have minimal automation and a new system is being installed.

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Retrofit Project Schedule Types

• “You mean you are not done yet?”
  Very short time to design/purchase/configure the system and get it running

• Longer Project Schedule, Very Short Cut Over
  There is time to select and configure the system, but the production outage must be minimized at all costs.

• “We have no money”
  Price rules all decisions.

• Long Project Schedule, Very Loose Budget
  …HA!!! Like THAT will happen!

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GOOD,
FAST,
AND CHEAP.....

PICK ANY TWO
(Manage Expectations)

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Retrofit Project Types – Why Does It Matter?

Obviously price impacts system selection, but time usually trumps cost. Consider:

System Retrofit Options
• Does the vendor offer ways to interface to existing wiring/IO Cards/controllers
• Do you WANT to re-use existing items?

Software Conversion
• Does it actually work?? TEST! TEST!! TEST!!!
• Do you WANT to leave your software as it is?
Understanding the Current System –
Know what you have

You cannot replace what you don’t understand. Do you fully know…
• What the system does and how it does it?
• Do you understand the normal operations and the abnormal operations? (cleanout, failure recovery, etc)
• How the cards work (Electrically)?
• How the system is grounded?
• What the system communicates to and exactly what it communicates and how often?

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Understanding the Current System – Red Flags

If you have any of these issues take extra caution:

• Intrinsically Safe Barriers
• Existing Serial/Digital Communication Networks
• I/O “Looped” through another system
• System to System Hardwired I/O
• Systems that never come down
• Poor Existing System Documentation or Process Knowledge.
• Vague Upgrade Scopes / Unrealistic Project Expectations
• Lack of a Plant Champion

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Understanding the Current System –
...a few remaining things

You have to understand:
• Loop Resistance on Analog Cards
• Grounding (Analog loops, shields, digital I/O)
• Voltage Drops (especially for IS installations)
• Digital Output voltage/current limitations
• Source/Sink of digital I/O

You also have to understand:
• ...what the future expansion plans of the new system are.

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NOW you are FINALLY ready to evaluate Control Systems!!

Your team may find your options have been greatly reduced…and that is a GOOD thing!

The options that satisfy your criteria are MUCH more likely to result in project success. The other options were wrong from the start!
Control System Selection

- Create an Evaluation Matrix
- Talk to Existing Users
- Visit Existing Plants
- Attend User Conferences
- Arrange an Opportunity to WORK on the system
- Evaluate Vendor Support
- Determine Spare Part Availability
- Evaluate Vendor Price Hike History
- Evaluate Logic Structures
- Beware of Automated Conversion Programs

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And MOST importantly……

EVALUATE THE ELECTRICAL DETAILS!!!!!
• Is the I/O compatible with the field devices?
• Are there grounding issues?
• Voltage drops/current limitations, etc.
• Also….Evaluate Wiring Interface Options Carefully! (Just because they say a “quick interface” will work does NOT mean that it will!)
Control System Installation Suggestions

• Avoid “Cliff Jumping”
• Build and Test Control Panels in Advance
• Prebuild & Pretest Wiring Harnesses
• Never Ship Panels with the Fuses Installed
• Prove ALL Digital Communication Networks in advance.
• If IS Barriers are involved – TEST EACH TYPE AND FLAVOR!!
• Utilize simple simulation systems for Operator Training.

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Control System Installation Suggestions - continued

- Provide completed graphics/modules for Operator Review and Training early.
- Generate documentation for adequate logic review, reference, and testing
- ALWAYS get a list of non-working instruments BEFORE the shutdown starts.
Conclusion

Successful automation retrofit projects are a direct result of listening to your customers, FANATICAL attention to detail, and very hard work. Identify risk and eliminate problems BEFORE they become problems and the likelihood of success is very strong.

Best of luck to you and your team.

Hunter Vegas

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Questions???

Please feel free to drop me a phone call or email. My contact information is:

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