What Makes Automation Project Management Unique?

Project management is as much an art as it is a science. One of my instructors once defined project management as "The Art and Science of Getting Things Done." Certainly, the science of project management is becoming well published and practiced. Organizations such as PMI and others have helped to drive standards and best practices for the nine knowledge areas of project management.

Most industries have embraced the value that project managers bring. For example, it would be unthinkable to execute any sizable engineering and construction (E&C) project without an overall project manager. It is also my belief (and the results of many case studies prove it) that executing an automation project without an automation project manager is as reckless as executing an E&C project without a project manager.

On a typical E&C project, the overall project manager has to manage many different disciplines and functional areas that eventually have to work together for the success of the project. Compound this multi-disciplined deliverable set with the fact that construction is always on the critical path, and it is easy to see why a project manager is extremely important to the success of the project. In very much the same way, automation teams require just as much coordination as E&C teams and are just as critical to the success of the project, except that in the case of automation, it is not buildings that are being constructed, but software and systems.

Before we move on, let's take a moment to define the automation scope in the current context so that we can agree on the area of automation project management. Automation would include some or all of the effort for:

- **Instrumentation** (Level 0) - design, specification, procurement and related services, calibration, P&ID input and reviews, etc.
- **Control software** (Level 1) - design development, off-line testing, source code review, software configuration management, functional requirements, design specifications, etc.
- **Control hardware design** (Level 1) - panel design and possibly fabrication, panel reviews, safety start-up process, process control network specification and configuration, installation and wiring, drive configuration, etc.
- **Formal software testing**—Factory Acceptance Testing, Site Acceptance Testing, functional testing development and execution support, possible operational qualification support, etc.
- **Manufacturing Network integration** (Level 2) - Historian (data collection) configuration, implementation and testing, HMI servers, clients, etc.

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- **MES—**Recipe and batch integration, personnel and material management, paperless tickets, data analysis (Level 3)
- **Representation** and participation in steering teams, cross-functional teams, project controls, IT and telecom interface, etc.
- For regulated industries, we should also include computer system validation including validation plans, test plans, design specifications, system overviews and configurations, business continuity plans, security plans, etc.

Looking at the list of activities that fall under automation, it is easy to see that the scope of automation spreads across many disciplines and many layers of the manufacturing and business architecture. From the diversity arising from physical instrumentation to the development of recipe interfaces and MES integration, automation is significant and complex. Kevin Wilhelm and Andre Michel noted in their recent article in the November, 2008 *In Tech* magazine that "Automation projects are more complex than most because you are trying to build an embedded intelligence into an integrated set of computer and people systems, in many cases to run a manufacturing process that has never been run before." This complexity of the automation discipline means that it is difficult to integrate into the overall project.

The project roles and responsibilities will identify an overall project manager to whom automation engineers report. This creates a skill-set gap in the overall project resource model. The gap is produced by the failure to identify the uniqueness and complexity of automation and creates unrealistic expectations of the overall project manager. Most project managers will freely admit that they do not adequately understand automation to the level that is required to manage it. Typically, project managers are construction based, or certainly lean towards the mechanical discipline, because of the nature of the engineering and construction firm's core business. They are really in the business of placing and arranging physical things. Their project responsibility is to deliver a facility (building), fit out the building, and then install the necessary manufacturing equipment to fulfill the material flow and processes of production. That focus typically results in a "plugging in" of the automation as an afterthought and not part of that flow of materials and products through the facility.

Project teams also tend to underestimate the complexity of automation and as a result, the master project schedules are inadequate. Construction activities are generally well defined, predecessors and successors are complete, and the proper milestones are in place. However, automation typically is not as well scheduled and most predecessors and successors are incorrect or missing. On many projects, someone on the automation team develops their own project schedule because the master schedule is inadequate for automation. This dual scheduling can, and often does, lead to issues with due dates, resources and dual recordkeeping for the automation team. This adds an additional burden on the

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automation leaders that detracts from the technical leadership they need to provide to the team. The automation project manager adds value here by working with the master scheduler and the project team to correctly integrate automation into the schedule. Most times, this exercise brings to light several misunderstandings that affect the master project schedule.

It is easy to understand why project delivery teams continue to struggle with correctly integrating automation into their project plans. Ask any seasoned manufacturing director or engineering consultant and they will undoubtedly tell you that the biggest advances in manufacturing over the last twenty years have come as a result of automation and the information it provides to the business. Perhaps in the days when automation meant panels full of relays, and machines were islands of automation, and integrated architecture was a dream, then automation was probably manageable by the general project manager. The boundaries have expanded today to where automation is treading on the turf of IT and the two disciplines vie for ownership of the communication infrastructure. They squabble over who owns Ethernet communication networks and how to get the information from the manufacturing process into the business process. This area of interaction and the management of the "middleware" space is another area that requires a dedicated automation project manager to understand and direct these diverse teams.

In a paper presented at the ISA Expo 2008, Dave Woll from ARC discussed a recent survey that indicated that the industry leaders found that the utilization of a dedicated automation project manager was one of the contributors to delivering successful projects. This finding is significant in that it clearly represents the need for automation project management. David Adler, retired Eli Lilly automation consultant and now with Brillig Systems, has done similar work and has made some clear discoveries as well. As a result of his internal studies, he has stated that: "The two key factors for project success are having the right people with the right skill sets, and having well defined requirements."

Not all projects have a large enough automation scope to justify adding a dedicated automation project manager, but most of them have more than enough complexity that it warrants adding an automation project manager to the organization chart.

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