APMD News

A Newsletter for Automation Project Managers

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Spring 2019

From the Chairman — Andre Michel

Birth of the ISA Automation Project Management and Delivery Division

I have the pleasure to announce that ISA has approved in October 2018, the renaming of the Management Division to focus on Automation Project Management and Delivery.

The division will have its own LinkedIn group at https://www.linkedin.com/groups/8638297/ , its own website at http://isaapmd.com/ and his ISA.org website : https://www.isa.org/apmd/

A listing of all the Division leaders can be found on the Division website and at the end of the newsletter.

Our vision is :

Automation and Process Control projects are **challenging** and can often invoke fear for the newly appointed Project Manager or Project Engineer in charge. In addition to all the usual challenges of any project, this particular type of **project is often even more complex**. This is the result of a variety of reasons including; integration of **multiple engineering disciplines** (software, computer systems, networks, and instrumentation), high dependency on **User Requirements of disciplines outside** of automation, integration of requirements from many areas (business, engineering, safety, environmental), delays in other areas of the project that propagate over into the automation area, new technology or technology constraints, and many more. In addition, Automation is often **viewed as a black box** by the non-automation community, which tends to isolate these activities and people from the broader project structures and support. Lastly, Automation projects by the very nature of what you are trying to build are **extremely complex**. It entails building an **embedded intelligence** into an **integrated set of computer and people systems**, in many cases to run a **manufacturing process** that has never been done.

APM Division is recognizing this challenge and provide the APM's with proposed methods, tools and networking opportunities to support the APM in his journey.

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As mentioned in the vision , we want to provide our members with methods and tools to support their project management activities in their project.

This effort has been initiated with a core group of the committee members with a discussion on the project management life cycle for automation projects . The group is formed of individuals from a variety of backgrounds so different approaches have been proposed

The Life Cycle diagram on the following page is the initial pass at this work.

For each phase, experienced APM's will use methods and tools which will facilitate their work. Those methods/tools can be categorized in different areas of project management as defined by PMI :

General (PMI calls it Integration)
Scope
Schedule
Cost
Quality
HR
Communications
Risk
Procurement
Stakeholder

For each area and for a specific phase of the life cycle , the group will review and discuss methods and tools they have been using in the past to generate a best practice for automation project delivery . This will be a long project (we estimate at 4 years at this point) but should generate extremely useful information for all APM around the world.

If this adventure is appealing to you , do not hesitate to contact any of the committee members to join us in this journey .

Andre Michel
ISA, APMD Director
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Editor's Corner

Ian Verhappen

Hello and welcome to the FIRST Automation Project Management and Delivery Division newsletter.

We are planning to issue a minimum of two newsletters per year with each newsletter containing the following content.

Director's Message
Project Management Guide update
Technical Paper(s)

Of course, if you the members wish to provide additional information that you think would be of interest please send it along.

Looking forward to hearing from many of you.—Ian

APMD Lifecycle Diagram

Area	Phases / Life Cycle								
	Justification / Profiling	Conceptual Enginering	Preliminary Engineering	Basic Engineering	Detailed Engineering	Construction	Commissionning	Qualification	Production
						Construction		Start-up	
	Initiaing	Planning				Executing	Monitoring and Controling		Closing
								Go Live	
	Requirement / feasibility	Planning	Design			Construct	Test		Turn over
	Identify /Asses	Select		Define	Execute				Operate
		Kick off / Project Requirements		System design	Development	FAT	SAT		Close
	The feasibility study	Project Design		System design	System Design	Software	Deployment		Support
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	Phase 9

Director-elect Update

Rory Moloney

A primary focus of the ISA Automation Project Management and Delivery Division (formerly automation management division) is to work together as Automation Project Managers working in various industries (Nuclear, Oil & Gas, Pharma, Power) to develop a new project management methodology that specifically addresses the unique problems faced by Automation Projects:

Integration of multiple engineering disciplines.

Automation projects require teams working together from various engineering disciplines such as IT, Automation, MES, Application services, Infrastructure, Validation, Security and a number of vendors. The strategic alignment of these teams and ensuring correct levels of stakeholder communication and engagement is key to successful project delivery.

High dependency on User Requirements of disciplines outside of automation.

Expanding on the alignment of multiple teams is the task to intake and manage the competing user requirements that arise from the various disciplines. Integrating and tracking these requirements through their lifecycle to ensure successful delivery of the project by managing the scope is correctly agreed nad managed.

New technologies and technology constraints.

With new technologies emerging at an accelerating pace, there are numerous challenges to select and deploy the latest solutions in VR, AR, smart sensing, precision time synchronization, 3D printing, etc. The application of new technologies into critical systems and GxP environments are challenging projects. Determining the lifetime of the technology and value that can be extracted before another upgrade is required requires in depth technical knowledge and training on the leading edge of vendor solutions. Experience and installed equipment are technology constraints impacting the rate at which new technology with associated improvements in efficiency of manufacturing while waiting for solutions to mature and become more stable.

The fact that automation is viewed as a complex dark hole/black box area and the consequences that come from that perception.

We have all experienced stakeholders in automation projects that are apprehensive about the unknown and complex nature of the automation systems involved. Many do not want to learn about or understand the complications involved and this can be detrimental to the projects. The Division sets out to overcome this obstacle by devising consistent processes/methods to introduce the automation aspects and elements involved in a project to stakeholders that are not familiar with the world of automation.

We believe that in the recent and ongoing merging of the IT/OT worlds and the fast-paced emergence of Industry 4.0 technologies, a proven methodology for managing automation projects through the challenges listed above is required. As part of developing a new methodology to manage and deliver automation projects, we will create templates of specific project documents and artefacts to enable Project Managers to move quickly and efficiently through these identified challenges.

Best regards,

Rory

Technical Paper

Automation Projects for Greenfield facilities face unique challenges

Carlos Pereira

Automation projects for greenfield facilities face unique challenges, since the project team must define from the very beginning multiple aspects of the delivery including the control system architecture, project execution and test plan, definition of the division of responsibilities, and integration of different work processes across multiple stakeholders which typically include the Main Automation Contractor (MAC), End User, and Engineering and Procurement Companies (EPC).

The control systems automation strategy and execution plan will benefit from appropriate Pre-FEED and FEED phases at a time when the ability to influence changes are high and the costs are relatively low. This early design effort will certainly increase the possibility of delivery of an automation project on time and under budget with a high level of quality.

Establishing the means the project is going to execute is vital in the early phases of the project and the following areas should be considered by the project automation team as part of the project execution plan:

- **Decouple the hardware and software execution paths**: Delays associated with site work are expensive and enabling the site team to progress with the installation, mechanical completion, and energization activities of the automation equipment by allowing the hardware activities to progress independently from software activities brings enormous benefits when it comes to meeting the main works contractor required-on site dates.

  Inputs required to progress on the hardware and software fronts should be clearly identified, segregated and prioritized. Integrated factory acceptanc tests should be planned to address concerns or risks associated with having these two independent paths.

- **Interface management:** This area cannot be overstated enough, since greenfield projects will typically select one MAC for the simple reason that having a common automation platform for the entire site brings enormous benefits from a total installed cost perspective.

  Different EPCs could be allocated different areas of the new plant depending on the overall size/ complexity of each area and/or the presence of technology licensors could prevent a simple EPC from taking over the entire project because of constraints imposed by non-disclosure agreements. The main works contractor role could be awarded to a joint venture or even a completely different EPC from those responsible for the execution phase.

  This means that the MAC is typically the common entity across the entire project and the interface management with all these different actors should be planned carefully. The geographical location of these different EPCs should be considered and deploying a qualified local automation resident engineer who speaks the same language and has the same cultural background as the EPC personnel will pay dividends in the long term.

  Interfaces with key vendors and sub-contractors should also be given the proper consideration. If remote instrument enclosures, remote IO enclosures or similar need to be manufactured and assembled in other geographical areas, then having a local automation resident engineer act as a member of the team can ensure that alignment is optimal as the project progresses.

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- **Proof of concept:** The automation project team being responsible for delivering the brains of the facility will certainly face challenges associated with new process technology or equipment which has not been utilized in the past.

  The risk associated with unknowns can be mitigated by fostering a culture of proof of concept or prototyping. These proof of concept activities will alleviate concerns associated with the new technologies, and represent an opportunity to properly define work processes and division of responsibilities of the multiple stakeholders involved on the project. They also represent an opportunity to identify technology constraints and decide if automated tools should be utilized to improve the efficiency of the project teams.

- **Cloud engineering:** Large projects will require tens if not hundreds of automation engineers to work on the system configuration for the new facility. Provision must be made to allow these resources to work collaboratively with minimum administration tasks regardless of their physical location. The automation project team should come up with software configuration guidelines and procedures during the FEED phase of the project to enable the resources to be as effective as possible.

- **Design reviews:** The EPCs need to finalize their engineering efforts before the MAC software configuration efforts can get started, and this represents a major constraint that could compromise quality if time is limited. Defining gate or early design reviews will allow the automation project team to confirm with the right stakeholders that software application is on the right path or define if a corrective action is required before it is too late.

- **Use of digital twin:** Using a multi-purpose dynamic simulator to test the integrated controls and safety systems application allows the project team to detect not only software configuration errors or shortcomings, but it also offers a window to improve the design and performance of the automation control strategies.

  The digital twin platform can also be used to perform engineering studies and/or allow the operations personnel to develop start-up and standard operating procedures. The new facilities personnel can be trained using this digital twin platform.

The following areas should be considered as part of the control systems automation strategy:

- **Use of remote IO:** Most industrial automation technology vendors offer remote IO enclosures rated for hazardous environments that allow the input/output modules of the integrated control and safety system to be located closer to the field instrumentation. The enclosures can communicate back to the control systems network using fiber optic networks and this results in extensive economic benefits to the project since copper wiring and routing is minimized.

- **Power distribution and fiber optic routing philosophy:** Remote IO enclosures need power and fiber and dedicated field fiber optic and power distribution enclosures across the facility could be utilized to facilitate the routing and distribution of these cables.

- **Purpose of remote instrument enclosures:** These self-contained buildings are typically used to house the control systems I/O, but with the existence of the remote IO enclosures, the size of these buildings can be significantly reduced since they will be dedicated to house the integrated control and safety system network cabinets and third party systems, i.e. vibration monitoring

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systems, vendor PLCs, and similar. This will result in significant savings to the project since these buildings not only tend to be expensive, but also occupy significant real estate in the facilities which comes at a premium.

- **Use of virtualization:** Servers and workstations cabinets are typically located in the central control building of the facility, and real estate in this location comes at a significant premium. The decision to virtualize most (if not all) servers and workstations will result in a significant reduction of server and workstation cabinets and savings for the overall project.
- **Instrument asset management strategy:** Projects tend to disregard the level of effort associated with configuring the field instrumentation which could be major for large greenfield facilities with thousand of instruments. Acknowledging and defining in the early phases of the project the work process that will allow the project team to benefit from technologies that allow the instruments to be configured in bulk will pay enormous dividends in the long term.

The early engagement of the automation team in greenfield projects will facilitate the development of the project execution plan. The industrial automation technology should be thoroughly evaluated, and benefits should be maximized by defining the control systems automation strategy. Both the project execution plan and the control systems automation strategy are key enablers to produce savings, minimize risks and remove technical and execution barriers to increase the probability of a successful automation project delivery.

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Member Benefit

Download the papers from the above event as an inclusive zip file from https://www.isa.org/isa-at-montreal-proceedings/ courtesy of the APMD Division.