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IIoT by the pieces

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Editor's Note: This is the first in series of articles about the many components of IIoT. Subsequent articles will discuss the promises and challenges of IIoT and big data, artificial intelligence, and cloud computing, offering advice and direction to help readers cut through the hype to determine if IIoT can help them manage their manufacturing businesses and to help them manage their projects for best results.

We have all noticed the big push by software suppliers and integrators to promote the industrial internet of things (IIoT), or Industry 4.0. IIoT is a promising network infrastructure to help you better control events and activities you should already be managing. It also promises to help you explore your business to discover events, relationships, and issues that can lead to better decisions.

However, IIoT is a risky endeavor if you lack fundamental knowledge of the processes and technologies you hope to improve. It is no trivial undertaking. It can be a significant and costly architectural investment that can either support better decisions or lead to frustration and poor decision-making.

As with any technology project, your keys to success include:

- Deep domain knowledge of the equipment and processes you intend to improve.
- Well-specified goals for your project. What will good results look like?
- Supportive management and employees.
- An experienced implementation partner willing to commit knowledgeable and experienced employees to your project. Too often, system integrators send their best people on sales calls but leave the work to less experienced staff resources.

- A knowledge of how to manage the volumes of data you collect. You need only collect significant events. You also will need people and equipment capable to understand how to read your data and use the necessary math to interpret its meaning and discover its value.

To understand the project risks, we need to look at enterprise resource planning (ERP). Manufacturing's experience implementing ERP, a 25-year-old technology, isn't exactly stellar. Studies by the Gartner Group ("Your guide to a successful ERP journey" from Deloitte) and Panaroma Consulting Solutions ("Key Findings From the 2015 ERP Report") estimate that 55 percent to 75 percent of ERP projects come in over budget, are significantly late, or fail to meet company expectations and requirements.

Some of the lessons from ERP include:

- **Increases in flexibility and agility are directly related to increases in complexity.** There is no way around this.
- **Software as a Service (SaaS) and the cloud are just platforms.** They aren't processes or innovations. You must focus on your business processes and select the right architectures to enable your own best practices.
- **Data integrity must be defined as a critical priority of any technology project.** It is too often undermanaged but is critical to any successful project.
- **Your IT organization may not be ready for new digital transformations.** Traditional ERP is an old-school product. It is an inflexible behemoth that attempts to wrap the old manufacturing resources planning, financial, and logistical applications into a single, unwieldy package. Newer ERP applications are returning to discrete business and manufacturing applications, but with tightly defined interfaces. This allows for greater flexibility but includes increased complexity.
- **Integration is hard.** One of IT's greatest challenges remains the ability to integrate applications and hardware. In the IIoT domain, there remain no universal standards for integration. This poses a problem for your ability to select connected devices and enable your existing equipment.
- **Plants are noisy environments.** Signal noise interferes with wireless communication from monitors and RFID tags.

IIoT is an integration tool, so implementation is complex in terms of technology, people, and objectives. An IIoT-enabled business comes with lots of "moving parts" and can generate tremendous amounts of data. As with any integration project, tying everything together into a meaningful and manageable system requires deep domain knowledge, research, and a lot of management and communication. At the end, the potential exists to explore your operations and discover new ways to manage and maintain your business. Improperly done, the potential exists to create a tremendous amount of misleading information. The result is up to you.

If you've done any research, you have seen the same trends and jargon as everyone else. Almost all the marketing materials promise fantastic results through the magic of monitoring, networking, big data, the cloud, and artificial intelligence. All these cool things really are just tools. As professionals who work with tools, we understand that a tool in the hand of a skilled professional with competent direction can create some fantastic results. We also know that a tool in the hands of someone less competent or poorly managed can be dangerous to your operation, employee safety, and your bottom-line results.