ARC BRIEF

By ARC Advisory Group

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Does Your Automation System have Integrity?

ARC
Advisory Group

Executive Summary

Competing in the flat world requires highly effective use of assets through greater agility, flexibility, and flawless manufacturing execution. An automation system is an essential ingredient of efficient, flexible, and reliable operations. Automation systems are heterogeneous in nature and continue to evolve in complexity. Maintaining the integrity of these systems is more challenging than ever, but is also essential for achieving operational excellence.

There are numerous risks involved in not utilizing a configuration change management strategy for automation systems. These risks, as summarized in the table below, include excessive recovery time to incidents, lost production, unintended consequences to changes, lengthy troubleshooting of automation problems, reduced automation performance, and lower human productivity. These risks can easily be mitigated through a comprehensive configuration management strategy. PAS offers a configuration management application called Integrity™. Integrity is useful for managing and validating automation system configuration, verifying data flow and connectivity, and evaluating system integrity.

Are you managing the Integrity of your Automation infrastructure?		
Situation	**No - (Risks)**	**Yes - (Benefits)**
Lack of Backup	Excessive recovery time after an incident — lost production	Rapid recovery — minimize loss
Out-of-Date Documentation	Current configuration state uncertainty — changes have unintended consequences such as triggering shutdowns	Comprehensive infrastructure perspective - visualize impact of changes
Multi-Supplier Environment	Incomplete view of configuration and interactions in complex environments	Common solution for managing multi-supplier infrastructures
Regulatory Compliance	Labor intensive regulatory compliance & coordination — possible fines	Common view ensures effective resource utilization
Human Productivity	Making changes and maintaining automation systems is difficult, time consuming and error prone	Increased productivity and reduced errors
Automation Troubleshooting	Searching for information is time consuming — troubleshooting difficult without proper tools	Faster problem resolution
Automation Performance	Performance degradation due to program remnants no longer needed	Tune for optimal performance
Managing work processes	Managing many diverse work processes is inefficient and unreliable	Common IT & Automation change mgmt ensures reliable processes

Automation Change Management Reduces Risks and Exposure

Business Challenges in the Flat World

In his book, "The World is Flat, A Brief History of the Twenty-First Century," Thomas Friedman highlights recent technological developments that have converged to create a new global playing field where information, knowledge, and resources are closely connected without regard to geographic distance or other barriers. This connected or "flat world" is driven by individuals enabled with digital, mobile, and personnel technology that makes it possible to instantly do business almost anywhere in the world.

> One of the requirements for success in the highly competitive business environment of the flat world is highly **effective use of assets** through greater agility, flexibility, and **flawless manufacturing execution**.

In the highly competitive flat world, it is no longer business as usual. Globalization has opened up new markets and new opportunities, but at the expense of introducing major new threats and challenges. In the flat world, companies have to deal with intense global competition, more demanding customers, greater product varieties, shorter production runs with frequent changeovers and shrinking product lifecycles. In addition, companies have to effectively deal with more stringent government **regulations** and **compliance** issues along with the need to be ever more vigilant against **cyber threats**.

The Flat World **Business Opportunities & Challenges**

Creates

Business Drivers

Dynamic Customer Requirements
Shrinking Product Lifespan
More Demanding Customers
Fierce Global Competition
Global Markets, Supply Chains
Greater Product Variety
Compliance and Tracking
Many Others

The flat world is creating new opportunities and new challenges

Business in the flat world is fast – changes occur rapidly – opportunities evaporate as quickly as they appear. Companies have a fundamental need to improve productivity, quality, and profitability through more effective use of assets by achieving greater **flexibility, agility**, **safety**, and flawless manufacturing execution. The role of automation and information technology in achieving these goals is critical. Large complex production systems can not be efficiently and safely managed without advanced information

management, sophisticated process control, and production management applications and methods to **manage**, **configure**, and **backup** these critical assets.

Trends in Production Automation

An automation system is an essential ingredient of efficient, flexible, and reliable production operations. Automation assets within a plant consist of a collection of distributed devices and software applications interconnected by means of a communication network. The automation system is responsible for process monitoring and control along with performing production management functions and reporting.
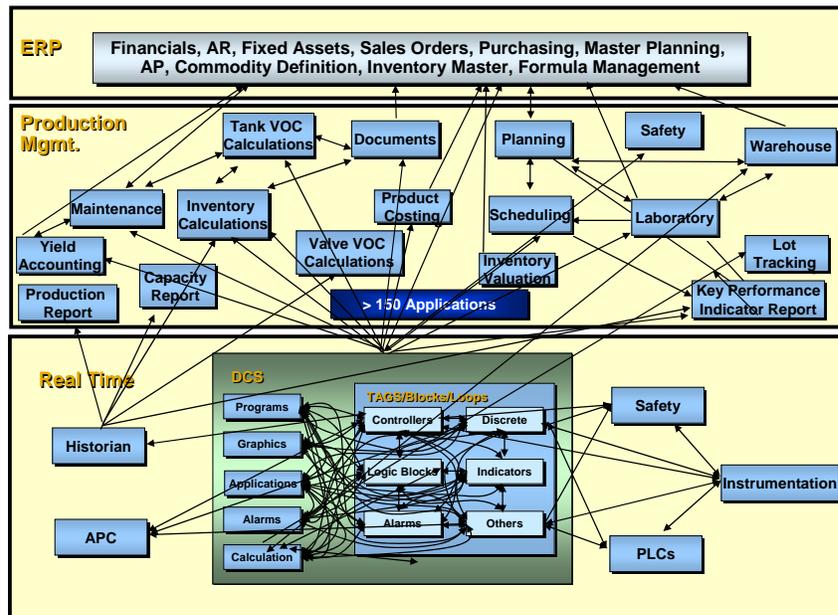
The complicated web of automation connectivity

Companies use a variety of different process automation technologies to control their processes and improve their business performance. Most facilities use a disparate set of automation technologies such as distributed control systems, historians, advanced controls, and planning and scheduling; all of which were designed for a specific purpose. The heterogeneous nature of automation technologies delivers best-of-breed functionality with significant benefits, but the benefits come at a price. The price, of course, is a complicated web of connectivity between the disparate automation assets that requires considerable maintenance and upkeep from domain experts. Maintaining the integrity of these assets is challenging and costly to say the least.

Recent advances in automation systems are in the direction of more complex and comprehensive. A typical process plant has over 150 applications that must be properly configured and maintained. Complicating the matter

is the fact that more and more companies are realizing the need for integration between automation systems and higher-level business systems. Additionally, most companies have adopted continuous improvement programs that constantly change and upgrade automation assets to improve operations. Furthermore, dynamic markets in the flat world necessitate more product and process changes that require more frequent modifications to the control system. Making and keeping track of all these changes has been a difficult and daunting endeavor.

Flirting with Disaster: No Configuration Management Solution

A company's automation assets represent a significant investment in production technology. Obviously, companies rely heavily upon all their automation assets – from sensors and devices to control systems and applications – to safely and efficiently manufacture their products. Automation assets, such as APC, are responsible for providing significant increases in throughput while others, such as real-time databases form the basis for performance analysis and decision-support. Maintaining the integrity of these assets is imperative to not only compete but thrive in the flat world. Despite this, many companies do not have a good strategy in place to achieve this objective.

Lack of Configuration Solution Risks
- Excessive recovery time
- Lost production
- Unintended consequences of changes
- Laborious compliance coordination
- Automation performance degradation
- Lengthy problem resolution due to lack of troubleshooting aids
- Inability to assess cyber attack damage

The plain truth of the matter is that most process automation systems in use today have had little or no change management applied to them. This puts them at risk and makes them vulnerable to impending disasters. The risks and vulnerabilities arise from many situations including:

- <u>Out-of-Date Documentation</u> – Without current documentation, engineers are unaware of changes made to the automation system. Their lack of knowledge of the current state of the control system, databases, or applications can cause numerous problems. Making changes based on the wrong assumptions, such as deleting a critical connection, can have undesirable consequences such as triggering a shutdown or perhaps something much worse.

- <u>Lack of a Backup</u> – In the event of a failure or other unfortunate event, the lack of an automation system backup can lead to excessive lost production and lengthy downtime caused by a difficult and time consuming recovery process.

- <u>Cyber Attacks</u> – Years ago, cyber attacks were likely to occur from the inside, by disgruntle employees. Today, as control systems suppliers moved to Windows-based PC platforms, hackers are just as likely to come from the outside. Intrusion detection is the first step in Cyber Security, but without facilities to determine changes over time, discovering and recovering from damage is difficult.

- <u>Automation Performance</u> – Without an effective change management program, traces of applications remain dispersed throughout the automation system and consume valuable computer resources that decrease its efficiency. In addition, these remnants can act as a decoy to confuse engineers when they are performing other tasks like troubleshooting or migrating applications.

- <u>Multi-Supplier Environments</u> – Tracking changes or getting a comprehensive automation infrastructure perspective is difficult for a multi-supplier environment. The incomplete perspective has similar risks to out-of-date documentation.

- <u>Lack of Compliance Support</u> – Several industries require detailed tracking of changes and strict access control to automation systems. Without an automated solution, these mandatory processes are labor intensive.

- <u>Lack of Troubleshooting Aids</u> – Searching for data and information to troubleshoot an automation problem consumes an inordinate amount of time and effort without the proper tools.

- <u>Lack of Knowledge Management</u> – Companies are losing their most valuable asset: their people and their intellectual capital. The approaching exodus of retiring workers will severely erode the knowledge base of many companies and compromise productivity if left unabated. This combined with an increasingly demanding manufacturing and business environment means that manufacturers are in dire need to make younger, less experienced employees more productive.

As the complexity of process automation systems continue to increase, it is imperative to ensure that all documentation is up-to-date and changes are properly tracked throughout the system's lifecycle. Keeping automation configuration current helps avoid incidents, facilitates troubleshooting, and increases automation performance.

Integrity: Automation Configuration Management

Configuration management identifies and defines the configuration of a system. It also entails controlling, documenting, reporting, and verifying any changes throughout the system's lifecycle. PAS has developed an Automation Configuration Management Solution called Integrity. Integrity addresses the risks associated with managing change in a multi-supplier automation environment for manufacturers competing globally in the flat world.
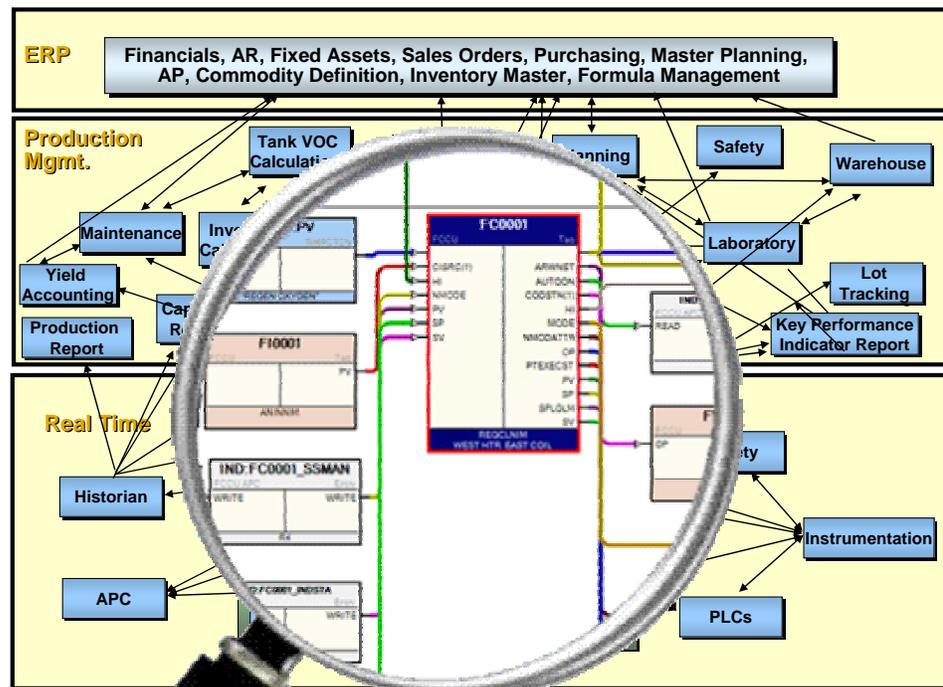
Integrity provides comprehensive view of automation connectivity in complex environments

Integrity from PAS provides a comprehensive automatic up-to-date lifecycle documentation and backup for control systems and the rest of the real-time automation infrastructure. It is used for several purposes including:

- Managing and validating automation system configuration

- Verifying data flow, connectivity and system integrity

- Data mining and knowledge management

Integrity is a configuration management solution that enables users to protect, discover, and track changes for process automation systems as well as recover data quickly in case of loss or failure. Its real-time data-mapping feature automatically finds all data connectivity issues and configuration changes, any mismatched references across all systems, and shows precisely where data is coming from and where it ends up. Integrity identifies potential integrity issues such as deleted objects being called by programs, multiple objects outputting to the same object, and unused objects to name a few. Integrity also permits viewing of all modifications to a given asset model or object.

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The use of Integrity results in a secure, well-documented and controlled environment, which provides users with significant benefits including:

- Improved plant safety by identifying data integrity issues and other potential problems

- Reduced costs associated with improved productivity of plant personnel armed with real-time data for troubleshooting and making continuous improvements

- Support for Regulatory Compliance (e.g., OSHA 1910.119 and 21 CFR 11) with change management, controlled access, and electronic records

- Improved Return on Assets by lowering costs associated with down time and providing facilities for quick disaster recovery

- A framework for a knowledge management system that captures complex configurations and automation strategies and provides intuitive visualizations

Integrity addresses all levels of automation, from field instruments and control systems to historians, APC, and Computer Maintenance Management Systems (CMMS). Users of Integrity significantly lower the risk and exposure to potentially serious problems.

Why PAS

Founded in 1993, PAS is a supplier of People and Asset Solutions to the process industries worldwide. PAS provides a comprehensive portfolio of integrated plant reliability and optimization solutions that include APC, Automation Configuration Management, and Alarm Management. The company is well known for its knowledgeable staff and domain expertise in the plant reliability and optimization areas.

PAS software products and engineering services help process plants improve plant safety, reliability, and profitability. PAS was established as an engineering and consulting firm to manage and enhance the performance of distributed control systems (DCS). Initial solutions focused on DCS alarm management and system documentation. Since its inception, PAS has engaged in the development of automation software solutions. PAS is the company that launched the automation configuration management software business with the introduction of its DOC3000 product for automated documentation of the Honeywell TPS system in 1996.

Shortly after the introduction of DOC3000, Honeywell adopted it as the standard documentation product for the TPS DCS. Recently, Honeywell and PAS expanded the DOC3000 agreement to allow Honeywell to offer an OEM system documentation for both Honeywell and non-Honeywell customers. The product is known as Automation Change Manager and is based on PAS Integrity software.

Recommendations

- Companies must maintain the integrity of their automation system to achieve operational excellence. This is essential for a company to remain competitive.

- ARC recommends users adopt an automation configuration management strategy to safeguard their process automation system and reduce their risk of lost production, unscheduled downtime or worse.

- ARC recommends a corporate automation knowledge management strategy to capture, protect and share the significant engineering investments in the automation assets that are vital to plant operations and safety.

Analyst: Tom Fiske

Editor: Steve DePaola

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