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EXCELLENCE IN OPERATIONS

Jack Stout, Nexus Engineering, USA, discusses the importance of real time operations data and their effect on reliability programs.

Plant reliability continues to be a mission critical focus for today's industrial manufacturing complexes. Reliability program objectives have successfully improved process unit availabilities while extending run times between turnarounds. Benefits are realised in the form of increased site economic performance, assuming that an operational problem does not adversely impact unit availability. For example, a process unit might be operational until the scheduled turnaround, but frequent operations related outages and unanticipated maintenance upsets often overshadow targeted financial goals.

Although reliability programs deliver significant improvements in run time between major turnarounds, unit availabilities continue to be hindered by process disturbances. Reductions in technical support and the consolidation of operator console positions place increased responsibility, for a broader asset base, on a smaller team of qualified, available people. The ensuing operations environment significantly inhibits the opportunity for operations personnel to consistently detect process disturbances and correctly intervene to prevent minor disturbances from escalating into major process upsets. Lost production, unit asset performance degradation, and increased maintenance resulting from these issues clearly justify operations excellence programs.

Operational excellence (OpX) is defined by the ARC Advisory Group as 'consistently doing the right things well'. As OpX drives the manufacturing aspects of companies, the requirement of real time must be added to OpX. The result of real time operations excellence (*rt*Op^{x}™) being a fundamental shift in how improved operations can be achieved. Now, with *rt*Op^{x}™, the challenges of implementing Six Sigma strategies are greatly reduced.

Specifically, Six Sigma initiatives provide an event database to support business analysis of operations excellence opportunities. Quality critical events support the economic basis to guide the company's investment strategies. Results of these efforts historically yielded additional documentation and procedures (in various electronic forms) accessible by the operations team for reference. Although the information was available, a major dilemma existed in that no mechanism was present to deploy logic generated from these activities and yield real time, online value. Additionally, without a *rt*Op^{x}™ solution, there was no easy way to keep the documentation current.

Although OpX scope traditionally focuses on logistics and supply chain management, these principles can be applied to real time operations excellence (*rt*Op^{x}™) to focus on the time horizon 'at the moment of' or 'immediately preceding' a process transition or upset. The objective is to provide early detection, diagnostic, and decision support that enables the operator to consistently intervene and proactively impact event outcomes.

What it does

The execution of the *rt*Op^{x}™ initiatives may be mapped with the Six Sigma DMAIC (define, measure, analyse, improve and control) methodologies embraced by performance focused manufacturing companies. At a general level, *rt*Op^{x}™ enables companies to identify and manage quality-critical issues within process unit operation. Pursued at a business operation level, these items generally translate into addressing customer's requirements through the management of information (access and flow) across an organisation.

'Digitisation' of operations excellence logic forms the basis for *rt*Op^{x}™ systems. Deployment of operations 'best practices' creates a form of intellectual property for the client that can be managed and redeployed on similar processes at other global locations. This managed approach to operations excellence enables all of the process units to benefit in real time from any single location's demonstrated operations improvements. Instead of an individual lead site defining acceptable best practices, all of the company's sites, regardless of geographic location, contribute (again, in real time) to the operations excellence goal.

In addition to 'best practices', the real time world of operations excellence includes the scope of critical condition management (CCM). As defined by the ARC Advisory Group, CCM, itself consists of a spectrum of functions ranging from rationalisation of alarms to the deployment of the operations knowledge-base through an online application framework. Figure 2 reflects ARC's view of the architecture requirements for a CCM framework.

Industry benchmarking data continues to confirm the role of operations excellence in delivering the expected reliability benefits[1]. Although the definition of operations excellence has traditionally been 'in the eye of the beholder', today's advanced automation technologies are delivering 'material' real time benefits through the deployment of 'digitised' operations knowledge. Knowledge management was previously considered the development of operational standards and best practices to form the premise for training and work programs. Site efforts to define operations domain knowledge within a library of electronic documents, provided an archive of the knowledge to be referenced, post mortem, after an incident, but could not enable real time knowledge deployment during critical events. In addition, there was no way for this to stay current over time.

A digitisation strategy deploys logic from these operations knowledge domains through a real time logic management system to provide early detection, diagnostics, and advisories to operations personnel. In turn, these provide operations personnel with the opportunity to proactively intervene and minimise a process upset to diminish impact on the process equipment. The multi-variant analysis typically provides advisories before the process deviation has escalated to control system alarm limits. Deployment of this digitised knowledge provides the operations team with a real time operations excellence *rt*Op^x™ baseline to best manage the process unit performance and deliver availability aspects of reliability strategies.

The effects

Every site has its own history of operations problems that adversely impact unit availability. Media sensationalised images depicting over fired furnaces with ruptured tubes burning to the ground are extreme examples of adverse operations incidents. While these spectacular images may capture attention of the loss avoidance focus, the real losses are caused by frequently occurring minor events, in other words on a daily basis, across a much broader scope of the assets. These include, but are not limited to:

- Undetected instrument failures leading to the erroneous control of critical process streams.
- The unintentional blocked in pump left running during a pump swap, resulting in a blown seal.
- Undetected pump and equipment performance degradation during turndown conditions, resulting in future constrained capacity when required for the higher operating rate modes.
- Over fired heaters, resulting in coked tubes and reduced capacities.

Ironically, abnormal operations, historically a necessary part of the operations world, are almost considered normal.

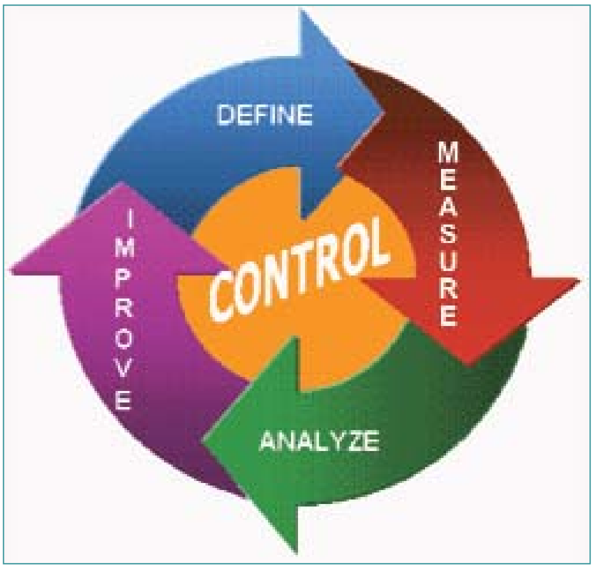


Figure 1. Six Sigma DMAIC diagram.

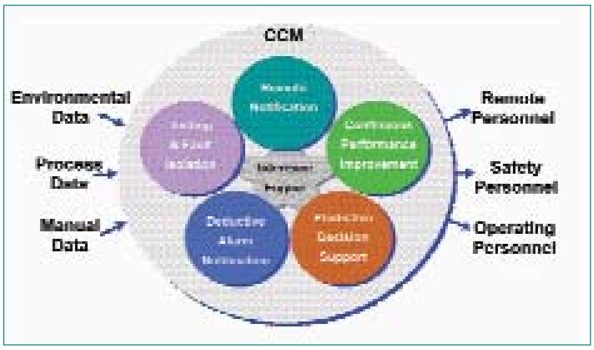


Figure 2. Critical condition management application architecture.

Improvements in process safety management (PSM) initiatives (initially driven by regulatory compliance) form the framework to identify correct operating procedures. The use of operator training simulators (OTS) enables sites to educate and exercise the operators' thought processes with the expectation that they will retain, correctly recall, and properly deploy that information when confronted by challenges of a real operations scenario. This can only occur with constant reinforcement, which is realised with a *rt*Op^x™ solution.

*rt*Op^x™ solutions are currently delivering major benefits far beyond those available from advanced controls. When looking at the spectrum of advanced application, APC benefits, delivered through constraint control, are further enabled and enhanced through improvements in unit availability provided by *rt*Op^x™ systems.

Unlike the installation of a hard asset, such as a new filter, investment in advanced manufacturing applications, such as APC and *rt*Op^x™ systems requires ongoing operations commitment to maintain and enhance these solutions. The correct strategy for ongoing application maintenance and enhancement enables the *rt*Op^x™ system to deliver incremental value beyond the initial project as additional operations excellence knowledge is deployed through the system and leveraged across multiple process units.

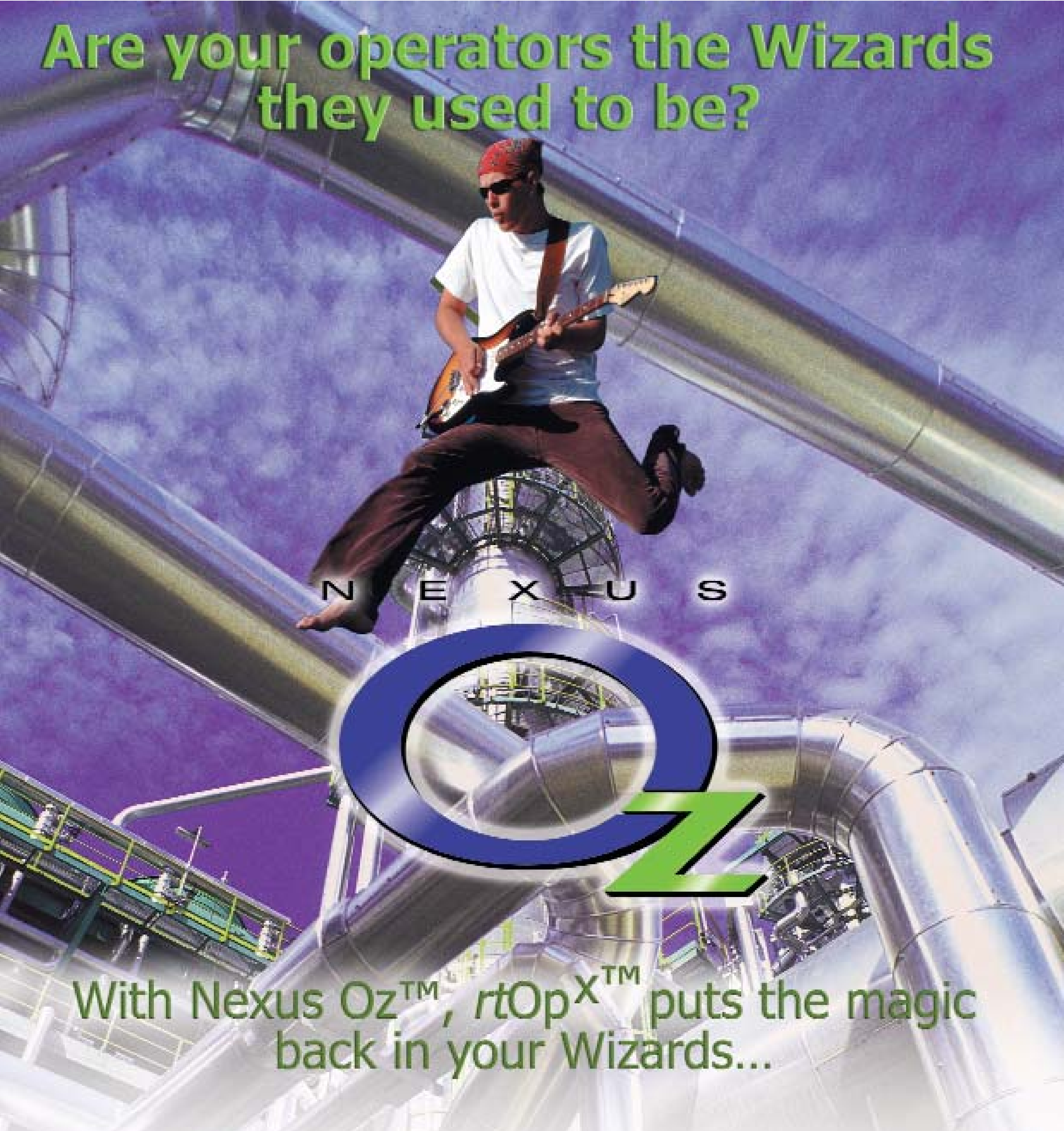
*rt*Op^x™ applications are operations centric and require personnel familiar with both technology and process operations to best scope and deploy the systems. The actual knowledge of any 'real world' process operation resides with frontline technical support and operator personnel. Deployment of that knowledge through the *rt*Op^x™ system is a symbiotic relationship between knowledge, experience, and an intuitive 'knowledge model' application framework.

Conclusion

Faced with increased competition and narrowing operating margins, the intrinsic value of *rt*Op^x™ systems is a cost effective investment that forward thinking companies must explore. Opportunities for financial gain escalate exponentially as these systems become embraced in operations critical roles. While pre-empting a single critical event through simple operator intervention can easily result in immediate return on cost of investment and productivity (reliability), consistent commitment to *rt*Op^x™ provides an untapped opportunity for unsurpassed economic performance (excellence).

References

1. BIRCHFIELD, G.S., 'Olefin Plant Reliability - 2/2000', Solomon Associates.



The *rt*Op^{X}™ (Real-time Operations Excellence) Solution Using Nexus Oz™ Drives Improved Operations Through:

- Continuous, Real-time Performance Monitoring
- Early Detection and Diagnosis of Degrading Plant Performance
- Accurate Decisions Delivering Predictable and Profitable Operations
- Capturing and Managing Current and Future Operating Best Practices

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