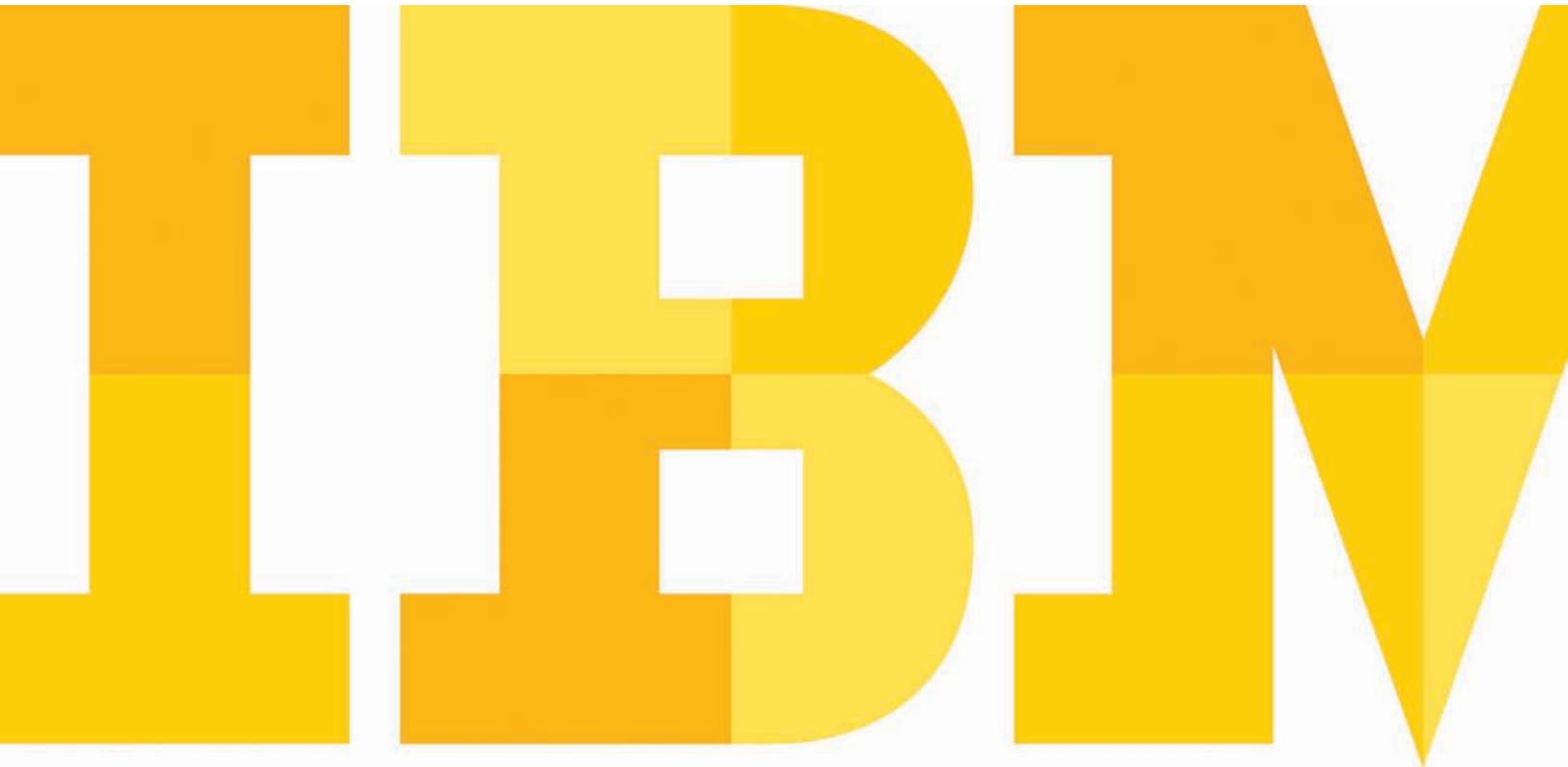


# Smarter asset management for the nuclear power imperative

*Harness worldwide nuclear best practices with IBM Maximo for Nuclear Power*



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## Introduction

Despite major setbacks to the industry in recent years, nuclear power continues to grow internationally. As Figure 1 shows, 52 new plants are currently being built, and 93 additional plants are in the planning stages. Globally, there are 435 power reactors in operation and many of these facilities are extending their operating licenses. The bottom line is that nuclear power is a key part of the energy mix for both developed and developing nations, and it will continue to be for the foreseeable future.

For existing plants, the imperative is to increase the total life of existing nuclear assets, including by updating critical applications and enterprise asset management systems. For new plants, the imperative is to put solutions and processes in place from the outset that will help ensure safety, long-term asset life, return on investment and power supply security. Operating in a highly regulated environment, where change can be a multiyear process, both new and existing plants must find ways to harness worldwide nuclear best practices.

## IBM and the nuclear industry

IBM has been a provider of IT and industry solutions to the energy and utilities industry for more than 30 years, and is the largest service provider to the utilities industry. IBM has worked in close partnership with the nuclear industry for more than a decade, providing industry-specific solutions and services, as well as thought leadership. IBM created the Maximo Nuclear Power Advisory Council in 2003 to facilitate the development of solutions that meet the demanding requirements of nuclear power organizations. More recently, IBM has worked hand in hand with partners in the nuclear industry to create a nuclear business maturity model designed to help global nuclear power companies address the many requirements associated with plant life extensions and with constructing and operating new nuclear power plants.

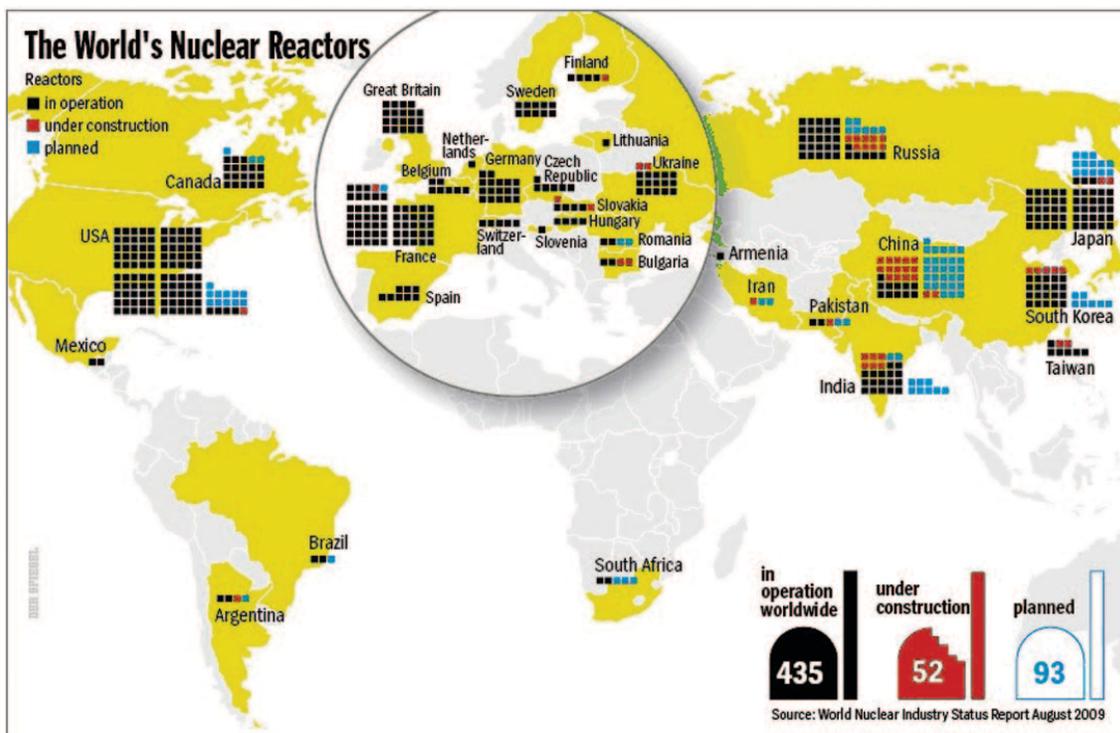


Figure 1: China, Russia, India and Korea lead the world in the development of new nuclear reactors.

Asset and operational management for nuclear power is unique and requires specialized enterprise asset management software. By working closely with partners in the industry, IBM has helped nuclear power organizations break down operational and organizational management silos through industry-specific solutions such as IBM® Maximo® for Nuclear Power. Backed by a powerful research and development organization,

IBM collaborates with clients and business partners on an ongoing basis to design and test new and expanded capabilities which are then incorporated into future releases of the software.

### The Standard Nuclear Performance Model

Across the nuclear industry, the Standard Nuclear Performance Model (SNPM) has been widely adopted for benchmarking nuclear operations as well as aligning business processes with

industry-standard best practices. As shown in Figure 2, the model reflects standardized benchmarking, process definitions, cost definitions, key performance indicators (KPIs) and staffing definitions developed by the Nuclear Energy Institute (NEI), Institute of Nuclear Power Operations (INPO) and EUCG (formerly Electric Utility Cost Group). The model divides nuclear operations into nine major processes, which are further categorized into 45 sub-processes.

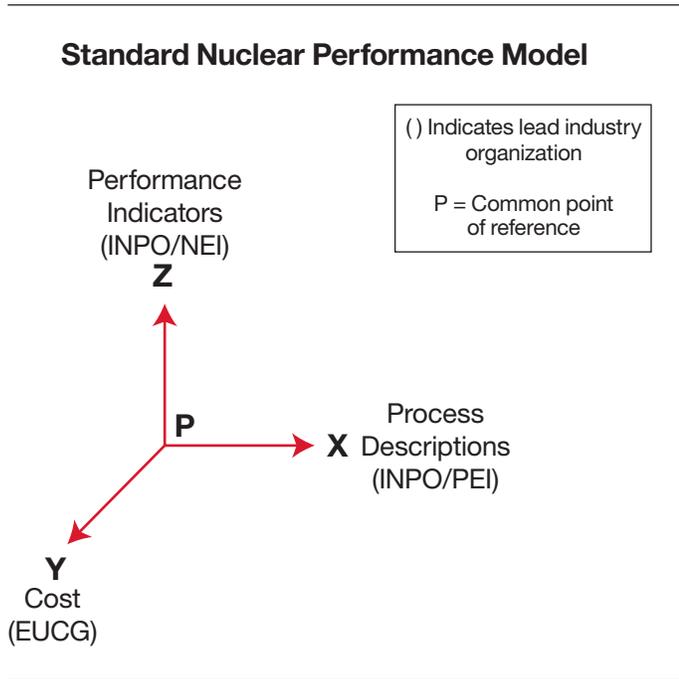


Figure 2: The Standard Nuclear Performance Model has been widely adopted across the nuclear industry.

Since its inception, Maximo for Nuclear Power has been designed based on the SNPM, with functionality built and expanded in alignment with this industry standard and its principles of comprehensiveness, performance and worldwide best practices. In fact, industry analyst Model Performance, LLC has determined that IBM Maximo for Nuclear Power is the best solution for meeting the process and integration standards identified by the SNPM.<sup>1</sup> According to a report by the organization, Maximo for Nuclear Power “supports the SNPM’s comprehensive process implementation, cost capture and KPI guidelines, along with integrated core applications and enabling processes.”

The SNPM informs and validates that IBM is roadmap for addressing the present and emerging needs of the nuclear industry. The capabilities of Maximo for Nuclear Power are mapped against the model to identify gaps, support software-related business decisions and plan enhancements. In addition, improvements resulting from the latest results in SNPM benchmarking enter the development process to ensure that the solution remains consistent with the model.

The reference process definitions of the SNPM are shown in Figure 3, including core business operational processes, management processes and enabling processes. These definitions help ensure that Maximo for Nuclear Power provides a means to manage nuclear plant processes, capture related costs and drive the necessary KPIs. The SNPM is also used to facilitate interoperability with other IBM nuclear initiatives.

### SNPM: Reference process definitions

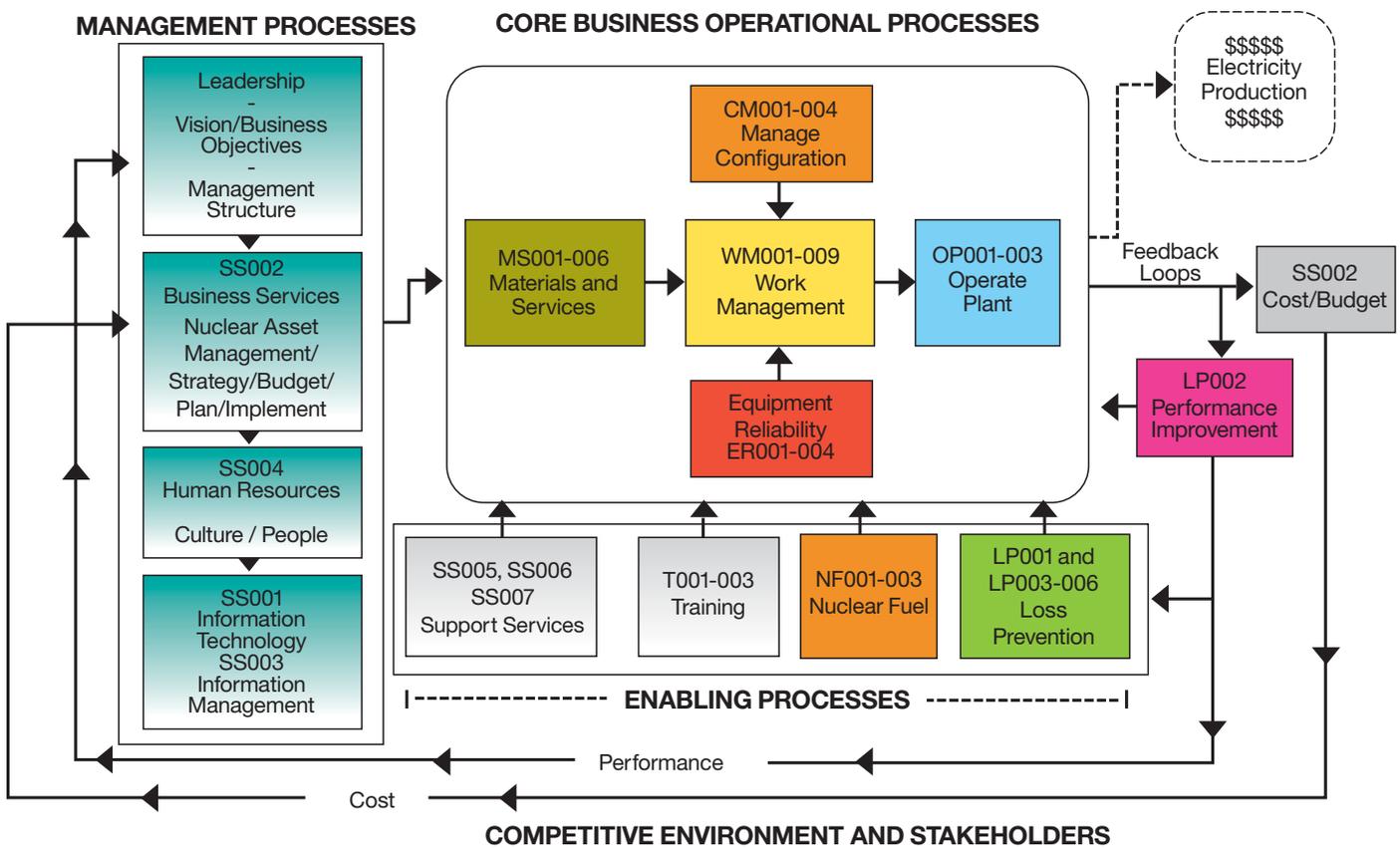


Figure 3: The Standard Nuclear Performance Model divides nuclear operations into eight major processes.

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### The IBM Maximo Nuclear Development Partner Program

The nuclear culture of sharing better practices and standardization is embodied in the Maximo Nuclear Development Partner Program, which encourages sharing of individual approaches to emerging rules, facilitating the development of new best practices and accelerating new product development that incorporates these practices and helps nuclear power organizations ensure ongoing compliance.

One recent example is the nuclear partnership's response to the INPO's issuance of AP-928 Rev. 3, Work Management Process Description, on June 11, 2010. In part, this standard required changes in how work backlogs were categorized and counted. It also formalized risk management evaluation processes for the work being performed.

Though all IBM nuclear clients were already successfully addressing SNPM / INPO requirements, they had implemented Maximo software at different times with different releases and versions. Additionally, each had implemented the Maximo system to suit their unique requirements using varying degrees of complexity and automation.

As a result of the collaboration, each client was able to meet the new requirements seamlessly. Even though each client was using a different Maximo software release and version, each was committed to—and contributed to—development of general business process requirements that supported the transition for all clients. The industry-specific functions developed as a result of this partnership were then fed into future Maximo for Nuclear Power development initiatives.

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## Core asset and operational management capabilities

Maximo for Nuclear Power is a proven, end-to-end enterprise asset management (EAM) and operational management solution based on IBM Maximo Asset Management. Designed specifically for the nuclear industry, it can help nuclear power organizations address stringent safety and regulatory requirements, and improve productivity by providing a single platform for managing all asset types by integrating asset and work management processes.

With Maximo Asset Management as the basis of the solution, Maximo for Nuclear Power provides a foundation of core capabilities that have been proven across a wide range of industries. These capabilities include:

- **Asset management**, including management of locations, linear assets, repair facilities, meters, relationships, failure codes and condition monitoring
- **Work management**, including management of job plans, routes, service items, work orders, failure reporting, safety, labor, qualifications, preventive maintenance and forecasting
- **Materials management**, including management of service items, tools, inventory, costing, consignment, condition codes, storerooms and reservations
- **Purchasing**, including management of accounts, requisitions, purchase orders, receiving, invoices, requests for quotation, terms and conditions, currency codes and exchange rates
- **Contract management**, including management of purchase contracts, lease and rental contracts, labor rate contracts, master contracts, warranties, software contracts and payment schedules
- **Service management**, including management of service catalogs, service level agreements, service requests, incidents, problems, changes, releases and solutions

Whether deployed in new or existing nuclear plants, Maximo for Nuclear Power addresses the demanding processes associated with managing a complex nuclear infrastructure, making nuclear asset and operational management easier, more efficient and more effective. The solution supports the business processes of nuclear power companies in construction, test and maintenance of nuclear power plants or fleets. And the flexible architecture of the system means the solution can be changed as requirements change, and expanded as business grows and new plants are added.

### Nuclear-specific asset and operational management capabilities

Maximo for Nuclear Power expands the base capabilities of Maximo Asset Management to include the categories of capabilities required to meet the unique demands of the nuclear industry. As shown in Figure 4, these categories include nuclear work management, operational management, engineering configuration management, surveillance functionality, nuclear supply chain, condition reporting and corrective actions, and regulatory management—corresponding with the SNPM operating processes identified in Figure 3.

## IBM Maximo for Nuclear Power

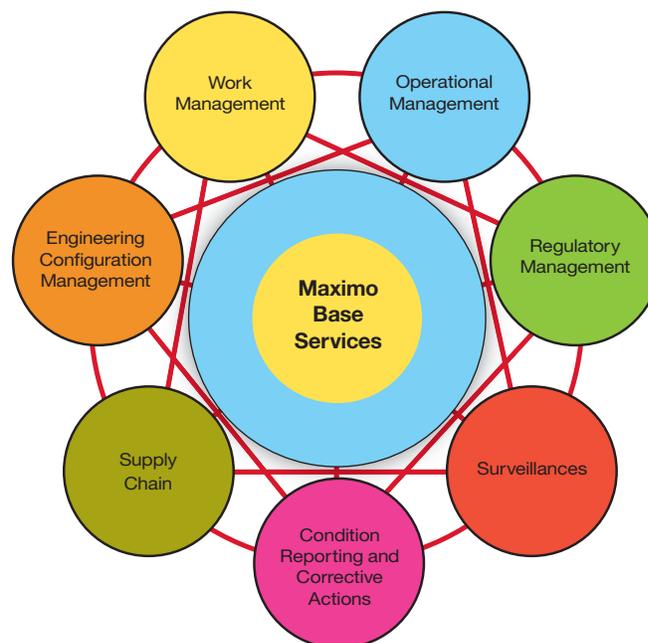


Figure 4: Maximo for Nuclear Power expands the base capabilities of Maximo Asset Management to meet the unique demands of the nuclear industry.

The solution provides comprehensive nuclear-specific functionality, including the following key features:

- **Corrective action**—Provides the ability to classify, prioritize, analyze, trend and solve problems related to plant equipment, processes and personnel performance. Supports a graded approach and considers the potential impact to nuclear safety and regulatory notifications.
- **Permits**—Provides the ability to manage permits for power plants. Supports a range of permit types corresponding to the requirements that accompany plant operations, maintenance and engineering activities. Fully integrated with work orders, preventative maintenance and impact plans.
- **Configuration change management**—Provides the ability to create and manage changes to location, asset or configuration item information. Leverages change and release capabilities to encapsulate engineering approvals and in-plant implementations prior to promoting new configuration data.
- **Quick locations and quick assets**—Provides the ability to rapidly create locations and assets for use in clearances, lineups and work orders. Quick locations and assets may be promoted to the full version later and entered into the engineering configuration management processes.
- **Equipment groups**—Provides the ability to relate locations, work orders, preventive maintenance, clearances, tags and permits into equipment groupings. Facilitates complex configuration management evolutions using the clearance revision process.
- **Clearances**—Provides the ability to establish safe working boundaries for performing maintenance and testing activities. Provides the operations staff with configuration control and oversight over the positioning of tagged plant components.
- **Lineup plans and lineups**—Provides the ability to establish, revise, manage and validate operational configurations. Enables comprehensive tracking of component positioning throughout the plant, recognizing both operator walk-downs as well as clearance and tagging operations. All capabilities are fully integrated with clearance operations.
- **Nuclear kiosk applications**—Provides the ability to design single-page applications for data entry of field data, including clearances, lineups, clearances sign-on and sign-off, and condition reports that initiate the corrective actions program.
- **Impact plans**—Provides the ability to efficiently identify the potential plant challenges associated with maintenance, and with the actions needed to minimize vulnerability. Includes Limiting Condition for Operation (LCO), retest, equipment unavailability, alarms, impairments, notifications, permits and other requirements. Provides data to external decision support tools.
- **Technical specifications, surveillance requirements and events framework**—Provides the ability to include the plant's technical specifications and surveillance requirements where applicable in work orders, preventive maintenance and impact plans. Permits identification of anticipated operational risks such as alarms, system and equipment actuations, isolations and trips, along with planned contingency actions and countermeasures.
- **SNPM workflows**—Provides the ability to implement best practices for work management, equipment reliability, materials and services, and equipment corrective actions. Provides a complete set of comprehensive workflows to support the SNPM.
- **Commitment tracking**—Provides the ability to identify and track commitments made to internal or external parties, and to track progress against commitments where action is required. Enhancements allow for the capture of review and comment as part of the commitment tracking process.
- **Surveillance testing**—Provides the ability to capture technical specification directives to drive regulatory-related asset testing with associated frequencies and grace periods. Supports testing of multiple plant components or tracking of surveillance performance against individual components.
- **Calibration / measurement and test equipment (M&TE)**—Provides the ability to support end-to-end calibration processes for instrumentation and controls (I&C) and M&TE via proactive management of tolerances, standards, analog / discrete datasheets, pre and post spot checks, and reverse traceability.

- **Job plan versioning**—Provides the ability to assign version references to a job plan, allowing the ability to maintain a single document number for a job plan that has multiple revisions.
- **Procurement engineering**—Provides the ability to assign specific technical terms to procurement items and specific quality terms to qualified vendors. Allows procurement engineers to define the procurement class, specification and approved vendors for plan equipment.

- **Equipment reliability**—Provides the ability to capture data elements to support equipment reliability analysis and asset-related decision making. Establishes foundational relationships among nuclear assets, locations, work orders and preventive maintenance.

As shown in the example in Figure 5, the advanced process support in Maximo for Nuclear Power can cut across multiple application components, such as work orders, work permits and person records, and can also include integration to specialized systems.

### Nuclear work order process support

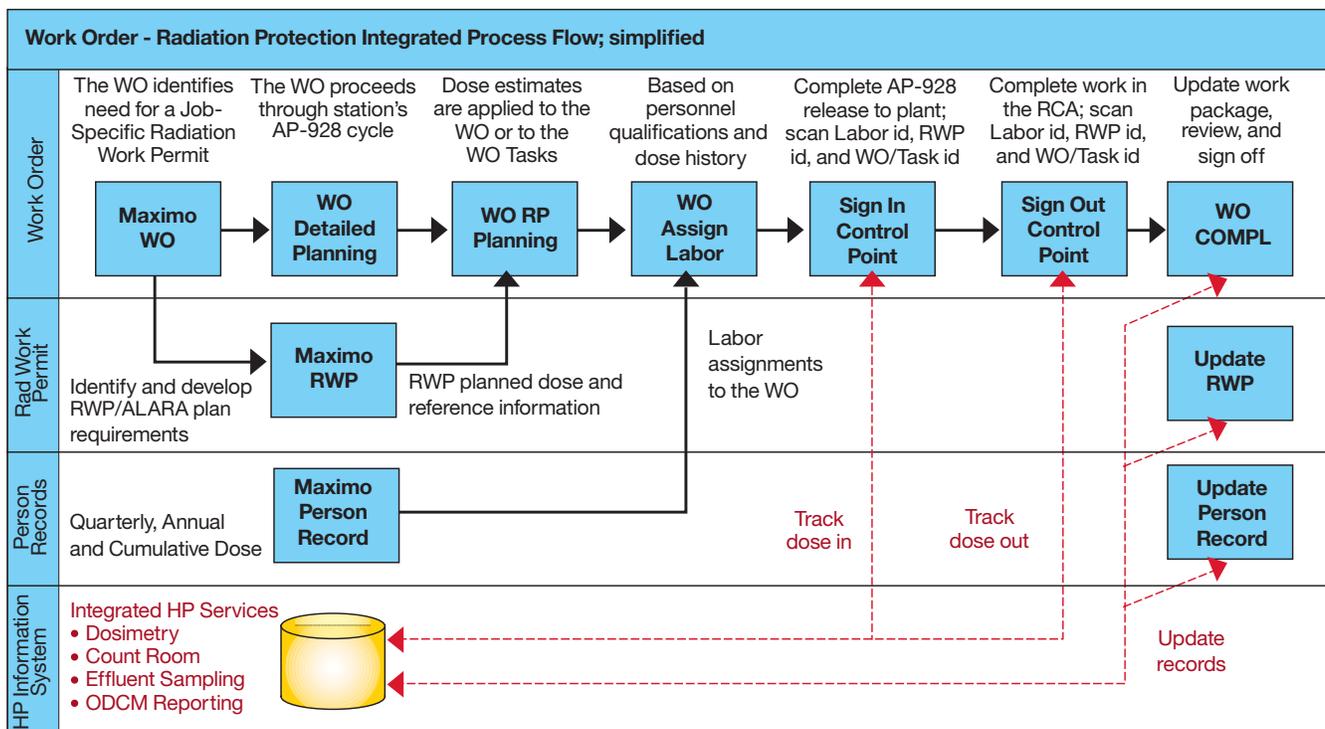


Figure 5: Process support can span multiple Maximo for Nuclear Power applications and specialized systems.

Other solutions from the Maximo software portfolio can be integrated with Maximo for Nuclear Power to provide expanded asset and operational management capabilities and extend the value of existing Maximo investments. These solutions include:

- **Maximo Everyplace**, for remote access to Maximo processes
- **Maximo Scheduler**, for visual navigation through work orders and tasks
- **Maximo Calibration**, for automated calibration processes
- **Maximo Spatial Asset Management**, for providing visibility to view asset relationships spatially
- **Maximo Linear Asset Manager**, for tracking changing characteristics over the span of a linear asset

### Architecture matters

Because nuclear power organizations can vary widely in terms of size, location and numbers of sites—and because the industry as a whole must be able to react rapidly to business and regulatory changes—a flexible foundation is critical for effective asset and operational management. Maximo for Nuclear Power is built on a flexible Java 2 Enterprise Edition (J2EE) component-based, service-oriented architecture (SOA). This modern, standards-based platform ensures development flexibility and scalability so the system can change and expand as needed, helping to protect investments over the long term.

The agile architecture of Maximo for Nuclear Power also facilitates integration using the powerful Maximo Integration Framework with existing business systems, including enterprise resource planning (ERP) applications such as SAP and Oracle, as well as with asset health and monitoring, engineering and design, and many other critical business, operational and safety systems.

### IBM Maximo for Nuclear Power worldwide

Maximo for Nuclear Power is helping nuclear power companies around the world integrate business processes, adapt to changing requirements and reduce operating costs. One nuclear power company in the American Midwest has used Maximo for Nuclear Power to consolidate, integrate and standardize business processes across nearly 200 different business units. The solution, which was integrated with SAP, Advantex, Esri GIS and Primavera solutions, resulted in significant annual operating cost savings, has improved decision-making processes, and has facilitated the sharing and implementation of better practices across the enterprise.

Another major nuclear utility has used Maximo for Nuclear Power to integrate work management, preventive maintenance, and financial and supply chain systems and processes, facilitating day-to-day maintenance across a fleet of more than 70 power-generating plants. The solution has increased both operational efficiency and asset utilization, and has provided the company with the flexibility to more quickly address new regulatory requirements.

### Toward smarter nuclear power

Today's nuclear power organizations need solutions that will support the instrumented, interconnected and intelligent assets that make up the vast nuclear infrastructure on today's smarter planet. Smarter asset, life-cycle management will support the mass convergence of physical and IT assets, and it will support all business processes, from the design and building of new nuclear plants to the operation and maintenance of both new and existing plants.

Armed with advanced asset and operational management capabilities, the nuclear power industry can be smarter about how these critical plants are built and operated, maximizing safe production and keeping plants and systems more secure, reliable and available. For example, engineering, procurement and construction (EPC) data can be fed into the Maximo for Nuclear Power data model early in the design and construction lifecycle, facilitating work management, operational management, configuration management and supply chain management. As the nuclear construction project transitions through start-up and test phases and into system commissioning and turnover, both the plant hardware itself and the supporting plant asset and configuration management process in Maximo for Nuclear Power will be ready for use. The software complements other information systems assembled in the current generation of new plants, while development tools such as IBM Rational® software, content management systems such as IBM FileNet® software, and business intelligence systems such as IBM Cognos® software can all play a role in driving effective and efficient operations from day one. IBM is already supporting the new nuclear build process as it works side by side with a leading EPC firm and nuclear client who are constructing the latest generation of nuclear reactor.

Building smarter nuclear power requires advanced solutions and thought leadership. Companies facing this imperative can rely on IBM for solutions that deliver long-term value and agility, as well as the specific functionality required by this demanding industry. With the subject-matter expertise and services required to support a complex and evolving industry, IBM is committed to supporting the nuclear industry in its realization of operational excellence and its drive toward smarter nuclear power.

### For more information

To learn more about IBM Maximo for Nuclear Power, contact your IBM representative or visit:

[ibm.com/tivoli/products/maximo-nuclear-power](https://ibm.com/tivoli/products/maximo-nuclear-power).

IBM encourages prospective clients to engage in trial programs, benchmark studies, and other hands-on projects that can help demonstrate the business value of the Maximo portfolio to the organization.

### About Tivoli software from IBM

IBM Tivoli® software from IBM helps organizations efficiently and effectively manage IT resources, tasks and processes to meet every-shifting business requirements and deliver flexible and responsive IT service management, while helping to reduce cost. The Tivoli portfolio spans software for security, compliance, storage, performance, availability, configuration, operations and IT lifecycle management, and is backed by world-class IBM services, support and research. For more information on Tivoli software from IBM, visit: [ibm.com/tivoli](https://ibm.com/tivoli)

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<sup>1</sup> Gilbert, Vince, “The Standard Nuclear Performance Model: Implications for Asset and Service Management Solutions,” Model Performance, LLC, 2007.



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