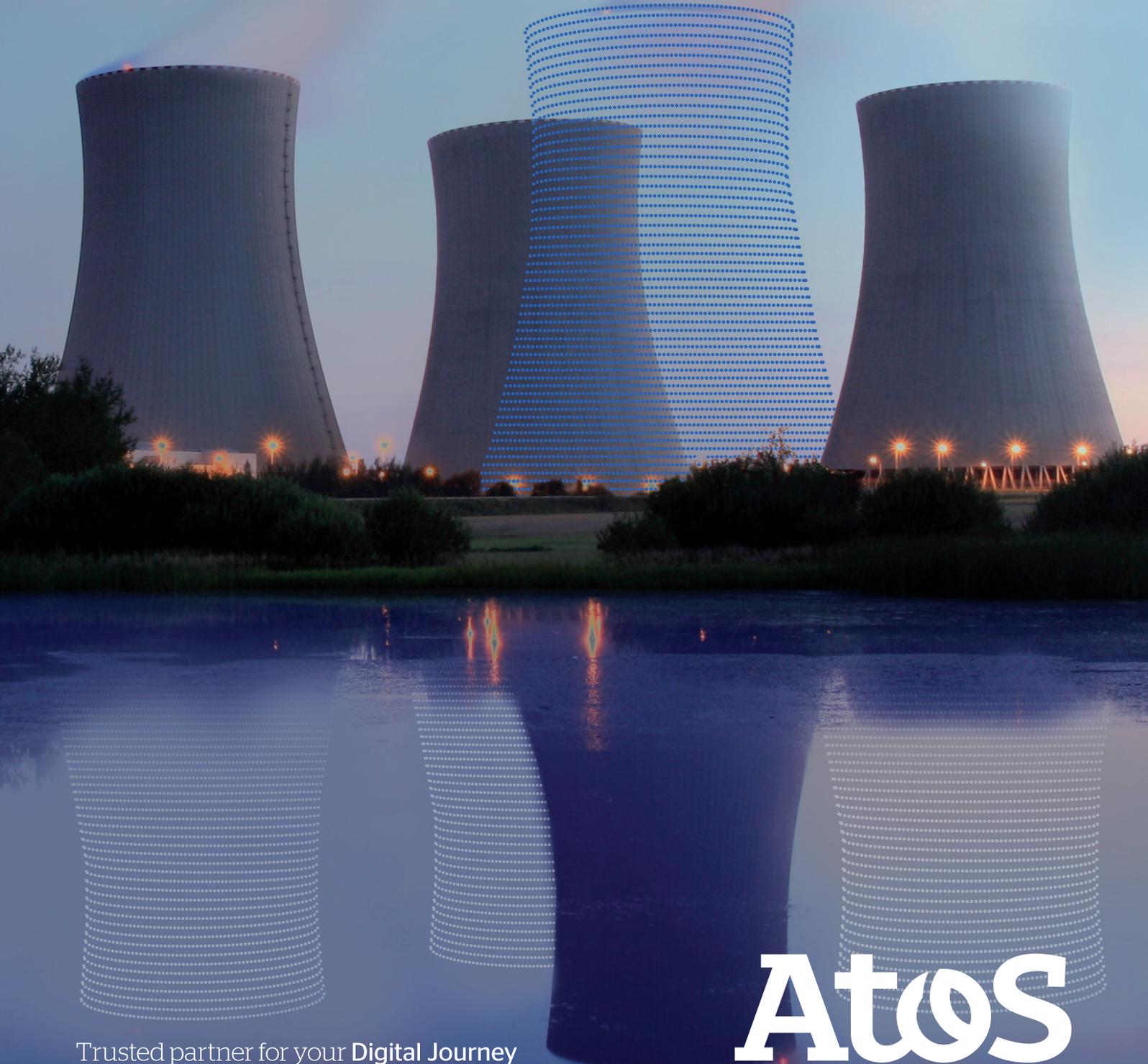


# New digital horizons in nuclear



# Atos

Trusted partner for your Digital Journey

Just as in every other industrial sector, nuclear operators are asking what **digital transformation** means for them. Unlike other sectors, however, nuclear operators have one unchanging priority against which every change must be measured: **safety**.

New digital practices can help meet operational and business challenges within the sector, but only if the stringent levels of safety and security which characterize the industry can be assured.

Atos not only believes that data-driven and digital practices can help the nuclear industry meet its particular challenges. More than that, we believe that only digital transformation can ensure that this most risk-aware of all sectors can continue to increase efficiency *and* meet safety obligations.

We examine digital transformation in nuclear from three specific perspectives: processes, people and assets.

With over 40 years' experience of operation and information technology in the sector, Atos is perfectly positioned to partner with operators as they explore and evaluate new digital horizons in nuclear.

# Digital transformation in nuclear

A lot has changed since nuclear reactors first connected to the grid in the 1950s. Over sixty years later, nuclear remains an essential part of our energy mix. So, what are the challenges today, and how can digital transformation help nuclear operators meet them?

Operators must extend the lifespan of existing plants, while containing the costs of this extension. In parallel, they seek the most effective path to new-build.

Achieving operational efficiency without compromising safety is also a constant theme: nuclear may be a special kind of business, but it's still a business and business rules apply.

Operators also face challenges in recruitment and skills retention, knowledge capture, and public image in the age of social media.

These topics are all interconnected. How, for example, can an industry that will only adopt absolutely proven and stable technologies attract a new generation of engineers who have grown up as digital natives?

## Data-driven and connected

As business technologists with over 40 years' active support for the nuclear industry, Atos sees the nuclear industry becoming increasingly data-driven and connected:



### Operations

From control room operation to plant-floor safety checks, process automation, digital twinning and access to realtime data become key to precision and efficiency.



### Automation and robotics

Cognitive computing, robotics, AI and machine learning can all now contribute to meeting complex engineering challenges, particularly in new-build initiatives where shared best-practice is the foundation of efficiency and safety.



### Digital workplace

Today's workforce expects access to information on the move. A generation that has grown up with mobile communications, gaming, virtual reality and remote support expect these practices to feature in their working lives.



### Security

Every nuclear operator must ensure round-the-clock protection from both physical and digital threats. Sophisticated radioprotection, biometric ID for plant staff and contractors, and rigorous cyber-security all have roles to play.



### Knowledge management

Whether in capturing the knowledge and experience of senior workforce members, ensuring data governance or delivering contextual information to engineers, digital transformation in knowledge capture and data analytics becomes a priority.



### Engineering

Plant Lifecycle Management (PLM) must support engineering teams in maximizing efficiency and boosting workforce collaboration. Engineering systems need to track asset histories from design through to decommissioning.



### Value-based maintenance

Artificial Intelligence and machine learning become prerequisites for the predictive analytics needed to safely maximize the effective life of plant and assets.



### Public acceptance

Every nuclear operator is sensitive to public perception. Activities such as social media analysis and news-tracking have to become part of their operational armory.



### High-performance computing

Data-driven nuclear power plants need unprecedented computing power, with new Quantum Learning Machines showing special promise in complex simulation. Hybrid cloud models now offer viable access to these resources.

# Industrializing digital transformation

Atos is well-positioned to help its nuclear industry clients establish an overarching picture of how digital transformation can contribute to safety and efficiency through every phase of the lifecycle - from design, engineering and construction through to operation and decommissioning.

## PLANT LIFECYCLE



Realtime critical systems

Instrumentation and control, simulation, radiation protection, condition-based monitoring

Operational Technology Systems

Manufacturing Execution Systems, Enterprise Asset Management, Predictive maintenance, smart mobility, Access control and security

Engineering Systems

Plant Lifecycle Management, Master Data Modeling, Artificial Intelligence, Knowledge Management, ECM, Simulation & High Performance Computing

Digital Transformation Factory

Business accelerators, Data analytics, Digital workplace, Orchestrated hybrid cloud, Cybersecurity

## FUEL LIFECYCLE



## Digital Transformation Factory

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At the heart of its strategy, Atos has established the Digital Transformation Factory. This initiative helps forward-thinking organizations navigate and manage the rapidly changing digital landscape.

By capitalizing on our technological strengths and people skills, the Digital Transformation Factory seeks to maximize the benefits of best practice. It has a strong focus on the specific requirements and challenges of the sectors we serve, but at the same time, seeks to help share ideas and learnings between sectors to everyone's benefit.

For our nuclear industry clients, the Digital Transformation Factory provides a structured and effective approach to the core transformation challenges in operational excellence, and trust and compliance, empowering them to adapt and thrive in the digital age.

The nuclear sector has a long tradition of open collaboration. Peer review and shared responsibility for effective adherence to standards are well-established practices.

The Digital Transformation Factory with its practical "use case" approach, actively promotes these principles in a spirit of shared benefit.

Nuclear engagements with the Digital Transformation Factory are consultancy-lead and will often start with analysis and review of the current maturity of digital practices. Compliance is also a key topic, and the Atos nuclear team will pay particular attention to questions of governance relating to the digital estate and its associated management practices.

The Digital Transformation Factory is based on four end-to-end and customer-driven services:

### **Atos Canopy Orchestrated Hybrid Cloud**

Creates the foundations for digital business, transforming applications and infrastructure

### **Atos Business Accelerators**

Enabling real-time organization, accelerating innovation and optimizing IT costs.

### **Atos Digital Workplace**

Enhancing communications, increasing collaboration and raising productivity.

### **Atos Codex**

Applying cognitive analytics to transform data into actionable insights and business outcomes.

These four offerings are enhanced by Atos' expertise and leadership in Cybersecurity.



# Sector focus

Atos is active in a broad spectrum of digital initiatives right across the nuclear power industry. Some focus on operational technologies, such as instrumentation and control systems. Others focus on classic information technologies, such as collaboration and documentation systems.

Whether we are dealing with well-established heritage systems or with projects driven by digital transformation, we constantly seek to boost efficiency and enhance safety for our nuclear clients.

Here is just a taster of some activities in which we have taken the lead in recent years. Our practical experience is encapsulated in a growing repository of use cases for the nuclear industry, putting our clients on the fast track to digital transformation.



## Operations and Maintenance

As nuclear operators extend the operational life of plants to fifty years and more, the need to manage all assets across the lifecycle is critical to safety, efficiency and cost-effectiveness. Atos provides comprehensive Asset Lifecycle Management solutions and services to the nuclear industry.

These, in turn, are closely linked to data analytics and cognitive computing capabilities which now drive all effective predictive maintenance programs.

Automation and computerized processes become the norm, as evidenced, for example, in the latest generation of Atos nuclear instrumentation and control systems. These exploit natural language processing, digital twins and advanced engineering simulation.



## Digital Workplace

A new generation of nuclear engineers expects a new kind of workplace. Paper work schedules and process lists which have been the norm until recently are being replaced in data-driven nuclear enterprises.

Working in close partnership with leading nuclear operators, Atos is already showing how augmented and virtual reality can contribute to more effective training or deliver much-needed contextual documentation during engineering and maintenance interventions.

While remaining acutely aware of the sensitivity of intrusive security and authentication, Atos is also helping trial biometrics with field workforces.

Improving access to knowledge and unified communication and collaboration plays an important role in the efficiency of the ecosystem.



## Critical LTE Communications

Nuclear power plants must be prepared for obsolescence in their communications systems and must phase migration to achieve compliance with the new LTE standard.

At the same time, operators seek to take advantage of numerous new technologies including smartphones, video and IoT.

As a modular, end-to-end solution ready for integration with both new and existing networks, Atos LTE responds to these demands. It allows both interconnection with traditional PMR solutions and facilitates migration to LTE. Atos LTE solution assures long-term viability, is readily scalable to native 5G environments and provides critical, secure and resilient communications.



## Safety and Security

More than any other industrial sector, nuclear makes safety and security their paramount concern.

Atos combines its deep knowledge of the nuclear sector with a strategic focus on physical and cyber-security.

The complexity of accidental and malicious threats to continuity and safe operations has increased dramatically in recent years. For nuclear operators, it is simply not an option to go into lock-down. You cannot disengage from the connected reality of the world in which we all live and work.

Atos offers a range of security capabilities tailored to the nuclear industry. Work with Atos to craft, implement and sustain an effective cybersecurity policy, and we will ensure you deal effectively, for example, with the challenges posed by adopting essential hybrid cloud architectures.

Atos is a global leader in digital transformation. We have 40 years' experience spanning the operation and information technologies on which our nuclear energy clients rely.

Whether we are dealing with well-established heritage systems or with projects driven by digital transformation, we constantly seek to boost efficiency and enhance safety for our nuclear clients.

Here is just a taster of some activities in which we have taken the lead in recent years. Our practical experience is encapsulated in a growing repository of use cases for the nuclear industry, putting our clients on the fast track to digital transformation.

We work with leaders in the delivery of nuclear energy across the globe including clients in China, France, the Nordics, Russia, South Africa, the UK and the USA.

Working in the tradition of shared best practice, Atos capitalizes on each engagement to extend its growing portfolio of nuclear use cases.

Current engagements include:

- Digital control rooms for eight new nuclear power units in China
- Refurbishment of main control room monitoring systems at 20 nuclear units in France
- Replacement of critical nuclear data processing and control systems in the UK
- Asset management systems used by 32,000 nuclear professionals in France
- 20 full-scope training simulators for nuclear teams in France and China
- Condition-based monitoring and proactive asset management solutions
- Radiation monitoring and compliance systems in 30 French nuclear installations

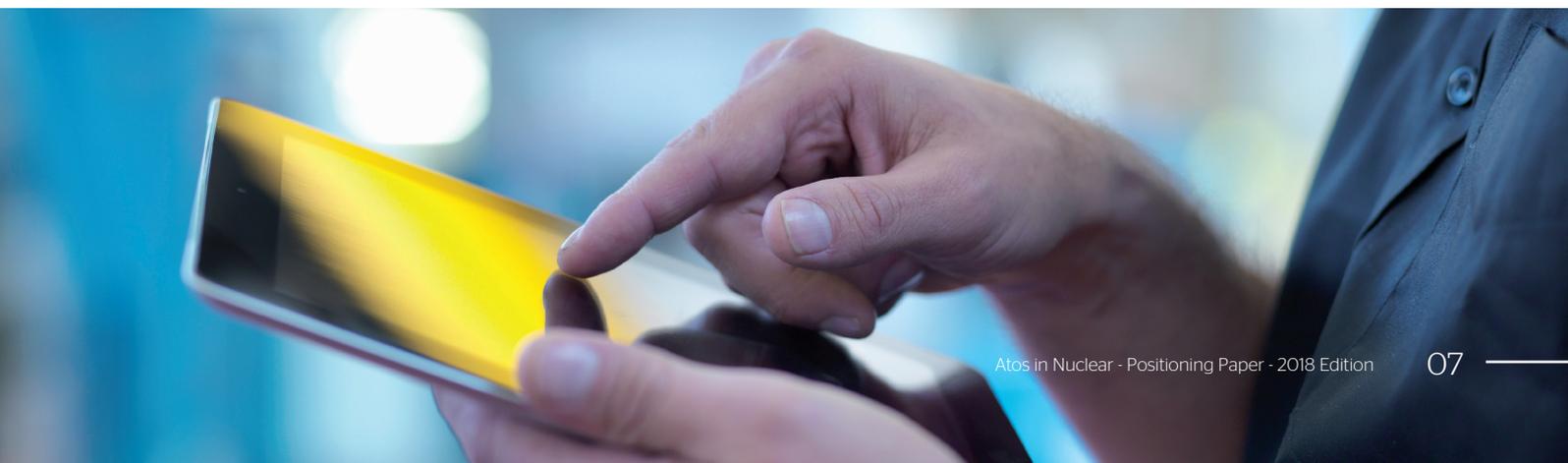
## Next steps

We are always ready to talk about specific projects and objectives. These may be focused on either operational or information technologies, maximizing the value of heritage systems or adopting new approaches.

But perhaps the best place to start is with the big picture - with sharing and envisioning overall digital strategy. Together, we will explore the new digital horizons in nuclear, examining the opportunities to transform process, to help your people reach the highest levels of productivity, and to protect your assets from acquisition to end-of-life.

Let's bring our experts together and explore the wider implications of digital transformation in the nuclear power industry. Our network of Business Technology Innovation Centers or our Atos Worldgrid Nuclear Power Center of Excellence make ideal locations in which to share ideas and experience.

**Atos - the trusted partner in your digital journey.**



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# About Atos

Atos is a global leader in digital transformation with approximately 100,000 employees in 73 countries and annual revenue of around € 12 billion. The European number one in Big Data, Cybersecurity, High Performance Computing and Digital Workplace. The Group provides Cloud services, Infrastructure & Data Management, Business & Platform solutions, as well as transactional services through Worldline, the European leader in the payment industry.

With its cutting-edge technologies, digital expertise and industry knowledge, Atos supports the digital transformation of its clients across various business sectors: Defense, Financial Services, Health, Manufacturing, Media, Energy & Utilities, Public sector, Retail, Telecommunications and Transportation. The Group is the Worldwide Information Technology Partner for the Olympic & Paralympic Games and operates under the brands Atos, Atos Consulting, Atos Worldgrid, Bull, Canopy, Unify and Worldline. Atos SE (Societas Europaea) is listed on the CAC40 Paris stock index.

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