



A Yokogawa Company

DIGITALIZATION: NOW IS THE TIME

Practical Digitalization Solutions for the Energy and Chemical Industry

EXCELLENCE: THE GOAL OF DIGITALIZATION

At KBC we believe in a world where plants operate with:

- No safety incidents
- No unplanned outages
- Rigorous adherence to operating plans
- Nimble response to market changes and plant disturbances
- A motivated and informed workforce
- A culture of profitability

We call this 'Excellence'.

Digitalization is one of the key strategies a plant can adopt in pursuit of operational excellence. KBC defines Digitalization as:

“**The scalable application of the digital technologies, and alignment of the organizational capabilities that we believe an energy or chemical process operation should have and master, with digital information at the core in order to achieve excellence.**”

Applied appropriately, Digitalization allows the facility to manage day-to-day performance safely and reliably, respond to swings in market dynamics, operate at a true optimum, squeeze down on the gap between potential and realized margin, create more utility for the end customer/consumer, and outmaneuver the competition.

It also enables a process operation to extend its problem-solving ecosphere beyond the plant: to engage the support, brainpower and technologies of its key partners, customers and suppliers who can each bring their own specific expertise and experience to augment the plant's own capabilities and resources.

It can turn a distracted organization that is bogged down reacting to day-to-day issues and inundated with data, information and advice, into an agile, well-tuned machine that anticipates issues and organizes to prioritize and solve them before they escalate.



THE DIGITALLY WISE ORGANIZATION

KBC addresses in practical terms, and good for implementation today, how Digitalization technologies and best practices can help organizations:

- Capture value through unexploited efficiency or productivity gains
- Discover and generate new revenue
- Execute and sustain that value in the face of continuous change and disruption
- Solve problems that are not viewed as solvable today
- Improve competitiveness

A Digitalized plant will make the most of its capabilities (physical assets, supply chain, human resources) to operate optimally in the face of changing economics, feedstock/fuel availability and operational constraints. A static, out-of-date plan does not drive the digitally wise plant - the market frequently adjusts the plan and the plant continuously responds in the most profitable way.

The tools provided by Digitalization are holistic and scalable in nature - they consider the impact of a change in one area on the end-to-end plant economics; they are smart enough to identify problems and recommend solutions, not to just present information without context; they are easy to use; they automate as much as possible; their reach extends via the Cloud beyond the corporate boundary. On a Digitalized plant, the human is an implementor and supervisor of strategy, rather than a number-cruncher and tactician; operating costs are minimized; production is optimized; assets are flexible and fully utilized; the plant is safe, and the environment is respected.

We call this being 'Digitally Wise'.

DIGITALIZATION THE KBC WAY

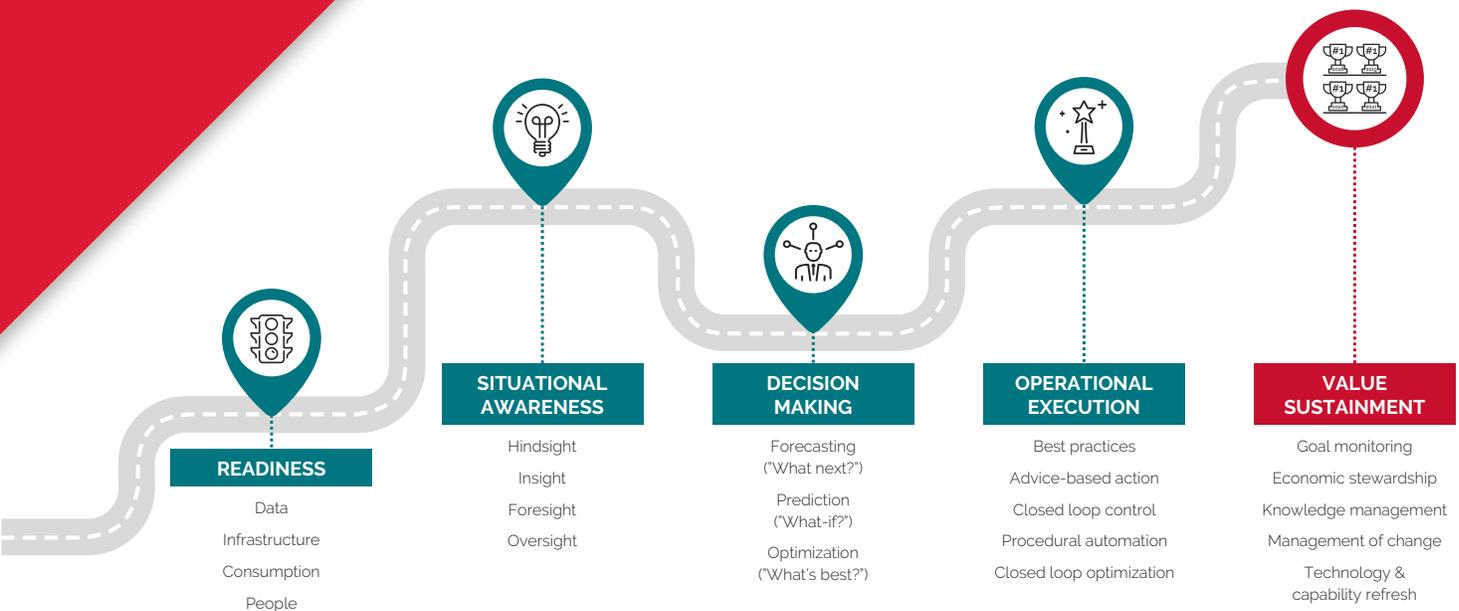
A digitally wise plant makes Digitalization investments embracing the following philosophy:

- Outcome-orientation
- Holistic in scope
- Fusion of technology and expertise
- Clear and deliberate transformation actions
- Knowing what excellence looks like in the Energy and Chemical industry
- Responsive and adaptive; Leading edge, not bleeding edge
- Collaborative and smart

- Leveraging the 'digital twin'
- Exploiting convergence of systems, technologies and organizational boundaries
- Managing plant data as a corporate asset: Garbage in, garbage out
- Automating wherever practical
- Recognizing that transparency drives safety (so minimizing the number of "black boxes" where decision rationale is unclear)

All companies are at a different stage of their Digitalization journey, so KBC has designed a 5-stage Digitalization Roadmap that we believe all Digitalization initiatives should follow.

Figure 1: KBC's Digitalization Roadmap to Success



When applied to a given operating challenge, the KBC Digitalization Roadmap reminds us what to consider in order to recommend, design and build the applications and capabilities needed to achieve and sustain excellence. It also overcomes the barriers to success.

Applicable along this journey, KBC offers the following suite of Digitalization technology and services:

DIGITALIZATION TECHNOLOGY

Analytics

- First principles simulation
 - Petro-SIM family
 - VM-EMS family
- Correlation-based modeling
 - Process data analytics

Manufacturing execution

- Planning
 - PETRO
- Scheduling
 - VM-SCS
- Production and yield accounting
 - VM-PAS
- Operations management
 - OGM
 - OM

Automation

- Procedural automation
 - Exapilot
- Advanced process control
 - PACE
- Real-time optimization
 - Petro-SIM
 - VM-ERTO
 - VM-EMPO
 - PACE
- Personnel learning & development
- Operator training simulators
 - OmegaLand
 - TechComm

DIGITALIZATION SERVICES

OpX consulting

- OpX Asset
- OpX People
- OpX Digital
- OpX Value Chain

IT & modeling services

- Process and data modeling
- Application software design and development
- Application implementation
- Software support and maintenance

Cloud services

- Co-Pilot Program
- Data-as-a-Service
- Software-as-a-Service



NOW IS THE TIME

Digitalization accelerates information flow, increases the power of analytics and automates much of the execution, which greatly condenses the decision/execution time horizons, allowing strategic business decisions to be made in real-time, and the results to be visible and available almost immediately. We can imagine the gap between future and past disappearing entirely.

The transition to Digitalization is not just optional, it is mandatory. Instead of viewing Digitalization as a change from a current steady state to a new slightly different steady state with a few more tools and a few less people, whether we like it or not, new technologies, new business models and pervasive connectivity mean that nothing remains static anymore.

The end result for the digitally wise is worth the effort: operations with a massively-reduced number of unexpected events; excellent levels of reliability, safety performance and environmental compliance; assets running with extraordinary efficiency in terms of energy and process yield, as all possible improvement mechanisms will be constantly exploited. The entire operation will be enabled to act with agility and flexibility to respond to external threats and opportunities, making and then implementing increasingly rapid changes to maximize value. This will all be achieved with a smaller but more empowered workforce.

The digitally wise will consume the laggards in the market.

4 DIGITALIZATION PROJECTS TO START TODAY



READINESS

Commission an As-Is Value Audit and Readiness Assessment

The value-add of Digitalization is less about digital technology itself and more about the environment that the technology is being installed into. Often, it is necessary to upgrade technology or fill gaps, but for the most part it involves refreshing existing applications to address challenges and opportunities that didn't exist at the time of the original installation. To be ready for change, the impediments to success and sustainability must be addressed: Data Readiness; Infrastructure Readiness; Consumption Readiness; People Readiness. The digitally wise approach is to audit existing applications, build an application register and understand how effective they are in relation to current goals. The findings help you decide whether to 'sweat' existing technology or invest in new, and how to ready the organization for change.



SITUATIONAL AWARENESS

Establish KPIs and Implement Fleet-wide KPI Monitoring and Assurance

All operations have goals and targets to achieve, constraints and limits to respect, and tasks to be done. Some are explicit and some are implicit; some are simple to measure and some are derived from complex chemistry, physics and math; some are static and some are dynamic; some are constant and some are conditional. A well-managed operation will know what these are, will document why they are needed and the consequences of non-conformance, and will have personnel accountable for compliance. A fleet-wide system for tracking and reporting performance, as well as assuring compliance is a necessary first step to operational improvement.



DECISION MAKING

Build a Digital Twin of Your Plant

Most well-run plants will have a simulation model of the plant – maybe it was created during the plant’s design stage, or maybe it has been created since. To make it practical to use the model for continuous performance monitoring, adjustment and optimization, the model needs to be set up as a digital twin. A digital twin is constantly synchronized with the plant via always up-to-date asset models for context, so that engineers can ask the model without delay how to improve from the current situation and the value of doing so. Input data needs to be right in context, so it can be relied on to make sound decisions via a model that is consistently a valid representation of the actual plant.



OPERATIONAL EXECUTION

Manage and Optimize Energy Use

Energy costs are a very large and necessary part of a plant’s operating budget. Trade-offs between the electrical and steam system have become especially significant since the advent of electrical deregulation in some markets. The operational complexity is compounded with the introduction of emissions constraints due to ever-tightening environmental regulations. This presents a challenging scenario for management of steam, electrical, water, hydrogen, fuel, and other utilities. Significant cost savings can be achieved by using an optimization program that is able to leverage the holistic flexibility inherent in the site’s energy systems in order to recommend lowest cost utility operation.



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