

## Essential Elements of Digital Transformation

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### Keywords

Digital Transformation, Industrie 4.0, Industrial IoT (IIoT), Maturity Model, Organizational Readiness

### Overview

Industrial organizations around the world are entering a period in which new digital technologies augment people and processes to an unprecedented degree. New, commoditized computing resources in the cloud (and at the edge) and artificial intelligence (AI) are changing how people work. Approaches such as the Industrial Internet of Things (IIoT) and Industrie 4.0 have helped pave the way for digital transformation across a broad swath of industrial sectors.

Most industrial process companies globally will undergo a digital transformation to some degree or other in the coming years. However, many companies today tend to focus efforts on technology, without considering the full organizational impact. ARC has developed a maturity model that can help answer some key questions relative to digital transformation.

Digital transformation spans industrial products, operations, value chains, and aftermarket services. It augments people and knowledge through expanded use of sensors, data, and analytics. ARC Advisory Group believes that most industrial process companies globally will undergo a digital transformation to some degree or other, with many already actively piloting advanced technologies.

However, many companies today tend to focus their efforts on technology, without considering the full organizational impact. ARC research shows that only a small percentage (5 to 8 percent) of industrial organizations consider themselves ready for a digital transformation program. Many others are not prepared to scale up the pilot programs currently in progress.

ARC research also indicates that barriers to organizational accountability, culture and employee change management impede transformation. Digital transformation requires a shift in approaches to deploying and utilizing technology. To help identify these gaps, ARC has developed a maturity model



for digital transformation based on multiple consulting engagements with end user clients. Companies can use the model to help answer the following questions:

- What is the role of the emerging digital organization?
- How can my company begin to transform?
- How can we leverage existing data without compromising security?
- How can we best prepare employees for digitization?
- How can we accelerate knowledge and competency?
- How can my organization scale up delivery?
- What are the metrics for success?

### Key Technologies Impacting Industrial Manufacturing

Several emerging technologies have major impact on the process industries, each in a unique way. ARC's maturity model for digital transformation connects these with people, culture, technology processes, and business processes. Industrial organizations have found this helpful to determine their respective organizational readiness for transformation.



### Digital Transformation Technologies

Many of the newer technologies require changing the way technology leaders think about people, technology architecture, and process. Many of today's plant-centric approaches will not support new technologies and approaches. Historically, plant-level operational technology (OT) systems have been procured and supported by plant engineering or operations staffs. But new information technology (IT)-based systems require internal IT staff or cloud service providers to manage and host the platform infrastructure, with engineering and/operations helping define the operational and supply chain outcomes.

## Essential Elements of Digital Transformation

To determine readiness for digital transformation, ARC has assembled maturity models that cross the boundaries of technology, business process and most important, people. We use these to help our clients evaluate current business processes and human capital, benchmark against industry peers, and perform a gap analysis. The maturity elements considered include:

- Teamwork and culture
- Knowledge transfer
- Capability and competency
- Decision making
- Workforce performance
- Employee change leadership
- Business process governance
- Process improvement and agility
- Measures and KPIs
- Technology architecture and governance
- Transformative potential and risk tolerance
- Data management

Clearly, the digital transformation of industry has the potential to contribute significantly to global economic growth. The World Economic Forum estimates that Industrie 4.0 alone could contribute more than \$20 trillion to global gross domestic product (GDP) by 2020.

However, this will require a well-focused effort that includes preparing the workforce, implementing the appropriate IT infrastructure, and adjusting business processes. ARC research indicates that many management systems currently in place create barriers to digital progress. Often, hierarchical management structure, weak employee change management leadership, and organizational silos create artificial barriers to information, impeding decision making, and - ultimately - hampering business performance. ARC's "elements of digital transformation" will help companies assess their respective readiness to transform. This consists of two main categories of organizational maturity: *people readiness* and *business process readiness*. Each element has its own implications for digital transformation.

Element	Digital Implication
Culture	Digital culture is based on a foundation of sharing. AI will be an enabler for process excellence. AI requires Big Data from many sources. Insights and knowledge are shared within an open governance framework, empowering people to make a difference.
Knowledge	Semantic search technologies have transformed knowledge on the web, with company tacit knowledge and know-how digitized, personalized, and transferable to employees as needed. AI-based knowledge systems drive new capability.
Capability and Competency	The entire organization uses a continuous improvement framework of individuals, workgroups and competency processes. Well-understood talent allows project teams to leverage their greatest assets.
Decision Making	Manual and labor-intensive activities detract from the company mission. Pervasive automation, Big Data, AI, and closed-loop systems allow people to focus on abstract and complex decisions.
Workforce Performance	Positive individualized performance assessment influence organizational change and drive continual process improvement and innovation.
Employee Change Leadership	A digital culture requires change leadership competency at all levels of the organization. Transformed processes require vision, skills, and enthusiasm at all levels.
Business Process Governance	A digital organization can quickly adapt processes to take advantage of emerging technologies. Business processes, governance, and mapping to workflow and activity levels must be understood.
Process Improvement & Agility	Employees are to be trained on a formal corporate wide continuous improvement program incorporating Lean Manufacturing, leveraging the emerging technologies. An agile, Cloud-first deployment is standard. Industry best practices are followed for all applications.
Measures/KPIs	Business improvement requires the ability to interpret, measure, and prioritize business process and performance. A digital organization uses collaborative metrics aggregated and mapped internally and/or externally as needed to drive change.
Technology Architecture & Governance	Shared IT and OT governance of converged technical architecture based on governance models. Investment planning and continuous improvement are coordinated and collaborative as a unified, high-performance organization.
Transformative Potential & Risk Tolerance	There is a shared business and technology (IT-OT) process to perform a cross-functional assessment of risk versus benefit to the company as a result of introducing new technologies, work processes, people, and skills. Programs exist to deploy leading-edge technology as a competitive advantage and evaluated for its transformative potential on corporate level contribution to the financial success of the overall company.
Data Management	Data at all levels of the organization is treated as a strategic asset. All staff are empowered and equipped to take stewardship of the information and seen as knowledge workers.

### Digital Transformation Elements and Organizational Implications

## Recommendations

ARC believes that, if not addressed appropriately, current organizational factors and the lack of key internal processes will hamper the ability of many industrial organizations to succeed in digital transformation, thus retarding agility and business performance and leaving them at a competitive disadvantage.

Many industrial organizations already acknowledge the need to better position the company to implement new digital and internet-enabled technologies without compromising cybersecurity. But as the OT and IT worlds continue to converge, a different technical organization may be required. The company's technology leadership teams must evaluate how to make better use of the existing infrastructure and data, create more value from existing applications, avoid duplication of effort, and make best use of OT and IT resources at the plant and enterprise levels.

As we move to a digital economy, many industries are gradually shifting many IT services to cloud-based service providers like Amazon and Microsoft. Addressing this shift to the cloud will be a critical step for successful digital transformation by transferring some technology accountability to the business stakeholders.

Based on ARC research and analysis, we recommend the following actions for industrial organizations:

- Assess your organizational readiness using the elements of digital transformation discussed in this report, paying particular attention to the cross-organizational process boundaries. Engage with an independent consultant to assist, if needed.
- Examine the processes used by IT and OT groups and look for potential gaps that could slow progress.
- Do not underestimate the degree of work process change and develop methods for addressing this.
- Help your workforce become comfortable with the inevitable change and disruption by investing in people and change leadership.

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