Scalable. Systematic. Sustainable.

Making next-generation manufacturing a reality with Accenture and SAP

Accenture Industry X
It’s one thing to start digitization of the factory. It’s another thing to scale it in a systematic and sustainable way—particularly in an environment where market dynamics are changing fast and there’s a need to economically manufacture lot sizes of one. Yet this is what it takes to make next-generation manufacturing a reality, satisfying customer needs and improving competitiveness.
While manufacturing has been under pressure to transform for more than a decade, there is greater urgency to do so today. Technology is evolving fast, and markets never stand still, disruption is all around, and technology is evolving fast. Most manufacturers often take a technology-first approach to digitization. They sometimes develop point solutions without a scaling plan or end-to-end support and insufficient budgets. These solutions often stay nice showcases that are easily forgotten.

Manufacturers that continue with this patchwork approach to digitizing manufacturing will fall behind. With growing demand for customized products, manufacturers—particularly across industrial equipment, consumer goods, components as well as OEMs—must streamline their value chain to speed time to market. They need smart factories that use a constant data stream from connected operations to respond to demand fluctuations and produce lot sizes of one. They need a well-integrated factory set-up driven by an integrated technology architecture that predicts and responds to future events. This is the essence of next-generation manufacturing.

Adopting next-generation manufacturing can be overwhelming. That’s why Accenture and SAP are joining forces. With pre-built accelerators and strong assets and tools, we can help manufacturers drive a systematic digital transformation that is centered on people—and sustainable over time.

Let’s look at our shared insight into must-have characteristics for every manufacturer. We’ll also provide guidance on small, systematic steps that companies can take to enable next-generation manufacturing.

Next-generation manufacturing demands a shift from linear processes to a flexible, automated and scalable unit that adapts fast to market change.
Where success begins—three characteristics of next-generation manufacturing

1. A strong focus on people

Manufacturers are often so focused on the technology aspect of digitization that they overlook people—what they need and how they can best use the technology to deliver outcomes. Only digital transformation that combines technology with and for people can realize its full potential.

Think first about the people involved in the core manufacturing process. With smarter connected processes on the factory floor, individual end users can use data to provide actionable insights. SAP makes this possible with its Intelligent Enterprise Platform that “experientializes” data from any business function.

Manufacturers must also factor in the experiences of the people who are responsible for executing the digital transformation. This is what Accenture and SAP’s “Manufacturing Reference Architecture” provides: a view of what a future digital enterprise would look like, both from a business and technology perspective.

Finally, manufacturers cannot lose sight of the people who will eventually consume the products they create. They have to align processes and production facilities to meet consumer demands at speed and scale. With this in mind, the Manufacturing Reference Architecture is specifically designed to transform businesses in the configure-to-order archetype to adapt quicker to market demands.
2. **Flexibility, flexibility, flexibility**

Flexibility is paramount as the conventional model of limited variants and mass-producing factories gives way to multiple variants that can be super-customized to meet individual needs. Yet most factories are not very flexible—and neither are the legacy technologies that power them.

The unpredictability of the market also makes flexibility key. Every customer wants “the latest and greatest” right now. This leaves manufacturers having to flex fast to deliver. Consider the industrial manufacturers that now build machines with open communication protocols for seamless integration. Another case in point: White goods manufacturers that must enable their equipment to talk to virtual assistants.

There’s also the need for flexible production facilities and enabling technologies. Manufacturers cannot price competitively without them. This is why a technology landscape that scales horizontally and vertically, a lean architecture, and advanced intuitive technology are not just nice-to-haves, they are must-haves.

It’s also important to remember the need for flexibility around business models. An outcome-based business model implies not only the ability to control equipment performance, but also the adaptation of accounting systems and company workforce.

3. **Automation of the full enterprise**

Factory automation decisions often occur at the plant level. But as digital enterprises move toward a vertically-integrated and transparent system, automation requirements must happen at the enterprise level. And the ability to automate and speed-up processes depends heavily on the underlying technology.

This is a weak link for many manufacturers. Technology obsolescence in the form of old machines, legacy software and over-customization of ERP systems is a common challenge. What’s needed are applications with open application programming interfaces (APIs) that can be integrated easily for scalability now and in the future.

As manufacturers invest to address these weak links, there are some fundamentals to follow to support automation of their production and business lines. When selecting the right technology solution, they must consider the out-of-the-box functionalities offered by platform, openness to integrate, licensing structure and development skills required to work on and maintain the technology.

As part of this process, manufacturers should also take the time to identify a starting point and build a scalable roadmap. Most manufacturers, in the hurry to stay relevant, start with the quickest plug-and-play solution available in the market without assessing its impact on the overall business and the technology landscape. A step-by-step scaling plan helps to sustain the transformation.
Small steps, big results — the digital manufacturing journey

With years of experience successfully delivering digital manufacturing and enterprise transformation initiatives, Accenture and SAP have created a structured, step-by-step approach to digital adoption. Our Manufacturing Reference Architecture is at the heart of this approach.

The Manufacturing Reference Architecture provides a vendor-agnostic view to help manufacturers understand the end-to-end capabilities they need to support digital transformation. It answers the frequently asked question: What does the digital enterprise look like?

Key features
• Includes common use cases that manufacturers adopt in digital transformation projects and provides a deep dive into them
• Goes beyond the typical process-driven view to reflect real requirements in a configure-to-order scenario
• Covers vital value chain functions across horizontal and vertical processes in engineering, manufacturing and production
• Maps SAP® technology to the technology-agnostic framework to identify the strength of the end-to-end SAP landscape in enabling business operations
Partners in innovation

Our Manufacturing Reference Architecture is unique in the market and only made possible by our strong solution development and delivery partnership.

Accenture combines people, technology and industry excellence to take enterprise transformation to the next level. In doing so, we create powerful change, and accelerate the path to value for our clients.

SAP’s core technology is increasingly modular, cloud-based and user-centric—and with SAP’s team of architects, it can be customized to client requirements.
The business capability and process view of the Manufacturing Reference Architecture provides a complete view of all required business capabilities.

### CROSS-FUNCTIONAL

<table>
<thead>
<tr>
<th>Project management</th>
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<tbody>
<tr>
<td>New product launch management</td>
</tr>
<tr>
<td>Workflow management for improvement projects</td>
</tr>
<tr>
<td>Approvals and test documentation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digital twin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product PLM Data</td>
</tr>
<tr>
<td>Sales configurator</td>
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<tr>
<td>EBOM and MBOM data</td>
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<tr>
<td>Asset after sales usage feedback</td>
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<td>Product as built data</td>
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<td>Service interface</td>
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<th>Product serialization</th>
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<tbody>
<tr>
<td>Creation of unique serial numbers</td>
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<td>Linking of serial numbers to products</td>
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<td>Integration to printing systems</td>
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### ENGINEERING

#### Ideation
- Idea capture
- Idea evaluation
- Idea selection

#### Requirement management
- Development
- Validation
- Engineering collaboration
- Ramp up

#### Configuration management
- Product configuration
- EBOM configuration
- Cost estimation

### MANUFACTURING

#### Portfolio Management
- Portfolio management
- Component cost management

#### Process Establishment
- Model and simulate
- MBOM creation
- Line balancing
- Process routing
- Production testing
- Approvals management

#### Process Improvement
- Runtime process data analysis
- Improvement suggestions
- Test and measurement data analysis
- Production data analysis

### PRODUCTION

#### Production control
- Production execution
- Order monitoring
- Performance monitoring
- Shopfloor logistics

#### Quality management and improvement
- Quality monitoring
- Inspection planning and execution
- Equipment calibration
- Root cause analysis

#### Maintenance
- Maintenance planning
- Ticket management
- Spares management
- Maintenance prediction

#### Operator qualification management
- Work instructions based on orders
- Work instructions with qualification details
- Operator qualification data
- Operator identification at work station
- Health and safety management
- Worker safety
- Incident management

#### Dynamic order scheduling
- Detailed order scheduling
- Re-scheduling
- Dynamic order release
- Tool status monitoring
- Tool inspection planning
- Tool ordering
- Tool inspection and calibration

#### Tool management
- Tool design documents
The technology framework of the Manufacturing Reference Architecture defines the technical capabilities that are required to support the business functions.

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<thead>
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<th>Enterprise intelligence</th>
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<td>Big data analytics</td>
<td>ERP</td>
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<td>MES</td>
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**Data management**
- Data hub
- Streaming
- Batch
- ETL
- Event orchestration
- Pre-processing

**Device management**
- Subscription
- Monitoring
- Version control

**IT/OT connectivity layer**
- IoT Edge gateway
- I/O adapters
- PLC controllers

**Shop floor control**
- Sensors & hardware
- OPC server
- DCS/PAS
- Embedded software

**Data management**
- ETL
- I/O adapters
- PLC controllers

**Data lake**
- Hot/Warm DB
- Cold DB
- Events
- Structured data
- Unstructured data
- Meta data

**Data engineering**
- Data models
- Data tables

**IT Integration**
- API
- Events
- EDI
- Notification hub
- ESB
A German automotive supplier wanted to seamlessly connect the shop floor with the enterprise with “one version of the truth” made possible by globally aligned processes and IT systems. IT and process experts from Accenture worked with the client to develop an architecture blueprint, identify a software vendor and create workstreams based on the architectural layers. By implementing the SAP technology stack across three factories, the company was able to connect multiple production lines and build a whole new level of transparency to monitor operations in near real time.

**KEY WORKSTREAMS**

- **Manufacturing execution.** Create edge, execution & machine integration layer to enable seamless data flow from production assets to management and data analysts.

- **Reporting.** Enable performance improvement through close to real-time decision-making capability on SAP Analytics Cloud.

- **Advanced analytics.** Design and implement advanced analytics capabilities using Apache Hadoop tools on SAP Big Data Services, to simplify querying for data scientists.

**KEY VALUE**

- **Creation of single source of truth** via a harmonized data lake across multiple production areas.

- **Design standardization of MES layer** for further scaling and upgrades.

- **Creation of a structure** that builds on existing querying practices. The final structure design is optimized for queries and is easily scalable, which streamlines analysis of process parameters.

- **Focus on storage optimization** to reduce storage costs and maximize performance. The approach includes classification of data points between hot and cold storage.
A proven adoption strategy

When it comes to an adoption strategy for digital transformation, manufacturers don’t have to get stuck in “pilot purgatory.” Drawing on our Manufacturing Reference Architecture and combined experience, we have developed a step-wise adoption strategy.

Manufacturers choose the place to start based on their current state. Each step gradually increases the transformation team’s level of engagement and technology adoption into the enterprise. The key is to use each stage as a stepping stone to the next.
We recommend an agile approach to drive fast improvements

Start. The digital transformation starts by building an understanding of the digital ecosystem and aligning around the vocabulary used to define the latest digital concepts, such as digital twin. This creates a common foundation and high-level view of manufacturer’s digital maturity.

Ideate. This phase helps identify areas of digital adoption using design thinking approaches. It is also a time to prioritize the adoption roadmap in line with the work that manufacturers have already done to improve the digital maturity of some of their function areas.

Define. Now the manufacturer can create the organizational strategy to support digital adoption. Working from the digital potential identified in the previous phase, the focus is on building a list of business cases, and in turn, assessing the impact on the technology.

Assess and build. Having defined the reference architecture, now the focus is to identify a scope for implementing a proof-of-concept or a pilot. It includes finalizing the technology partner and creating the target architecture. After development and testing of the first proof-of-concept, the team defines standards of adoption, which creates a starting point for further scaling.

Scale and roll out. Business leads from multiple geographies as well as a dedicated cross-functional dedicated scale-out team join with the consulting and technology partners to develop a long-term roll-out plan. Templates are built for different configuration scenarios based on the business types and manufacturing requirements. Along with a technology adoption, an organization-wide change management program is key so the transformation is successful over time.
The manufacturing environment is not what it used to be. Today’s manufacturers need a scalable, systematic and sustainable way to bring their factories into the digital age. Accenture and SAP combine industry insight and powerful technologies to help them do this—so they can become truly modern manufacturers that move at market pace, or faster.
ABOUT ACCENTURE

Accenture is a global professional services company with leading capabilities in digital, cloud and security. Combining unmatched experience and specialized skills across more than 40 industries, we offer Strategy and Consulting, Interactive, Technology and Operations services—all powered by the world’s largest network of Advanced Technology and Intelligent Operations centers. Our 506,000 people deliver on the promise of technology and human ingenuity every day, serving clients in more than 120 countries. We embrace the power of change to create value and shared success for our clients, people, shareholders, partners and communities. Visit us at www.accenture.com.

ABOUT SAP

SAP is the market leader in enterprise application software, helping companies of all sizes and in all industries run at their best: 77% of the world’s transaction revenue touches an SAP® system. Our machine learning, Internet of Things (IoT), and advanced analytics technologies help turn customers’ businesses into intelligent enterprises. SAP helps give people and organizations deep business insight and fosters collaboration that helps them stay ahead of their competition. We simplify technology for companies so they can consume our software the way they want – without disruption. Our end-to-end suite of applications and services enable more than 437,000 business and public customers to operate profitably, adapt continuously, and make a difference. With a global network of customers, partners, employees, and thought leaders, SAP helps the world run better and improve people’s lives. For more information, visit www.sap.com

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ACKNOWLEDGMENTS

We would like to thank Kerstin Tinter and Tobias Schneider-Pungs from SAP and Ishita Biswas and David Briand from Accenture for their contributions to this publication.

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