Data-Driven Manufacturing

Navigating new market realities with data

CGI

Entering a new era

Manufacturing is going through a sea change. In this new world, companies face new and increasingly challenging market realities.

Processes are becoming increasingly automated, underpinned by intelligent analytics. Hyper-personalization is driving production lines, and cognitive computing is accelerating innovation. Manufacturers are working in hyperconnected ecosystems focused on using data and analytics to proactively meet customer needs and offer innovative services and sustainable products in a circular economy.

At the same time, pressures from a global energy crisis, talent shortages and supply chain disruptions are pushing manufacturers to evolve even faster. Improving operational performance, including first-time-right production to reduce waste or rework, and lowering energy consumption are top priorities.

Equally important and driven by stakeholder demands, manufacturers want to become responsible leaders of the future who embrace sustainability by meeting environmental, social and governance (ESG) targets.

Human Awareness

Industry 5.0

Technology

Sustainability
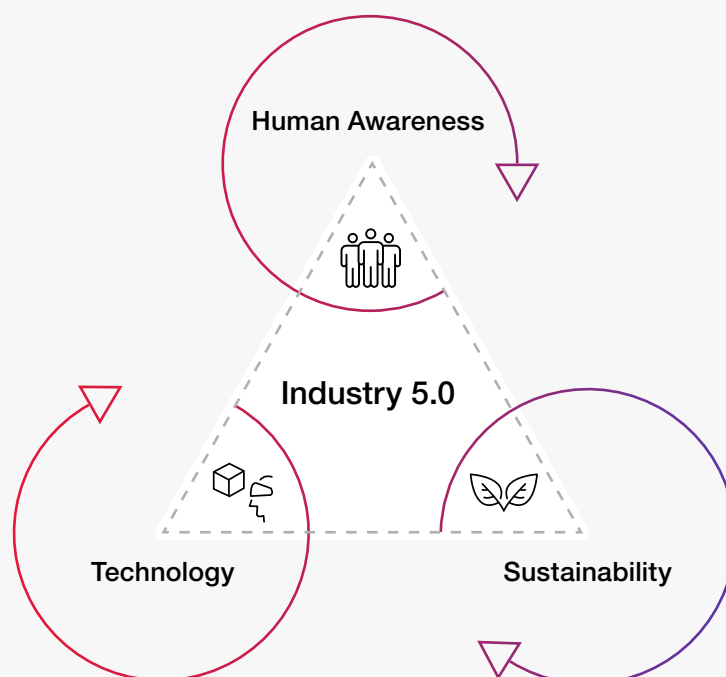
Gaining strategic and operational insights to navigate the future

Manufacturers want to transform the way they operate to sustain growth, reduce costs, improve product quality and achieve operational excellence—all in a manner that supports their sustainability goals and transition to net zero.

Achieving these goals requires answering several critical strategic and operational questions:

- How can I sense and shape demand to satisfy it?

- How can I increase operational visibility and then optimize my facilities and transportation lines?

- How can I gain visibility into my carbon footprint and decarbonize my products and operations?

- How do I automate to make the best use of the limited resources (people and transport) I have?

- How can I use data to identify value-creating innovations?

The challenge for manufacturers is to leverage data across their value chains to answer these questions and guide decision-making.
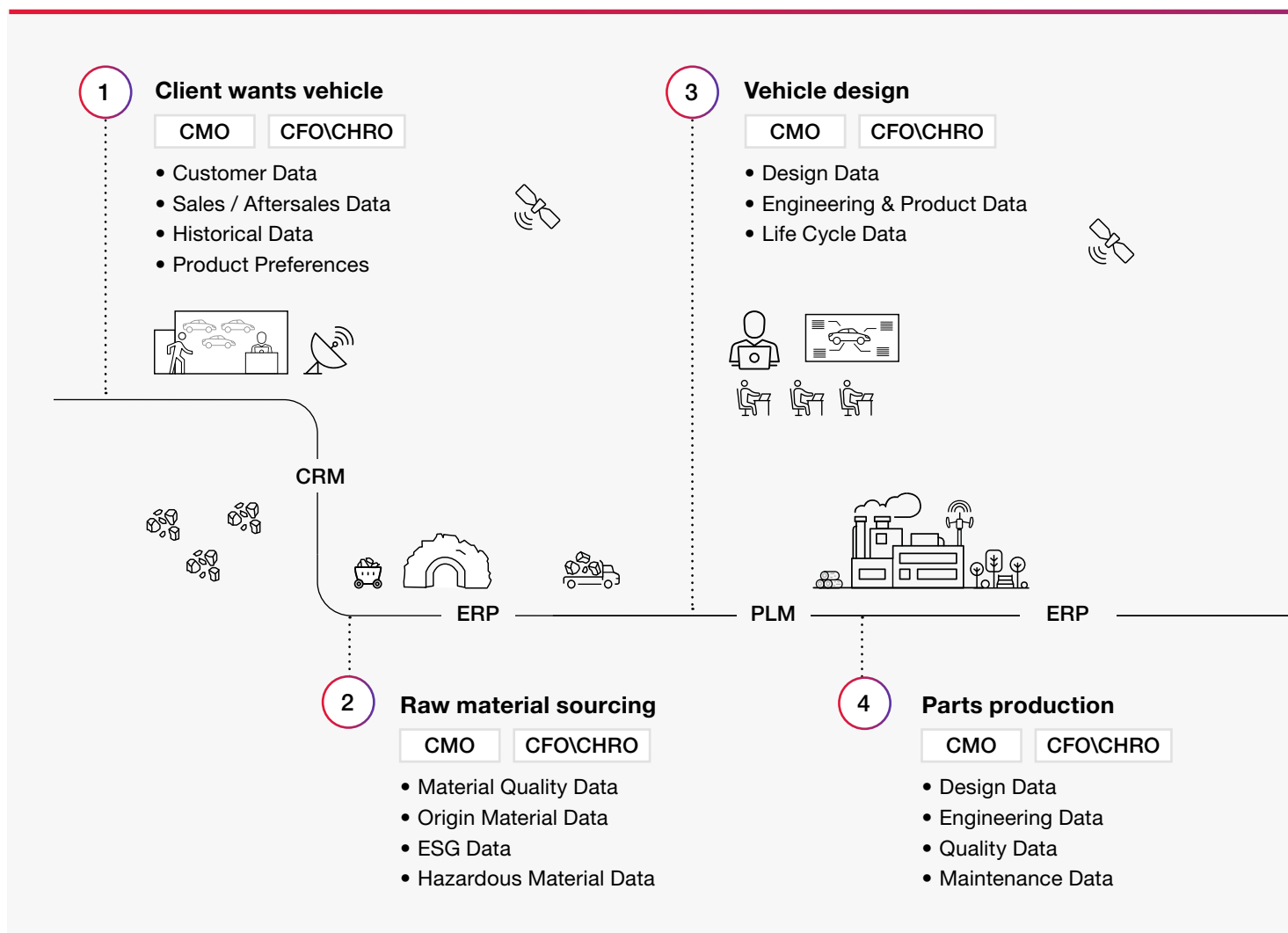
Those embracing data to gain trustworthy operational and strategic insights are pulling ahead of their peers in tangible ways, both in competitive advantage and more effective operations.
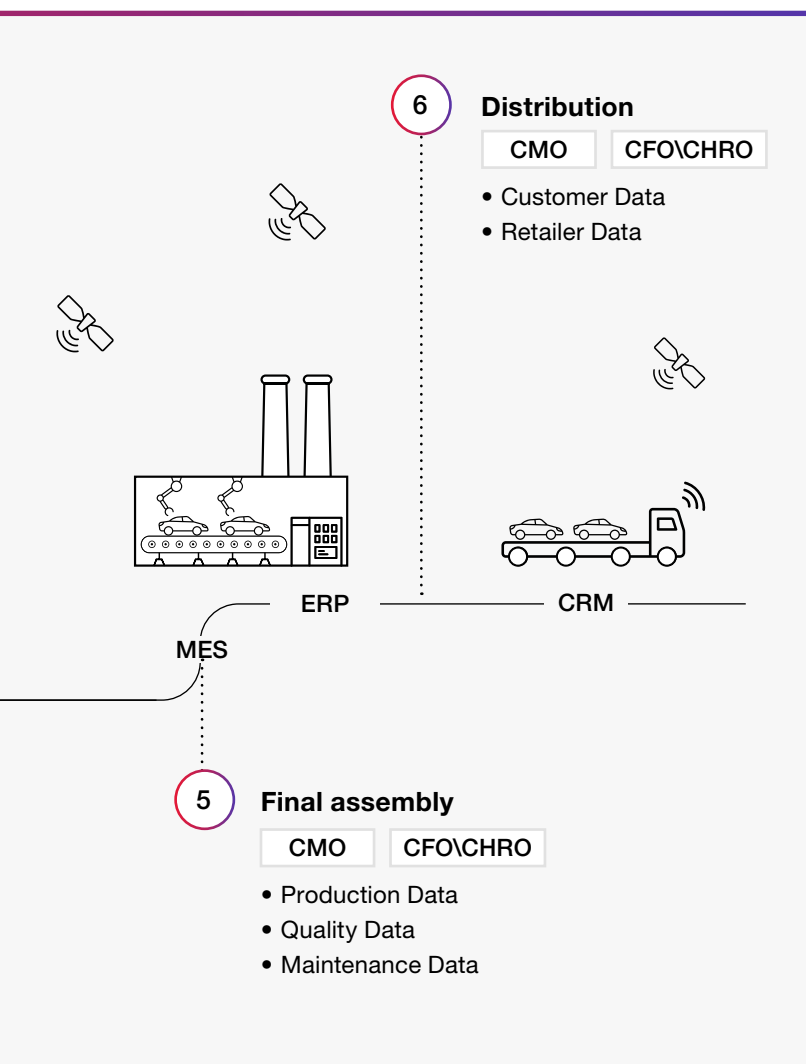
The challenges ahead

Becoming a truly data-driven manufacturing organization requires implementing a digital continuum from design and distribution through to sales and customer feedback. It requires becoming an intelligently connected organization where business units share and receive information at the right time.

Here's an example from the automotive industry that illustrates the complex data capture and interactions required in the manufacture and sale of a vehicle.

1 Client wants vehicle

| CMO | CFO\CHRO |

- Customer Data
- Sales / Aftersales Data
- Historical Data
- Product Preferences

3 Vehicle design

| CMO | CFO\CHRO |

- Design Data
- Engineering & Product Data
- Life Cycle Data

CRM

ERP

PLM

ERP

2 Raw material sourcing

| CMO | CFO\CHRO |

- Material Quality Data
- Origin Material Data
- ESG Data
- Hazardous Material Data

4 Parts production

| CMO | CFO\CHRO |

- Design Data
- Engineering Data
- Quality Data
- Maintenance Data

As the example demonstrates, manufacturing environments are complex and layered. Value chains are multifaceted, with multiple source systems, myriad data lakes, different processes, languages and access rights. Many organizations struggle with data strategy, governance, technology and the lack of a data-first culture needed to become truly data-driven organizations.

6 Distribution

CMO	CFO\CHRO

- Customer Data
- Retailer Data

ERP — CRM

MES

5 Final assembly

CMO	CFO\CHRO

- Production Data
- Quality Data
- Maintenance Data

Most manufacturers struggle on several fronts.

- Despite having a strategy, often, initiatives are not aligned with business goals or the overall vision of the organization.

- Data is not viewed as a core priority, and consequently, there isn't an empowered Chief Data Officer in place.

- There is a lack of organization-wide buy-in, as well as a lack of alignment between IT and business executives.

- Data silos across people, processes and machines make it difficult to access and integrate all relevant data.

- Employees don't have the required data skill sets, and there is no access to specialized talent (data engineers or scientists).

- The required technology enablers and culture to support data-driven efforts are missing.

- An ecosystem approach for data sharing is still nascent.

Turning data into actionable insights

As manufacturing becomes more unified, transforming data into actionable business insights will be critical to address new market realities and drive smart, sustainable and resilient operations.

By collecting, processing and analyzing critical data, manufacturers can shift from reactive decision-making to proactive planning based on forecasts and predictions.

Having data will not be enough; having access to quality data, with meaning, is the key differentiator. When data is structured, and context is added, it shifts significantly in value to offer trustworthy insights and tangible benefits (rather than just being an energy drain). Once structured and stored, applying analytics, machine learning and artificial intelligence (AI) increases insight across the organization.
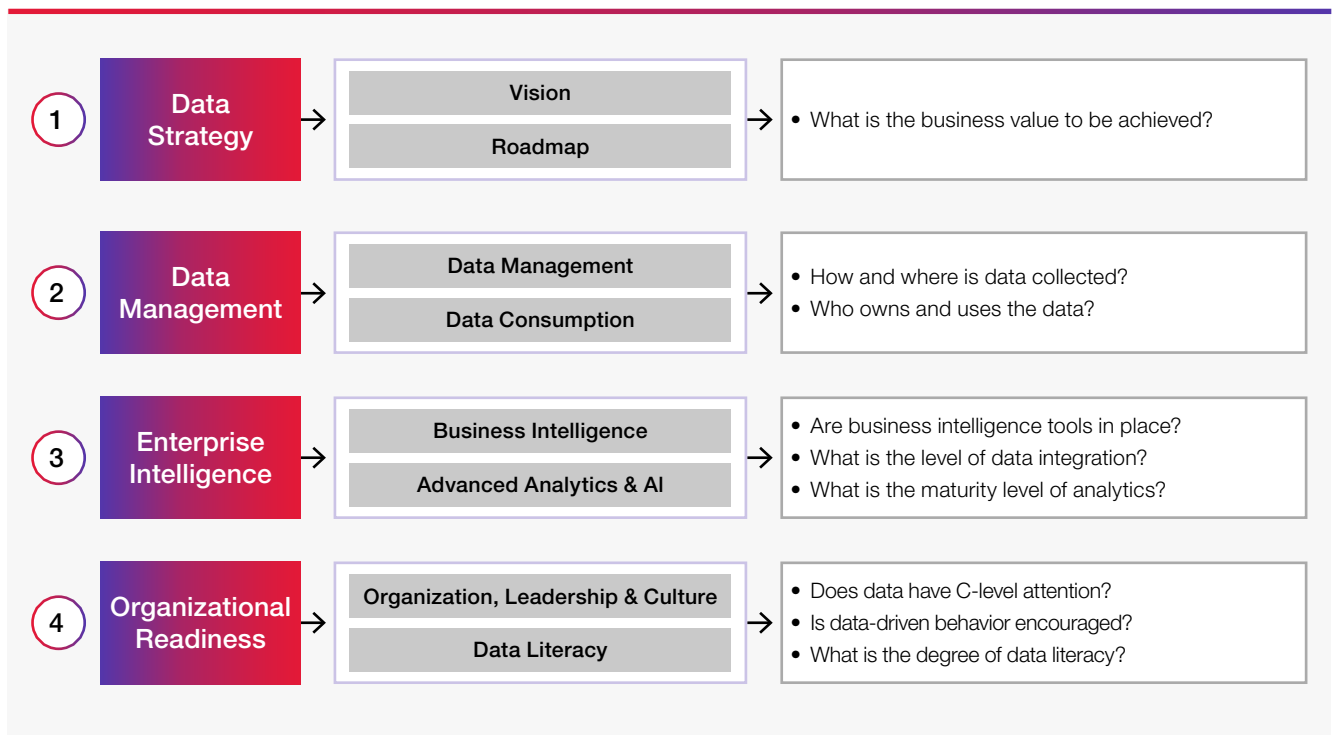
However, for data-driven initiatives to take hold and enable transformation, the organization must be ready to embrace this change.

So, where do you start?

4 steps to becoming a data-driven organization

Our 4-step approach helps you transform holistically.

1 Data Strategy	Vision / Roadmap	• What is the business value to be achieved?
2 Data Management	Data Management / Data Consumption	• How and where is data collected? • Who owns and uses the data?
3 Enterprise Intelligence	Business Intelligence / Advanced Analytics & AI	• Are business intelligence tools in place? • What is the level of data integration? • What is the maturity level of analytics?
4 Organizational Readiness	Organization, Leadership & Culture / Data Literacy	• Does data have C-level attention? • Is data-driven behavior encouraged? • What is the degree of data literacy?

1 Align your data strategy to business value

Manufacturers can unlock the transformative power of data by building and executing a comprehensive data strategy aligned with their values and business objectives. While each manufacturer's goals and vision varies, we work with our clients across their multiple lines of business to get a better understanding of what they are looking to achieve and explore various use cases linked to business goals.

We help you build a data strategy that:

• Accelerates outcomes by strategically aligning initiatives to business value

• Enables data and analytics to adapt as your business and customer priorities change

• Identifies the maximum value with the minimum scope to deliver initiatives that result in an ROI

• Factors in the role of critical information and data for strategic and operational decision-making

2 Manage your data as a strategic asset

Data must be managed as a valuable asset. Ensuring data is fit for purpose and aligned to business objectives requires an informed approach across the complete data life cycle—from creation to end-of-life. The data life cycle, or data flow, will connect data to different users, activities and business processes, enabling oversight and transparency of the full data journey.
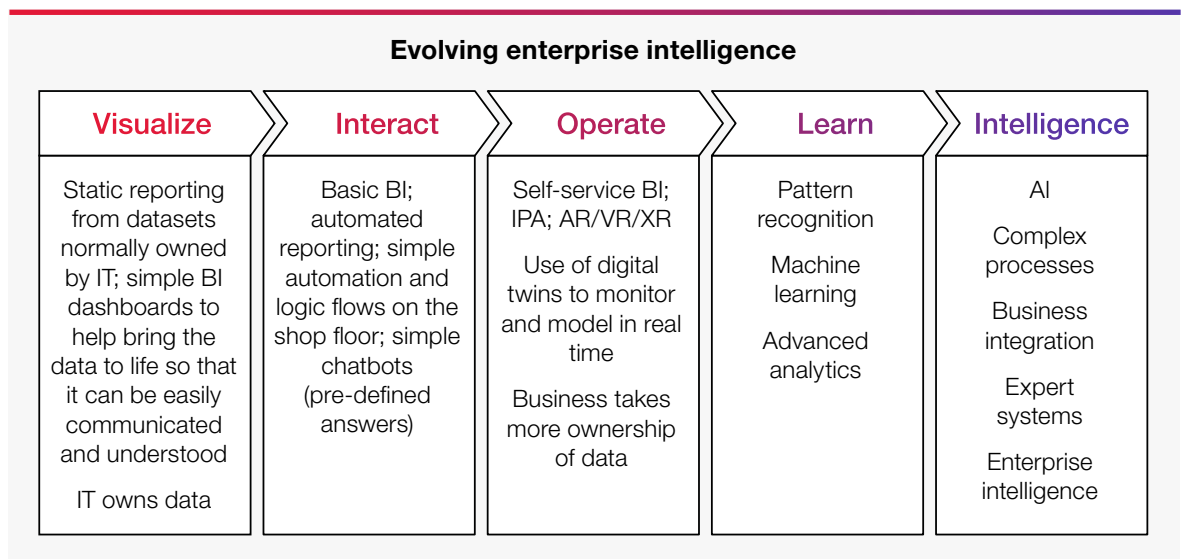
We help you:

- Collect and capture relevant data from assets and across the business value chain, and migrate and integrate external data sources and databases.

- Clean and process data to ensure it is fit for purpose and strategically and securely store data, whether it calls for developing and managing data lakes or deciding the role cloud will play.

- Understand and define who owns the data, when data needs to be used, the different levels of access and rights within your organization and the broader ecosystem and how they should be modified.

- Build a clear plan for the end-of-life and develop protocols for archiving and destroying data.
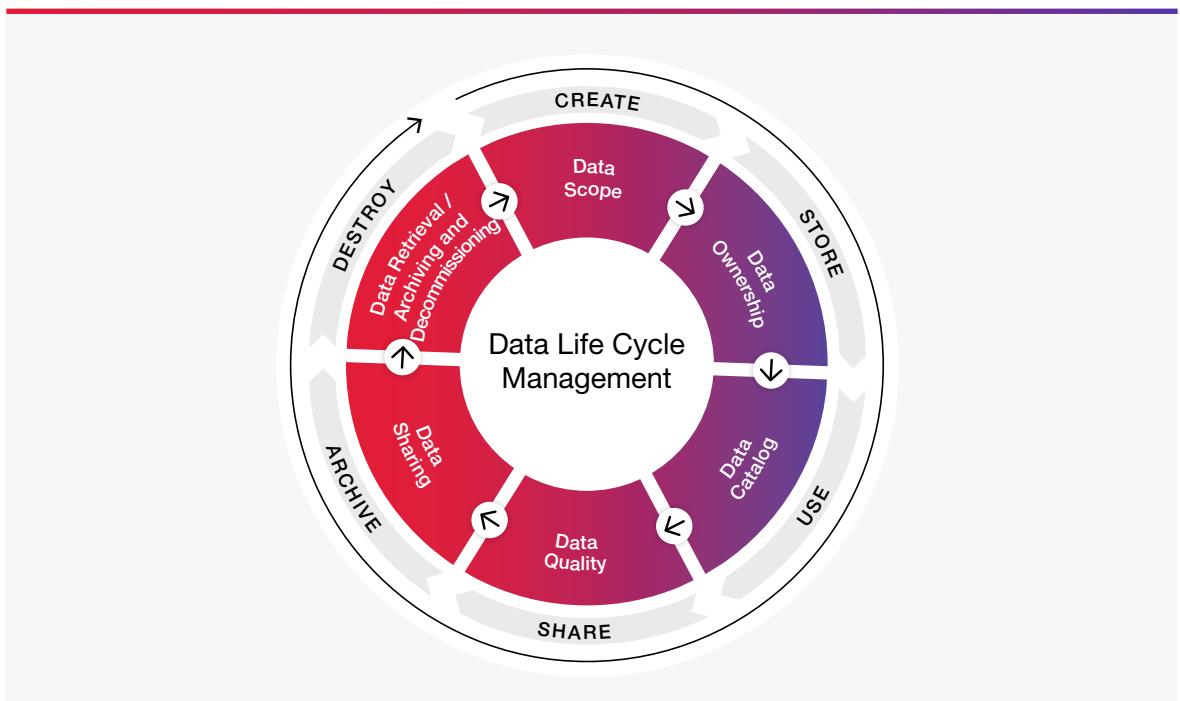
③ Raise your enterprise intelligence

Enterprise intelligence is your organization's ability to turn context-relevant data into actionable insights that drive business value, be it new growth opportunities, better customer experience or lower costs. Once harnessed, your data can rise up the knowledge pyramid*—moving from data to wisdom—by applying increasingly complex analytics and AI.

Evolving enterprise intelligence

Visualize	Interact	Operate	Learn	Intelligence
Static reporting from datasets normally owned by IT; simple BI dashboards to help bring the data to life so that it can be easily communicated and understood IT owns data	Basic BI; automated reporting; simple automation and logic flows on the shop floor; simple chatbots (pre-defined answers)	Self-service BI; IPA; AR/VR/XR Use of digital twins to monitor and model in real time Business takes more ownership of data	Pattern recognition Machine learning Advanced analytics	AI Complex processes Business integration Expert systems Enterprise intelligence

We help you make gains across these five "evolutionary" phases by:

1. Deploying basic reporting to retrospectively gain insights into why certain events occur.

2. Building in basic automation and simple logic to automate certain activities, minimize human errors and maximize productivity.

3. Employing intelligent process automation or digital twins to visualize and simulate decisions before acting on them.

4. Implementing cognitive computing such as algorithms, machine learning and pattern recognition to gain powerful insights that can help reduce waste, improve efficiency and enhance the customer experience using human-like chatbots.

5. Applying AI so that technologies such as neural networks or genetic algorithms can be incorporated into processes to improve efficiency and provide novel and innovative ways of doing business.

*Knowledge pyramid refers to to the data-information-knowledge-wisdom (DIKW) pyramid that represents the knowledge hierarchy within information management.

4 Ensure organizational readiness

A data-first mindset is critical to building trust and ensuring ROI on your data investment. Whether a small initiative or a large transformation program, a structured approach helps effectively manage the human side of change. Initiatives underpinned by a data-first culture and excellent change management strategies have a higher chance of meeting their objectives and supporting transformation.

We leverage human-centered design and cultural transformation approaches to empower your people and create an adaptive and data-first organization. This includes:

• Developing a shared vision and roadmap to nurture collective data-first behaviors.

• Conducting a skill gap assessment and building competency through regular training programs to upskill employees with new data analysis skill sets.

• Building the buy-in and input required from all levels of your organization as this ensures diversity of thought, increased creativity and faster problem-solving.

Benefits of transforming into a data-driven enterprise

These four key steps help you become a data-driven organization, where your decisions are based on facts rather than intuition alone. You benefit from acting as a unified organization—across the entire business value chain and your wider ecosystem. This transformation helps you:
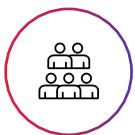
Build highly productive teams that work from the most insightful and supportive data in real time—enabling true innovation and cross-pollination.
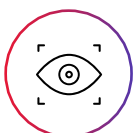
Move beyond just optimizing operations to preempting change and responding proactively with strong business and IT alignment.
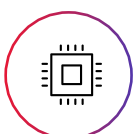
Gain true insight across vast data stores to create new services, products and ways of doing business.

Connect with external ecosystems and enjoy win-win benefits with new and sometimes unlikely partners.

Reflect, learn and continuously improve to realize your vision and demonstrate measurable results.

Embrace responsible and transparent practices and processes, and adopt enabling technologies that unearth the relevant data required to take measurable action and demonstrate sustainability progress.

Retain and attract new talent by offering employees a career with purpose.

How we can help

For manufacturers seeking to become data-driven organizations, CGI provides a holistic approach that helps unlock the transformative power of data to address new market realities and drive smart, sustainable and resilient operations.

Our solutions and services help you gain the strategic and operational data insights needed to ensure sustained growth, cost reductions and operational excellence—all while taking the appropriate actions to move toward a green and sustainable future.

Unlike other offerings focused only on technology, CGI's Data-Driven Manufacturing approach brings together strategy, governance and the human aspect of change while implementing data solutions to ensure success.

We provide a powerful combination of industry, data, technology and change management expertise, building a relationship with you locally while providing you with the scale of a truly global partner.

Contact us to learn how we can collaborate to advance your data-driven transformation: manufacturing@cgi.com

About CGI

Insights you can act on

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world.

We are insights-driven and outcomes-based to help accelerate returns on your investments. Across hundreds of locations worldwide, we provide comprehensive, scalable and sustainable IT and business consulting services that are informed globally and delivered locally.

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