Capgemini
CONSULTING.TECHNOLOGY.OUTSOURCING

Digital Manufacturing Services

Helping to steer your digital transformation journey to smart, connected products and plants, while keeping your mobility, connectivity, analytics and cloud solutions inherently secure.

People matter, results count.

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Introduction

Transforming Digitally

Digital is changing the game for manufacturers. Smart, connected products, assets and operations offer the potential for productivity gains, cost savings, and improved revenue. Transforming digitally, however, demands new thinking as operations and information technology converge.

Capgemini can help. Our Digital Manufacturing services focus on improving the digital maturity of core manufacturing functions across product and asset life cycle management, operations management, system simulation, and industrial cybersecurity. We draw on deep expertise in consulting and technology services, combined with a network of global Applied Innovation Exchanges and a strong ecosystem of partners, to ensure you gain sustainable competitive advantage from your digital investments.

Overview of services

Converging IoT, Operations Technology and IT systems

Capgemini Digital Manufacturing services use all the benefits of digital to meet the following types of need:

- Faster, secure product and asset lifecycle management to accelerate the time from product and asset conception to full production;
- Smart product development through the adoption of digital technologies across product lifecycle management (PLM), 3D continuity, and simulation;
- The optimization of industrial operations management (remote management, preventive and predictive maintenance, Digital Worker, etc.);
- Increasingly intelligent configurations and monitoring of production processes, factories, and infrastructure;
- Securing products and industrial systems – Operations Technology (OT) and IT – against cyberattacks and other threats.

We have a unique position in these markets. As a provider of both technology and consulting expertise, we are one of the few players able to bring together OT and a company's IT systems.

3 reasons to work with Capgemini

- Breadth of expertise: Our services bring together key strengths in consulting, technology, Internet of Things (IoT), 3D continuity, platform-as-a-service, and data management services;
- Global presence: We are a partner of choice for manufacturers with international operations seeking consistent quality of service, wherever they're located;
- Key strengths: Our strong capabilities in cybersecurity, connectivity and cloud are helping the industry successfully make the jump to the Internet of Things. Plus, our Digital Customer Experience practice offers unique insights into how manufacturers are responding to new customer expectations.

Your needs

Responding to the pace of digital

In our increasingly connected digital world global manufacturing companies face a multitude of challenges. Smart and connected products embed IT at the heart of the product itself across all industrial sectors: Aerospace & Defense, Automotive, Chemicals, Consumer Products, Energy and Utilities, High Tech, Industrial Products, Life sciences and Resources.

Each product or machine is becoming part of the information system itself, interacting on a real-time basis with their users and the world they are living in. There is a continuous effort to use digital to improve the efficiency of product and operations management functions within engineering and industrial facilities, and the pace of delivery is faster than ever.

In this connected, digital world, heightened customer expectations are becoming the key drivers of transformation. For example:

- Mass customization: A leading automotive manufacturer reports that only two identical cars from one of its top series have been ordered during the last 18 months
- Product as a service: By moving from a largely manufacturing base towards a more holistic document management service provision, a global office equipment company is generating more than 50% of its turnover through services.

Capgemini Digital Manufacturing services will ensure that manufacturers can respond to these digital business drivers. We help you achieve key business imperatives, including:

- Digital transformation: Increase enterprise performance with digital technologies
- Time-to-market: Accelerate the time from product and asset conception to full production
- Shop floor optimization: Transition towards seamless and real-time solutions
- Modernization: Plant renovation in parallel with production running (industrial run-to-build)
- Product, plant, flow and process efficiency: Model and simulate complex systems to avoid physical prototypes or tests, reduce time to market and optimize quality
- Visibility: Real-time tracking and monitoring to prevent raw material, human or machine deviations or failures
- Industrial cybersecurity: Safeguard operations against cyber-attacks and malicious internal behavior.

Digital future

The 4th industrial revolution

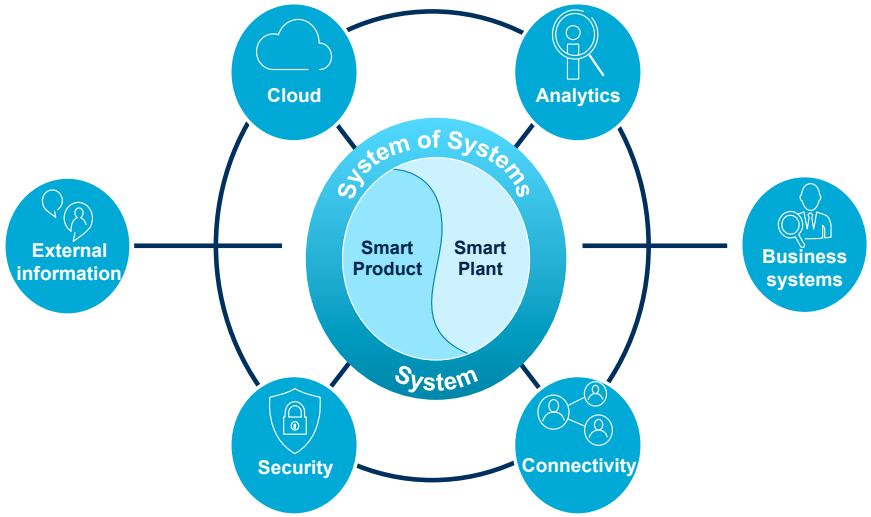
The Internet of Things (IoT) is changing the way the world operates. IoT is the technology driver for the 4th industrial revolution. It is a revolution in which “things” as opposed to the “internet” are creating a disruptive force in manufacturing; where each and every physical object or system is becoming smart and connected thanks to electronics, embedded software and digital communication capabilities.

A number of technology developments have accelerated the uptake of IoT capabilities industry-wide. These include:

- More intelligent, smaller and less expensive sensors/devices
- More powerful automatons, robots, digital commands
- Increased network bandwidth and lower communication costs
- Wireless ‘new technologies’, embedded software and communication capabilities
- Internet Protocol version 6 (IPv6)
- More powerful and less expensive data storage
- Big data and analytics driving insight into products and their end users
- IoT platforms and the Application Programming Interfaces (APIs).

As digital and the IoT continue to shape the future of manufacturing, companies in this sector will see their sensors, engines, machines, elevators, cars and more become increasing smart and connected. In this landscape, cloud, analytics, security and connectivity will replace social and mobile to form the IT foundations of the digital manufacturer.

Digital Manufacturing: The Digital transformation journey to smart, connected products and plants



Overcoming digital challenges

Delivering sustainable growth

Predictions suggest that there will be more than 40 billion physical connected devices in use worldwide by 2020. With this growth, future manufacturing Information System/Technology (IS/IT) evolutions will move beyond ERP and be driven by products, machines and real-time interactions. Two key trends in this respect are:

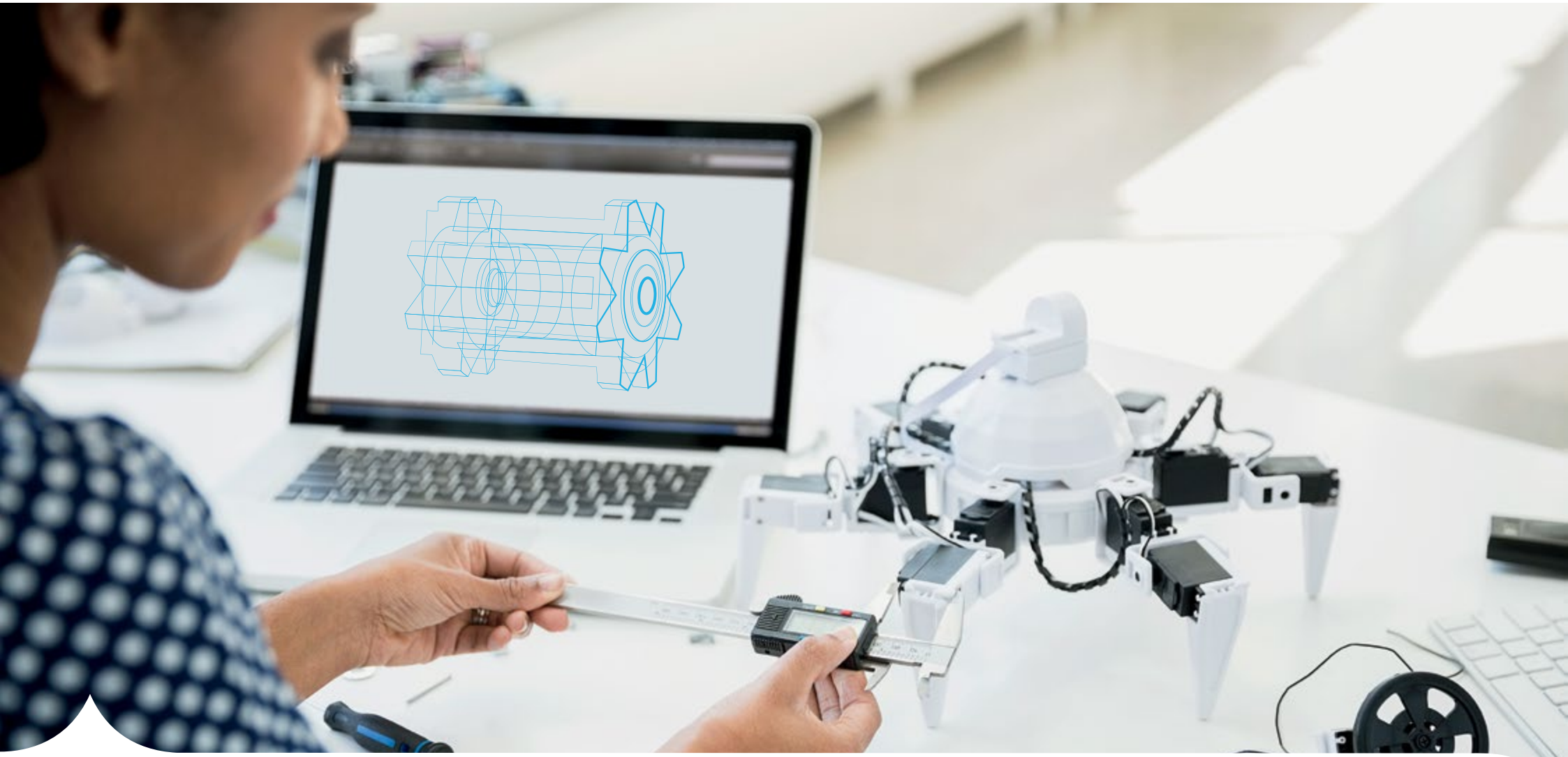
- IT is becoming an integral part of the product itself and therefore a strategic tool
- IoT – OT – IT convergence will fuel and speed up growth and profitability.

The value created by the Internet of Things will be driven by three key levers: productivity, the shift from product to service, and new business models:

- Productivity
  - With no need for physical prototypes or testing, a full digital product development approach has the potential to reduce time-to-market by more than 30%
  - In flight and real-time monitoring of engine behavior can reduce unplanned maintenance and aborted take-offs in the aviation industry by more than 50%
- Industrial companies are becoming services companies:
  - An electrical components manufacturer has transformed its business so that its energy management operation now represents 30% of the total turnover
  - An engine pay-per-use model adopted by a turbine provider represents more than 60% of the company's total turnover
- New business model development is part of the strategic agenda:
  - An industrial IoT platform empowers an electrical large-scale component company to become a digital provider
  - A global tyre manufacturer transforms to provide full end-to-end fleet management services.

Capgemini Digital Manufacturing services are enabling you to embrace these business drivers. Together we will ensure that your digital investments deliver sustainable competitive advantage.

Our services

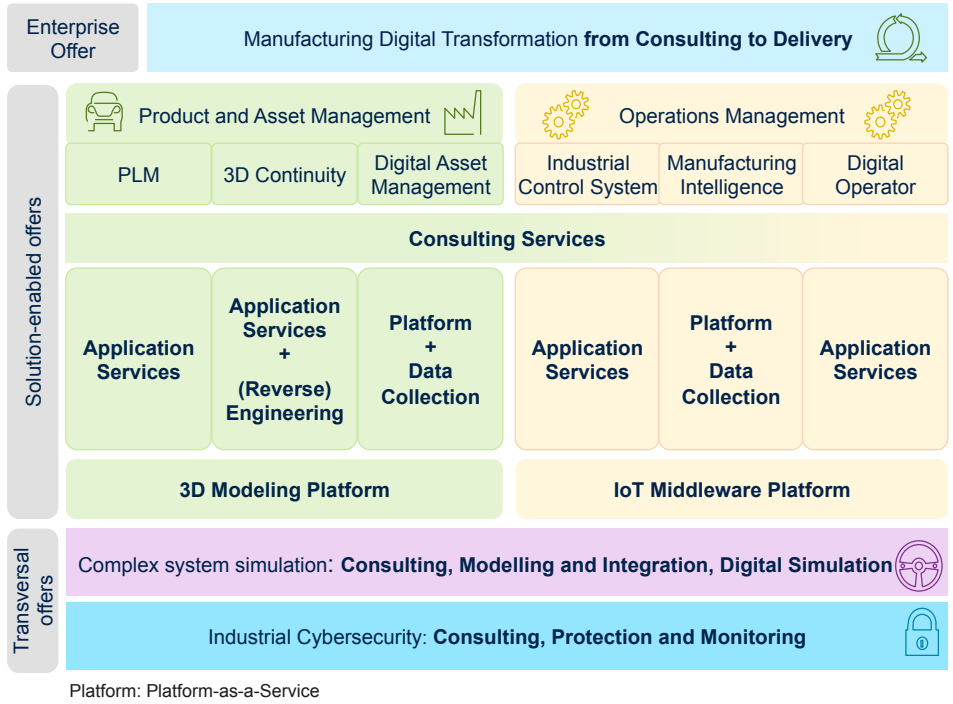


End-to-end services for industrial organizations

Capgemini Digital Manufacturing services extend from consulting, application management and engineering services, to platform-as-a-service, IoT middleware and data management services. They are delivered within a framework of offerings across the following functional areas:

- Enterprise-wide manufacturing digital transformation: Increasing your enterprise performance by leveraging digital technologies and empowering your people and ecosystem;
- Product and Asset Management: Enabling you to embrace product lifecycle management (PLM) transformation, address the business and technology dimensions of 3D continuity, and deliver effective digital asset management across your industrial facilities;
- Operations Management: Delivering services across industrial control systems, manufacturing intelligence and digital operator, while continuously launching improvement initiatives and preventive actions;
- Complex system simulation: Helping you model and simulate your complex systems in order to reduce time-to-market while avoiding physical tests and optimizing quality;
- Industrial cybersecurity: Guiding you through your digital transformation while securing your mobility, big data, cloud and IoT initiatives.

Overview of services



Platform: Platform-as-a-Service

Enterprise-wide manufacturing digital transformation

Disrupt with digital

We help manufacturing companies embrace enterprise-wide digital transformation by leveraging disruptive technologies and empowering people and ecosystems.

Our key services include a highly sophisticated bundle that we tailor to the individual needs of each client:

- Digital awareness and assessment comprising:
  - Applied Innovation Exchange digital day
  - A discover tour for Executive Committee members
  - Digital maturity benchmarks
- Digital strategy services including:
  - Digital manufacturing vision creation
  - Roadmap and benefits case
  - Transformation governance
  - Proof of Concept
  - IT foundations scoping
- Digital transformation encompassing:
  - Pilots and scale-up planning
  - Business transformation management
  - IT governance implementation

Product and asset management

Our suite of Product and Asset Management services encompasses three core pillars:

Product and Asset Lifecycle Management (PLM) Digital

We help you drive PLM transformation through the following services:

- Consulting: PLM vision development and implementation, business process consulting, and PLM process design
- Solution implementation: Specific solutions for business and technology specification, solution design and implementation, technical upgrades and data migrations
- Application maintenance: Technical and business support, help-desk services and on-demand services catalog.

3D Continuity

We offer key services that bridge the gap between an as-designed and as-built/ as-operated model. We enable you to address both business and technology dimensions of 3D continuity including:

- Consulting services across 3D modeling and printing
- 3D model production services across both modeling and printing
- Application services: 3D representation and configuration management.

Digital Asset Management

Our Digital industrial Asset Lifecycle Management (DiALM) offers large enterprises with substantial investment in complex industrial assets a competitive edge through a robust, digital platform to record, organize, validate, and apply asset and process information. By substantially easing the day-to-day decision-making process of asset managers, DiALM reduces risks and costs and prepares an industrial footprint. This enables a manufacturer to brace for natural calamities, seasonal production spikes, and planned maintenance shutdowns. While avoiding the common pitfalls of dispersed and incoherent data, DiALM also stands out as an advanced training tool for new entrants in industrial ecosystems – from trainee engineers to Chief Operations Officers.

Learn more about our DiALM solution

Operations management

Our suite of Operations Management services encompasses three core pillars, as follows:

Industrial Control Systems

Our seamless and real-time Industrial Control System (ICS) solution guides you through your shop-floor optimization. The key ICS services include:

- Consulting: Systems audit and obsolescence management, architecture definition and implementation studies, software selection, and risk analysis and deployment planning
- Solution implementation: Services for legacy revamping, solution design, build and integration, testing platforms, operators and staff training
- ICS Maintenance: Specialized services including application maintenance, maintenance in operating conditions, cybersecurity conditions tracking and incidents prevention.

Manufacturing intelligence services

Our end-to-end services are designed to empower your manufacturing staff to continuously launch improvement initiatives, apply industry standards, take preventive actions and stay on budget. Key services include the following:

- Line coaching: Management of production processes, results analysis for production teams, and support for staff teams in identifying improvement actions
- Data collection: Services for real-time data acquisition from: sensors / actuators, machines and their components, and multi-source data collection
- Analytics-as-a-service: Data visualization and monitoring tools provision, benchmarking and parameters analysis.

Digital operator services

Our tailored solutions aim to optimize your field operations services, drawing on a combination of end-to-end technology expertise and extensive experience in solution implementations. Key services include the following:

- Use case scoping: Thorough needs analysis, roadmap and business case planning, technology planning and use case qualifications
- Solution implementation: Integration services for software, hardware devices and data integration and multimedia applications
- Application maintenance: Technical and business support services, help desk management and on-demand services catalog.

Complex system simulation

We help you model and simulate complex systems, while reducing time-to-market, avoiding physical tests and optimizing quality. We leverage our R&D investments in science, IT and human-machine-interface (HMI) to offer tailored and integrated services.

Key simulation services across product, plant, flow and process include the following:

- Consulting: Our services include opportunity and feasibility studies, flow and layout optimization, assessment and recommendations on existing modeling systems and tools
- Modeling and integration: Our integration services span turnkey complex system simulator, conception and improvement of complex simulation systems, HMI definition and optimization, and High Performance Computing applications or systems
- Simulation: We deliver services for flow simulation and systems simulation testing.

Industrial cybersecurity

We have a deep know-how of security products across IoT, OT and IT systems, along with a dedicated R&D team focused on testing security products and IT security evaluation facility (ITSEF). We help you embrace digital transformation while keeping you secure throughout mobility, big data, cloud, and IoT projects.

Key services include the following-

- Consulting and audit: Including audit maturity assessment, risk analysis and security policy governance
- Protection: Including secure by design, secure coding, security functional testing, penetration testing and evaluations
- Monitoring: Spanning threat intelligence vulnerability management, security monitoring and security response and reporting.

Learn more about our cybersecurity services

How we work

Industry expertise

Strength in partnership

Our Digital Manufacturing solutions have been developed with the involvement of an ecosystem of technology alliance partners, start-ups and agencies. It also draws on our digital transformation research partnership with MIT Center of Digital Business and on our own intellectual property (IP) solutions, such as:

- 3D Modeling & Simulation: Open Cascade – Key solution attributes include 3D CAD modeling engine, complex geometry & topology algorithms, 2D & 3D visualization capacities, and applicative and rapid development framework
- Digital industrial Asset Lifecycle Management (DiALM): Offering capabilities such as data-driven continuity in asset management from design to decommissioning, tech-agnostic, data consolidation from multiple sources, Platform-as-a Service, and regulatory compliance

Learn more about our solution

- IoT Middleware: E-object – Unique solution features include device independence with on-the-shelf connectivity plug-in, device management from provisioning to real-time monitoring and remote upgrade, as-a-service business model, open and highly scalable architecture.

Learn more about our solution

Benefits realized

Manufacturing IS/ IT transformation is increasingly driven by products, machines and real-time interactions. IT is becoming an integral part of the product itself along with IoT-OT-IT convergence speeding up growth and profitability. At all times, the way in which we work with you is designed to create value through:

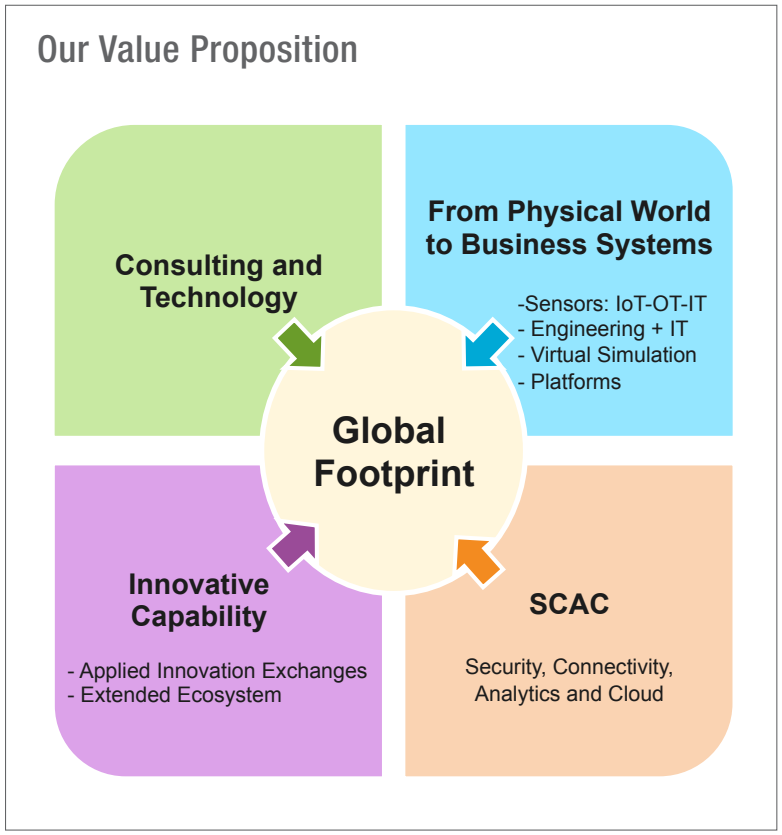
- Productivity gains: Our services drive higher throughput in production through faster time-to-market for digital product development, real-time tracking and monitoring, optimizing resource usage, real-time shop floor management, quality management and preventive defect management.
- A shift from product to services: Smart products, plant management enables manufacturers to increase turnover, drive higher cost savings, improve energy management and deliver higher net income.
- New business models: We help global manufacturing companies embrace new business models while addressing fast growing customer expectations, such as mass customization in configure/ make-to-order models.

Global, connected, innovative

Capgemini has a unique value proposition that will take today's manufacturer forward on the digital journey. Our global expert network enables us to deliver digital manufacturing services across geographies and industries. In addition to our strong partner ecosystem, we have a strong IT foundation embracing the digital components of security, connectivity, analytics and cloud.

Our network of nine global Applied Innovation Exchanges facilitates new partnerships. It is a unique global network of exchanges designed to promote and speed up the process of innovation. We help you gain sustainable competitive advantage from your digital investments. We further innovate with a smart product and process incubation facility, in which we draw on our digital expertise to design and operate smart product and plants.

Learn more about our Applied Innovation Exchanges



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Contact Us

Find out how Capgemini Digital Manufacturing services help steer your organization's digital transformation journey.

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