

Internet of Things

Driving efficiency, agility and digital transformation

CGI

Experience the commitment®

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The IoT revolution

The Internet of Things (IoT) continues to excite the imagination of businesses and technology vendors. More importantly, many businesses are starting to recognize the value of connected or intelligent assets given the data that they generate, which can be an essential ingredient for successful digital transformation.

The range of applications stretches from small consumer applications—like wearable devices that monitor your health—to manufacturing equipment, to city-wide deployments that use many thousands of sensors to improve citizen experiences and help governments plan for the future.

The key to the value created by IoT is in collecting and using data from a myriad of connected “things” and combining that with other data from within your organization to make better decisions and to enable new services.

Adoption of IoT solutions is driven by a number of new business models arising from digital transformation:

- ▶ There is a growing need for predictive services rather than just simply reacting to events.
- ▶ “As-a-service” models are driving change in many markets as service delivery replaces traditional product sales.
- ▶ The desire for increased collaboration across supply chains and partnerships is on the rise.

The organizations embracing these new models transform their relationship with their customers and improve their shareholder value.



The worldwide Internet of Things market will grow from **\$655.8 billion** in 2014 to

\$1.7 trillion in 2020

with a compound annual growth rate (CAGR) of **16.9%**.

(Source: IDC Doc 256397, Worldwide Internet of Things Forecast, 2015–2020, May 2015.)

Endpoints of the Internet of Things will grow at a **35% CAGR from 2013 through 2020**, reaching an installed base of

25 billion units

(Source: Gartner, P. Middleton, T. Koslowski and A. McIntyre, Forecast Analysis: Internet of Things, Endpoints and Associated Services, Worldwide, 2014 Update, 02 December 2014)

Business drivers

Accelerating digital transformation is a top priority of CGI clients based on the findings of our 2016 Global 1000 outlook.* Business and IT leaders are aligned on the top business priorities to drive growth. These point to an urgent need to adopt digital as a business model, not just as an efficient technology solution.

The Internet of Things has arrived

By 2020 there is forecast to be an explosion in the number of connected devices, representing an enormous market opportunity to enable digital transformation.

Using IoT helps to address the following business challenges:

- ▶ **Operational efficiency**
Improved access to real-time operational data helps organizations to eliminate waste and use assets more effectively.
- ▶ **Optimizing supply chains**
Remote monitoring of assets helps to identify critical events and automate responses to them.
- ▶ **Preventative operational models**
Having access to a regular stream of event data enables new actionable insights that can inform operational and business decisions.
- ▶ **Generation of new revenue streams**
As data from sensors and other sources are combined, these enable new data-based business models for customers who also can benefit from the investment in IoT.

* The CGI Global 1000 outlook brings together the findings, insights, and CGI's point of view on the strategic topics that emerged through face-to-face interviews CGI's consultants conducted with more than 1,000 business and IT leaders across 10 industries and 20 countries between January and April 2016.

Technology enablers

There are several factors behind IoT's explosive growth:

- ▶ **Low cost sensors**
Sensor technology has matured to the point where sensors are small and cheap enough to be incorporated into almost any device, opening up new opportunities for IoT.

- ▶ **Pervasive connectivity**
Existing cellular communications are being supplemented by new low-power technologies, which are cheaper and have a longer battery life.

- ▶ **Powerful data analytics**
Obtaining insight from data is critical to any IoT project. New toolsets are emerging that can rapidly aggregate and analyze data to generate insights that can be acted upon.

- ▶ **Smartphones and tablets**
Smartphones and tablets are changing expectations on how information is visualized by a new generation of employees.

- ▶ **Cloud computing**
The availability of cloud computing lowers the cost and risk of experimenting with new IoT concepts and scaling to meet growing demand.




Anatomy of an IoT solution

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A typical IoT solution is made up of several technology components and business processes. These can be built around cloud-based platforms, which provide the basic building blocks.

Analytics and rules: Many IoT platforms feature analytics and rules engines that can trigger the right action when certain events happen.

Data processing: Data from devices needs to be pre-processed so that events requiring immediate action can be triggered. The rest can be stored for future analysis.

Connectivity: IoT devices can be connected by a variety of methods, both fixed line and wireless. The best connectivity solution will depend on a number of factors, including the volume of data and how often it's transmitted. The data flow can be managed directly from a sensor or via a hub or gateway.

Devices: In a large-scale rollout the devices themselves are usually the most expensive part of the solution. They will need to be carefully considered to keep the total cost of ownership (TCO) down.

Security: Since IoT solutions could potentially be the target of attacks, cybersecurity must be considered from the beginning in any solution.

User screens: Mobile and desktop interfaces need to display the information that's relevant to an individual or department, whether it's a citizen, field engineer or control center agent.

Integration with business processes

New business processes will be needed to support the IoT solution, for example:

- ▶ Predictive analytics for maintenance of assets and health of people
- ▶ Remote management and control of city and network infrastructure
- ▶ Operational monitoring of supply chain operations or fleet management
- ▶ New service launches

Integrating the processes

Although some platforms provide the building blocks to create an IoT solution, configuring them to your needs can be expensive, risky and time consuming. CGI's framework contains pre-built logic, available within the cloud, that delivers the core functions you need to rapidly move to operational pilots.

Transportation

- ▶ Downtime can be minimized and efficiency improved through the predictive maintenance and monitoring of logistics vehicles and aviation.
- ▶ Travellers can be provided near real-time traffic updates for public transport services.
- ▶ Logistics can be streamlined through location tracking and load planning.

Utilities

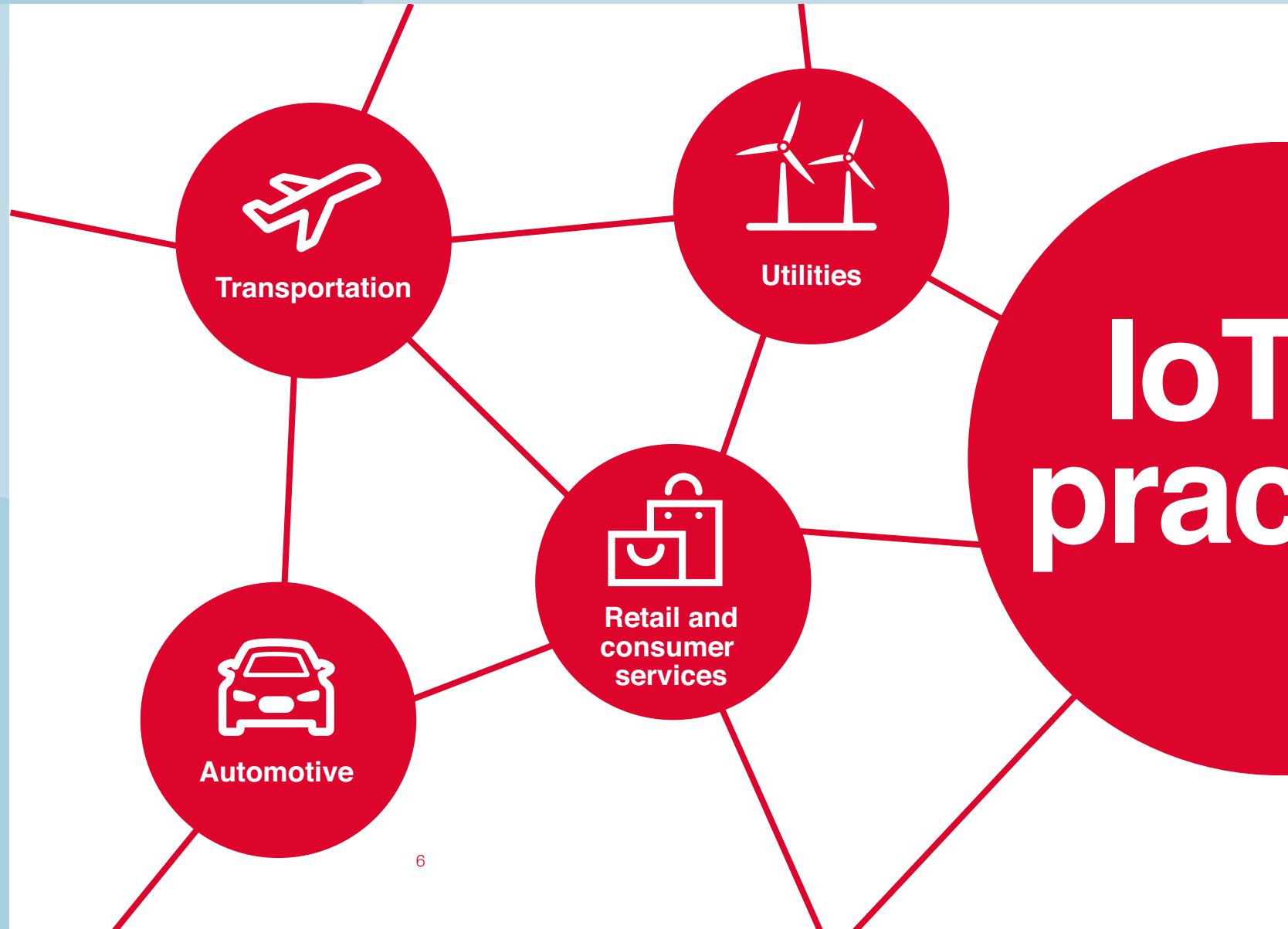
- ▶ Smart meters can provide time-based consumption data and enable time-based billing.
- ▶ Smart grids can allow demand response, helping to manage peaks of energy consumption as well as micro-generation and renewables.
- ▶ Exploration and extraction can be improved by having better visibility of geological conditions.
- ▶ Production outages can be reduced through equipment monitoring and preventative maintenance.

Automotive

- ▶ Maintenance and performance can be improved through analytics, and dealer visits can be reduced through over-the-air updates.
- ▶ Driver behaviour can be assessed to improve fuel consumption or provide usage-based insurance.

Health

- ▶ Chronic conditions can be remotely monitored through wearables and ingestibles.
- ▶ The location and usage of medical equipment can be tracked remotely to improve efficiency and availability.
- ▶ The vulnerable and elderly can be monitored.





Future cities

- ▶ Public safety can be improved and costs can be reduced with smart lighting.
- ▶ Urban traffic management can be transformed by merging data from existing and new sensors to give real-time impact assessments.
- ▶ Energy consumption can be reduced with smart buildings.
- ▶ Water can be preserved by predicting floods and reducing leaks.
- ▶ Waste collection can be optimized via sensors attached to bins.



Retail and consumer services

- ▶ The customer experience can be personalized through product recommendations and location-based offers.
- ▶ Supply chain management can be improved using RFID tags.
- ▶ Indoor location-based services can use technology to help customers find products.
- ▶ In-store assets like vending machines can have increased availability through predictive maintenance.

in practice



Manufacturing

- ▶ Production can be automated by interfacing assembly machines to share information such as specification and destination.
- ▶ Logistics can be improved through sharing of manufacturing facilities.
- ▶ Defects can be identified and removed through post-production tracking.
- ▶ Output can be optimized through analysis of the production process. Stock holdings and logistics can be optimized by tracking individual stock items rather than entire pallets.



Agriculture

- ▶ Irrigation and fertilizer can be used optimally with drones and soil sensors that monitor conditions.
- ▶ Livestocks' health and location can be monitored by tagging the animals.
- ▶ Livestock buildings can be monitored and controlled, optimizing growing conditions and safeguarding animal welfare.

Delivering the solution

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Realizing the full value of IoT requires a business-led approach that focuses on creating financial benefit and competitive advantage.

CGI's approach guides you through the steps involved, and helps you to define and achieve your IoT objectives.

- ▶ Discovery workshops and inspire sessions show you what's possible and focus on specific business challenges.
- ▶ Business-driven pilots prove the value of the technology. They're delivered in a manner that can scale up to meet the needs of a production deployment when successful.

- ▶ The insights from the initial pilot can help to identify where further value can be derived from the additional data sources and other devices. These can then be built in and scaled.

This iterative approach helps you develop a tailored roadmap that closely involves your people as it's rolled out.

Our recommended approach

- ▶ Start small and scale.
- ▶ Focus on the insights that could impact the business.
- ▶ Use a pilot approach to validate benefits and provide a launch pad for solutions.
- ▶ Develop a roadmap for IoT deployment that integrates across your technology landscape.
- ▶ Identify the suppliers and partners with whom you can deliver the vision.
- ▶ Adopt an agile, "fail fast" development approach.
- ▶ Engage the business users early with user interfaces. Their involvement will be the key to success.

CGI's approach



Start small

The principle of our approach is “start small, but start.”

Although most organizations recognize the potential of IoT, many are put off experimenting with it because of the pace of development and because of questions about the short-term return on investment.

We believe it's wise to start soon with a small project or pilot to prove how IoT can add value to your business. The project, once successful, can be built on—incrementally adding value with each step.

The IoT ecosystem

We work with global technology providers like Microsoft to deliver scalable, cloud-based platforms that can grow to proofing your solution.

Our framework is a cloud-based CGI platform that contains the pre-built core functions for an IoT solution. It allows you to get the best out of your technology, and deploy more quickly and cheaply.

We work with a network of partners to help foster innovation and to ensure we provide a best-of-breed solution. Our Small and Medium Enterprise (SME) Accelerate program has created a network of 400 small and medium enterprises with whom we work and share a common passion. This diverse group of SMEs includes digital design agencies, sensor manufacturers, communications providers and big data specialists.



Why CGI?

- ▶ A market leader with award-winning solutions across both the commercial and public sector
- ▶ Commercial off-the-shelf, scalable and integrated services using a standardized cloud-based platform
- ▶ Cross-industry expertise—IoT should be considered in line with a wider digital transformation strategy
- ▶ Ready-to-go IoT platform using CGI's global IoT IP solution
- ▶ Rapid development and deployment, reducing your time to market
- ▶ Consumption-based, “pay as you go,” agile service models
- ▶ Expertise across legacy and digital environments that uniquely enables us to help clients at every point in their digital transformation journeys





Driving your digital transformation

CGI helps clients achieve superior value through end-to-end digital transformation. Our expertise across legacy and digital environments uniquely enables us to support clients at every point in their digital transformation journeys.

We have the methodology and capabilities to assist clients in defining their digital strategies and roadmaps, as well as the breadth and depth of experience to deliver their transformations through key digital enablers. CGI's enterprise digital transformation capabilities and industry expertise help clients embark on their transformations and succeed in becoming customer-centric digital organizations.

Learn more about our digital transformation capabilities and industry expertise by visiting:

cgi.com/digital-transformation or by contacting us at info@cgi.com.



Award winning solution

Microsoft Partner

2014 Partner of the Year Winner
Intelligent Systems

CGI's intelligent asset management work for ThyssenKrupp Elevator, which maintains over 1.2 million elevators globally, won the 2014 Microsoft Partner of the Year Award for Intelligent System Service.

About CGI

Founded in 1976, CGI is one of the largest end-to-end IT and business process services providers in the world, helping clients become digital organizations through high-end consulting, enabling IP solutions and transformational outsourcing. With a deep commitment to providing innovative services and solutions, CGI has an industry-leading track record of delivering 95% of projects on time and within budget, aligning our teams with clients' digital transformation strategies to help them better run, change and grow their businesses.

The CGI logo is displayed in a bold, white, sans-serif font. The background of the slide features a close-up of a hand with fingers slightly curled, set against a dark red gradient. In the lower right, there is a network diagram consisting of yellow nodes connected by thin lines, suggesting a digital or data network.

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