

Internet of Things



Digital Customer Experience



Digital Employee Experience



Digital Insight



Internet of Things



Payments



IP Solutions



Cyber Security



Cloud

CGI

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Internet of Things



The IoT revolution

The Internet of Things (IoT) already touches many aspects of daily life and impacts most industries. With IoT, we have a world where smart objects are seamlessly integrated as part of a global network; and where smart objects interact with each other or the external environment to deliver new services and improved processes.

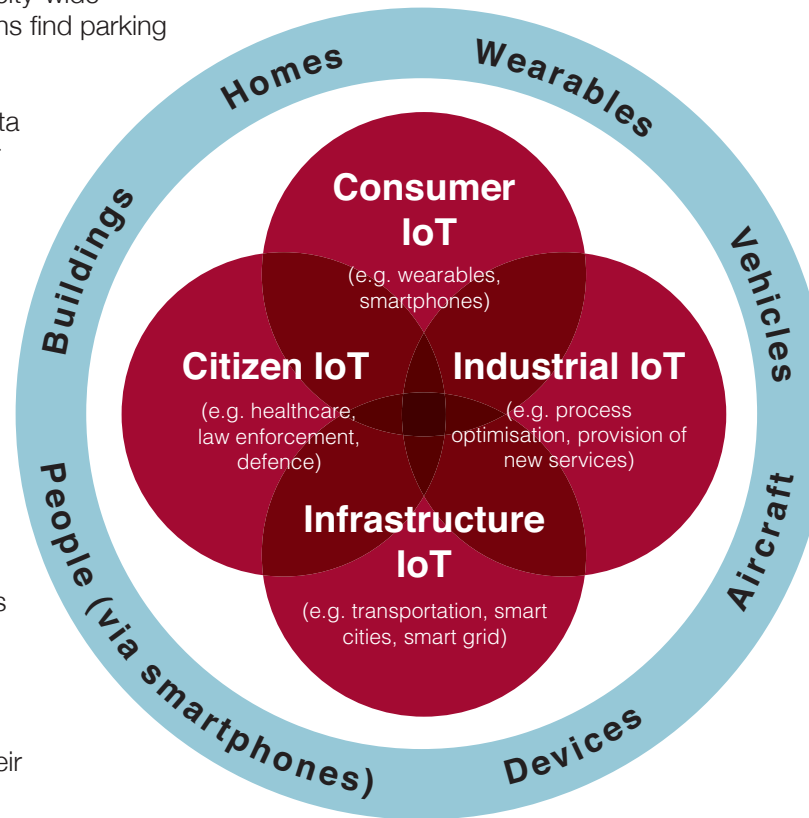
IoT can range from small consumer applications – like wearable devices that monitor your health, and fridges that know when you’re out of milk – to city-wide deployments that use many thousands of sensors to help citizens find parking spaces and governments to plan for the future.

The key to the value created by IoT is in collecting and using data from a myriad of connected “things”, as well as from within your organisation to make better decisions and to enable new services.

Early adopters in each of these areas are already starting to tap into the potential of IoT:

- ▶ **Delivering operational efficiencies** is often the starting point, through more intelligent use of assets.
- ▶ As they mature, organisations then start to deliver **new services** that leverage the closer integration that IoT allows with their customers.
- ▶ Once the possibilities of IoT are proven, many organisations then embark on a more **fundamental transformation** of their **operating models**.

The organisations that manage to navigate this journey will 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

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. Using IoT helps to address the following business challenges:

- ▶ **Cost reduction**
Improved access to real-time operational data helps to eliminate waste and use assets more effectively.
- ▶ **Improved understanding and management of risk**
Remote monitoring of customer behaviour and assets helps to identify critical events and automate the response to them.
- ▶ **Improved business agility**
Provides a means to quickly react to events and scale rapidly thereby helping to mitigate risks and proactively leverage new business opportunities.
- ▶ **Generation of new revenue streams**
Provides a direct connection with customers, enabling new services to be offered.

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 analyse data to generate insights that can be acted upon.



- ▶ **Smartphones and tablets**
Smartphones and tablets contain a wealth of sensors and processing power enabling devices to be integrated.



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



Anatomy of an IoT solution

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, cyber security 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 centre 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 on the cloud to deliver the core functions allowing you to rapidly move to operational pilots.



Transport

- ▶ Downtime can be minimised and efficiency improved through the predictive maintenance and monitoring of logistics vehicles and aviation.
- ▶ Train derailments can be prevented by merging data from GPS, tracks, cameras and other sensors to precisely monitor location.
- ▶ Logistics can be streamlined through location tracking and load planning.
- ▶ Taxi services like Uber can be provided through smartphone apps and connected cars.



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.



Future cities

- ▶ Law enforcement and public safety can be improved by analysis from crime data.
- ▶ Public safety can be improved and costs can be reduced with smart lighting.
- ▶ Congestion can be reduced by tracking highway vehicle flow.
- ▶ Energy consumption can be reduced with smart buildings.
- ▶ Water can be preserved by predicting floods and reducing leaks.
- ▶ Waste collection can be optimised via sensors attached to bins.



Retail and consumer services

- ▶ The customer experience can be personalised 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.
- ▶ Vending machines can be made smarter to provide personalised offers and to alert when out of stock.



Automotive

- ▶ A driver's experience can be personalised with 'infotainment' services that sync with smartphones.
- ▶ Maintenance and performance can be improved through analytics.
- ▶ Dealer visits can be reduced through over-the-air software updates.
- ▶ Anti-theft solutions allow vehicles to be tracked and remotely disabled.
- ▶ Rescue locations can be pinpointed through emergency distress beacons.



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.



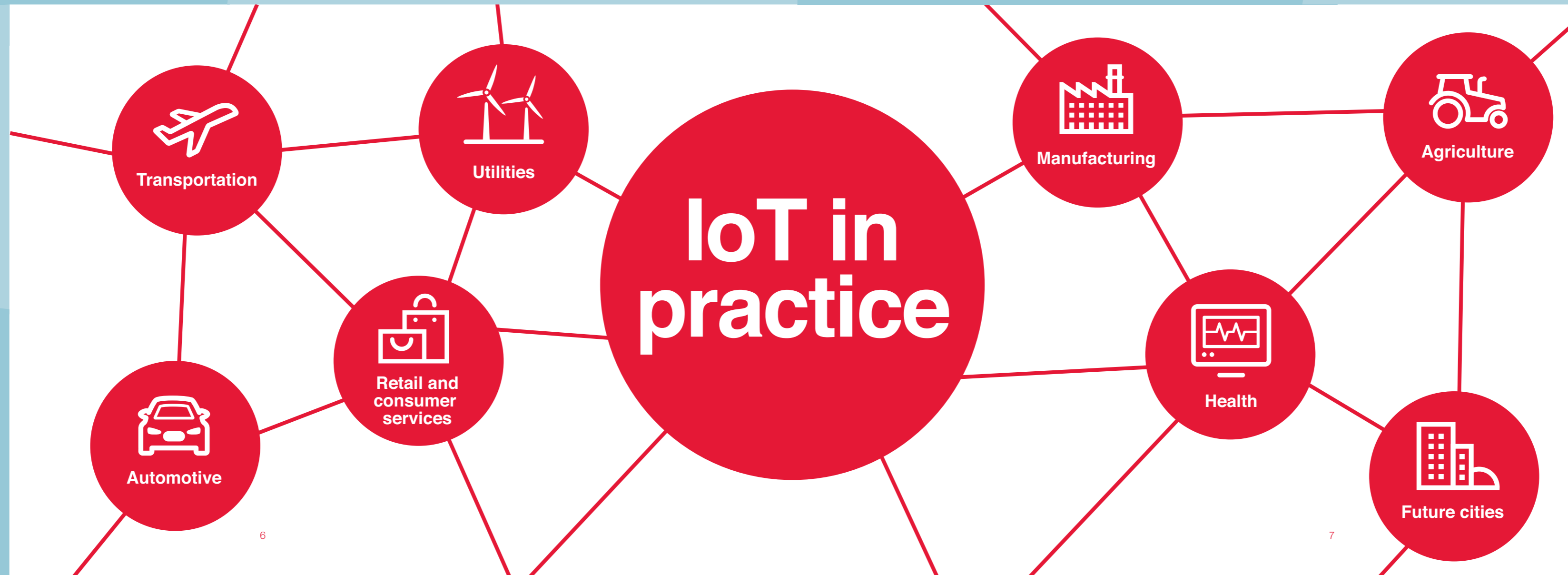
Manufacturing

- ▶ 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 optimised through analysis of the production process.
- ▶ Stock holdings and logistics can be optimised by tracking individual stock items rather than entire pallets.



Agriculture

- ▶ Irrigation and fertiliser 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, optimising growing conditions and safeguarding animal welfare.



Delivering the solution

Our recommended approach

Realising 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 to develop a **tailored roadmap** that closely involves your people as it's rolled out.

CGI's approach

Expand by adding new devices, assets, data and functionality.

Increase number of 'things'.

Generate new insights to create new business value.



Start by identifying use cases that will impact the business.

Identify the data you need and information you already collect.

Pilot using CGI's IoT framework.

- ▶ 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.

Start small

The principle of our approach is '**Start Small but Start**'.

Although most organisations recognise 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 partners like Microsoft to provide scalable, cloud based platforms that can grow to whatever scale your organisation needs, while future 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 SME Accelerate programme has created a network of 400 small and medium enterprises who we can rely on to deliver with the same ability and passion that we do. This diverse group of SMEs includes digital design agencies, sensor manufacturers, communications providers and big data specialists.



Why CGI?

- 1 A market leader with award-winning solutions across both the commercial and public sector.
- 2 Commercial off-the-shelf, scalable and integrated services using a standardised cloud-based platform.
- 3 Cross-industry expertise – IoT should be considered in line with a wider digital transformation strategy.
- 4 Ready-to-go IoT platform using CGI's global IoT IP solution.
- 5 Rapid development and deployment, reducing your time to market.
- 6 Consumption-based, “pay as you go,” agile service models.

Connect assets | **Build** and unify | **Operate** as services



Examples of our IoT solutions

- ▶ After a successful pilot project to install **traffic monitoring cameras** at 15 sites, CGI now maintains the **radars** for a transport ministry. CGI analytics is used to prioritise critical activities to improve road safety.
- ▶ CGI designed and developed a **virtual travel planning** assistant service for public transport passengers, which also serves as a personal public transport “satnav” for each passenger.
- ▶ CGI developed in-car and infrastructure technologies that will **transform how vehicles communicate** with each other and the broader transport network.
- ▶ In Finland, we used **smart data** to improve the City of Helsinki’s bus system. By working with a large amount of the city’s data, we were able to design **smoother bus traffic**, resulting in more satisfied passengers and benefits for the environment.
- ▶ CGI built a cloud-based solution to **manage electric vehicle charging**. This solution tracks the location, condition and status of each individual charge point, and **securely manages payments**.
- ▶ ThyssenKrupp Elevator wanted to transition to a **more proactive and predictive maintenance approach** driven by **real-time data and rich, valuable insight**. CGI was brought in to design, build and implement an insight-driven elevator monitoring system pilot that leverages the latest Internet of Things (IoT) technologies and is helping ThyssenKrupp to achieve its strategic maintenance objectives.

Award winning solution

Microsoft Partner
2014 Partner of the Year **Winner**
Intelligent Systems

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

“We wanted to go beyond the industry standard of preventative maintenance, to offer predictive and even pre-emptive maintenance, thereby guaranteeing a higher uptime percentage on our elevators.”

Andreas Schierenbeck
CEO, ThyssenKrupp Elevator

About **CGI**

Founded in 1976, CGI is the fifth largest independent information technology and business process services firm in the world.

Approximately 68,000 professionals serve thousands of global clients from offices and delivery centers across the Americas, Europe and Asia Pacific, leveraging a comprehensive portfolio of services, including high-end business and IT consulting, systems integration, application development and maintenance, infrastructure management, as well as a wide range of proprietary solutions.

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