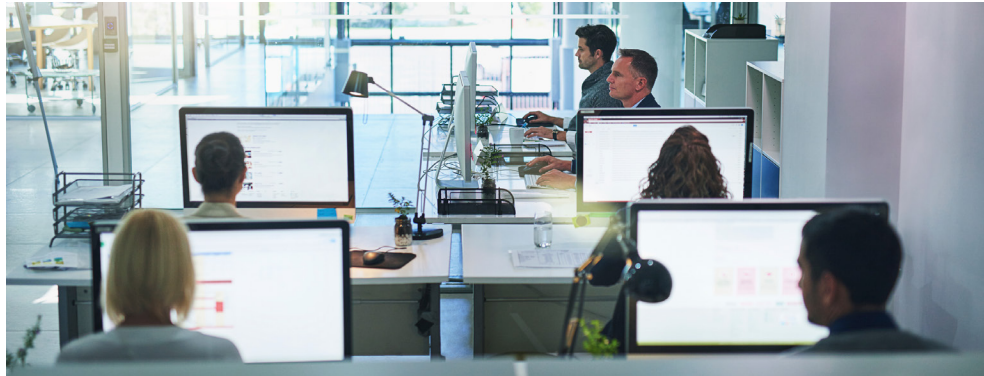# CREATING VALUE THROUGH THE INTERNET OF THINGS

COMPANIES CAN SPUR INNOVATION, TRANSFORMATION, AND GROWTH BY EMBRACING THE POTENTIAL OF CONNECTED DEVICES

GARY LES AND **MIKE ROBERTS**

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Companies and other enterprises around the world are rapidly adopting devices that use internet and cloud-based connectivity to monitor and control systems, products, and services. Known as the Internet of Things (IoT), network connectivity of everyday objects is poised to grow very rapidly over the next several years.

Technology analyst group Gartner, Inc. estimates that in 2016, an additional 5.5 million new IoT-connected devices will be added each day. They forecast that there will be a total of 6.4 billion connected things in use worldwide by the end of this year.[1]

Ericsson, a leading global mobility services, software and infrastructure company, forecasts that in 2018 the number of IoT devices, which includes connected cars, machines, utility meters, remote metering, and consumer electronics, will surpass the number of mobile phones in service. In a report released in June 2016 Ericsson says, "IoT devices are expected to increase at a compounded annual growth rate (CAGR) of 23 percent from 2015 to 2021, driven by new use cases. In total, around 28 billion connected devices are forecast by 2021, of which close to 16 billion will be related to IoT."[2]

1. Gartner news release dated Nov. 10, 2015, http://www.gartner.com/newsroom/id/3165317
2. "Ericsson Mobility Report 2016", June 2016, https://www.ericsson.com/mobility-report

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The value that can be created by IoT-connected devices is immense. Technology provider Cisco estimates that IoT will create $14.4 trillion in "Value at Stake" — the combination of increased revenues and lower costs that is created or migrates among companies and industries — in the 10 years ending in 2022.[3]

A primary reason for the explosive growth and implementation of IoT devices and applications is that they create value rapidly and in a number of ways. Adopters are able to use the devices to monitor existing procedures and processes, and use the resulting data to gain insights that allow them to innovate and transform processes, products, and even their business models.

The types of IoT connected devices are wide and varied. They range from consumer-oriented products such as fitness bands and smart home technologies, to large interconnected manufacturing systems that monitor production, control energy and other input costs, and optimize output and profitability across a global platform.

Examples of IoT innovation

With the explosive growth of the IoT market in the past five years, there are countless examples of how companies have used IoT tools to manage enterprise issues, improve performance, and generate growth and profitability.

One example is a middle-market fitness products company that designs, produces, and distributes functional fitness products to wholesalers, retailers, fitness centers, and rehabilitation centers globally.

Gary Les, who has a strong background in innovation strategy and IoT capabilities, led the company's executive team in leveraging

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3. Cisco White Paper, "Embracing the Internet of Everything To Capture Your Share of $14.4 Trillion", 2013, http://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoE_Economy.pdf

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IoT solutions cover a wide variety of markets with diverse characteristics, including:

- **Agriculture** — Monitoring of crops and livestock, precision application of water and nutrients, energy use optimization

- **Automotive** — Connected cars, telematics monitoring, security, maintenance

- **Building and Home Automation** — Mechanical, electrical, security

- **Consumer Products** — Remote user interfaces, maintenance, software management

- **Energy Management** — Switches, power outlets, connected light bulbs, outage management

- **Environmental Monitoring** — Air, water quality

- **Infrastructure Managemen**t — Bridges, railroad tracks, wind farms, power grid optimization, emergency management

- **Insurance** — Asset and customer tracking, claims automation

- **Large Scale Deployments** — Smart cities, smart corporate and institutional campuses (universities, hospitals, healthcare), fleet management, digital signage

- **Manufacturing** — Equipment monitoring and maintenance, controls, inventory, supply chain

- **Medical and Healthcare Systems** — Devices, implants, patient compliance and monitoring

- **Media** — User experience, targeting, data mining

- **Oil and Gas** — Remote monitoring of equipment, equipment maintenance, pipelines and other transportation

- **Retailing** — Inventory, supply chain, user experience

- **Shipping and logistics** — Container monitoring and environmental

- control, location tracking, route optimization

- **Transportation** — Smart parking, traffic control, vehicle control

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technology with their unique products. The team identified the need to objectively measure and record the amount of force expended during a patient's exercise and identify improper exercise form. This data would assist a physical therapist to assess and track the patient's recovery. Mike Roberts, now of LS Research (LSR, a Laird business), also consulted to identify technical solutions for this product.

The product team created rehabilitative hardware with force and motion sensors which accurately measure applied force, timing, and range of motion during assessment and therapeutic exercises. The device is highly portable and interfaces wirelessly with custom software, enabling physical and occupational therapists to objectively assess patients and track their exercise regimens, remotely if desired. Some of the benefits of the system include:

- Recording accurate and objective patient data, providing information that can be used in improving the efficacy of the rehabilitation regimen. The system wirelessly populates a secure cloud-based database for storage and analysis by the physical or occupational therapist.

- Providing a "virtual coach," with 3D animations demonstrating the proper form of the exercise, and providing real-time feedback of the patient's actual form, range of motion, patient-specific targets, and limits for proper performance and safety.

- Tracking progress and compliance anywhere there is an internet connection, and it is equipped with proper access credentials for patient security purposes.

This successful creation and implementation of the system led to the spin-off of a subsidiary, which focused as a separate company on the design, development, manufacture, and distribution of objective measurement and tracking devices for the rehabilitation and physical therapy market.

Medical devices benefit from IoT, too

Another prime example of IoT includes a medical-device start-up incorporating IoT transmitters into inhalers used for respiratory therapies to monitor patient usage and compliance. The Bluetooth® enabled inhaler captures the date and time the patient uses the device, and that information is synched wirelessly to the patient's mobile phone application. Today's smart phones all contain GPS radios, so the mobile app can now also record the location where the event took place. The captured data can be sent to the cloud and analyzed.

The patient's individual physician can review the data to make decisions on treatment. The "big data" from all of the connected inhalers can be analyzed by research companies to monitor potential trends in air quality on a national level. LSR was instrumental in bringing this IoT concept to reality by helping the customer understand the entire solution needed from adding wireless capabilities to the product, to the mobile app for the patient, to the cloud platform interface among patients' physicians and research organizations.

The potential use of this type of IoT device in other healthcare applications is significant. A successful adoption of IoT devices by healthcare providers will allow wearable patient sensors to transmit data and eliminate patients being tethered to medical equipment by wires. According to a study from GE, a 1 percent IoT-generated reduction in healthcare system inefficiencies could bring about savings of $63 billion over a 15-year period.[4]

IoT can transform business models

IoT isn't just changing the way consumers and patients interact with products. It's also transforming the business models of companies that are looking for ways to differentiate themselves from the competition. LSR has been helping one such client that manufactures consumer durable goods—appliances you would find in the typical home kitchen. Sensors are embedded into the appliance so that the

"vital signs" of the equipment can be remotely monitored by both the consumer as well as companies that service the equipment. With a mobile app, the consumer has access to certain attributes of the equipment to customize their own user experience. Through advanced software algorithms, the equipment manufacturer can now more accurately predict when the equipment will need servicing before a malfunction actually occurs, potentially ruining the inventory of the appliance.

Many services, including software upgrades and new feature enhancements, can now be performed remotely and transmitted without the need to dispatch a service technician to the consumer's home. This level of near real-time servicing is a clear differentiator and a new opportunity to build brand loyalty, not to mention the potential for a new revenue stream for the equipment manufacturer to provide these advanced services.

Wireless technologies in IoT systems

A wide variety of wireless technologies and protocols are being deployed in IoT systems. WiFi, Cellular, Bluetooth, and Bluetooth Low Energy (BLE) are the most widely used technologies, but RFID and even some proprietary technologies are finding a place in the large IoT spectrum. WiFi is often considered, since it provides connectivity to wireless networks and gateways/routers already installed to help devices move data to cloud applications. However, in many commercial and especially healthcare sites, access to the WiFi network and infrastructure is not available for fear of over-taxing the network.

LSR is seeing a growing interest and trend in new technologies such as LoRa, a Long Range and Low Power Wide Area Network (LPWAN) protocol. LoRa hardware typically runs at frequencies different from WiFi, allowing for longer range communications between devices without interfering with the site's WiFi network. Some of the trade-offs for a LoRa-based IoT system are lower data rates and the requirement to install

LoRa-based gateways, though fewer gateways are typically required to cover the same space. Over the coming years, we may see LoRa technology expanding to public networks, similar to what most of us use every day with our cellular phones. This could have a compelling impact on LoRa technology being widely adopted as a strong IoT standard in the future. This public network along with the long range capabilities of LoRa will have a compelling impact on a variety of industries, especially university campuses, medical centers, agriculture, and oil/gas/energy.

How can businesses assess and adopt an IoT strategy?

We have identified five key elements to success in our experience working with companies that have used the Internet of Things as a means to bringing about innovation, transformation, and growth.

1. **Embrace technology changes and prepare to reevaluate your business model and service offerings.** Many companies focus solely on defending a legacy model when the opportunities for growth are not there.

2. **Create an internal cross-functional leadership team to understand digital technology and explore applications in your business.** This team should include the:

   a. CEO — Champions and drives the project

   b. VP of Business Development — Advocates the voice of the client

   c. CTO/CIO/Director of IT — Leads the understanding of the technology

   d. Director of New Product Development — Develops a proven process

   e. CFO — Analyzes and manages the ROI

3. **Engage outside experts to develop a strategic plan that leverages connectivity and the Internet of Things.** Going it alone can be a recipe for disaster. By knowing what your business' core competencies and

technical expertise are, you can identify gaps to augment with outside firms. This ultimately results in faster-time-to-market with a project that stays in scope, on time, and with proactively managed risk.

4. **Acquire talent and/or businesses that will accelerate your company's position in the global marketplace.** This can be particularly important as you look to expand outside of your core market or outside of the country.

5. **Continue to refine your strategy and service offerings to serve your customers, stay in front of the competition, and ensure survival.** IoT is a vehicle, and not the destination.

What can Huron Consulting and LSR bring to the table?

Huron and LSR can assist you with an assessment and strategic plan to leverage the power of the Internet of Things in your organization. The plan would include practical integrated applications for wireless connectivity to separate your organization from the competition and create significant value for your business.

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ABOUT THE AUTHORS

Gary Les, Senior Director, Huron Consulting Group
Gary is a global senior executive with more than 25 years of experience leading, managing, and growing manufacturing, distribution, and technology companies. He has an extensive background in strategic planning, revenue development, P&L responsibility, worldwide supply chain management, technology, licensing, acquisitions, and legal affairs. As a President/CEO, Gary has managed people and projects in more than 30 countries including China, Taiwan, India, Pakistan, Germany, England, Nigeria, Mexico, Honduras and other strategic locations around the world. Gary is a natural leader of people who implements collaborative change to drive results and create value in companies.

For additional information on Huron and its services, visit www.huronconsultinggroup.com or contact Gary Les at gles@huronconsultinggroup.com.

Mike Roberts, Director of Disruptive Innovation – Central USA, LS Research (a Laird business)
With more than 25 years of new product development and design automation experience, Mike has focused his career on helping manufacturers get their products to market. Mike's role focuses on assisting manufacturers across numerous industries identify and execute on their 'connected products' strategy, empowering them to disrupt and reinvent their product category with emerging technologies based on wireless protocols such as Wi-Fi, Bluetooth, LoRa, and RFID.

For additional information on LSR and their IoT product development capabilities, visit www.lsr.com or contact Mike Roberts at Mike.Roberts@lairdtech.com.