NYPRO
A JABIL COMPANY

The Internet of Things (IoT) is Accelerating Connected Health

The Internet of Things Will Be a Big Business

Mobile phones have had the fastest adoption curve of any technology on the planet. In the US, to reach 80 percent penetration, electricity took 37 years, the color television took a little over 20 years and the Internet took almost 20 years, but the mobile phone only took about 13 years. According to eMarketer, as of May 2014, there are 4.5 billion mobile phone users worldwide, equivalent to over 60 percent of the world population, although the rate of mobile adoption is slowing.

ABOUT NYPRO

Nypro provides a comprehensive array of global solutions in ideation, product design, molding, tooling, intelligent supply chain management, device assembly and manufacturing for the Healthcare and Packaging industries. Our expert teams leverage over 40 years of industry experience, fueling speed-to-market, ingenuity and agility. Our customers can focus on their core competencies knowing Nypro's experience and capabilities are behind them.

What is the Future?

DEVICES CONNECTED TO THE INTERNET

1 Billion Fixed Internet in the 1990s

6 Billion Mobile Internet in the 2000s

28 Billion "Things" Connected to the Internet by 2020

This unprecedented acceptance of mobility is migrating from connecting people to connecting things. This Internet of Things (IoT) is dramatically reshaping many aspects of everyday life, from the clothing we wear to the cars we drive and the homes we live in.

Simply defined, the IoT is a network of physical objects including everyday items, equipment or devices (aka things) connected to the Internet, usually wirelessly, which send data, share information and/or remotely control and manage a device or process in order to provide a more beneficial outcome for a specific user base or the population as a whole.

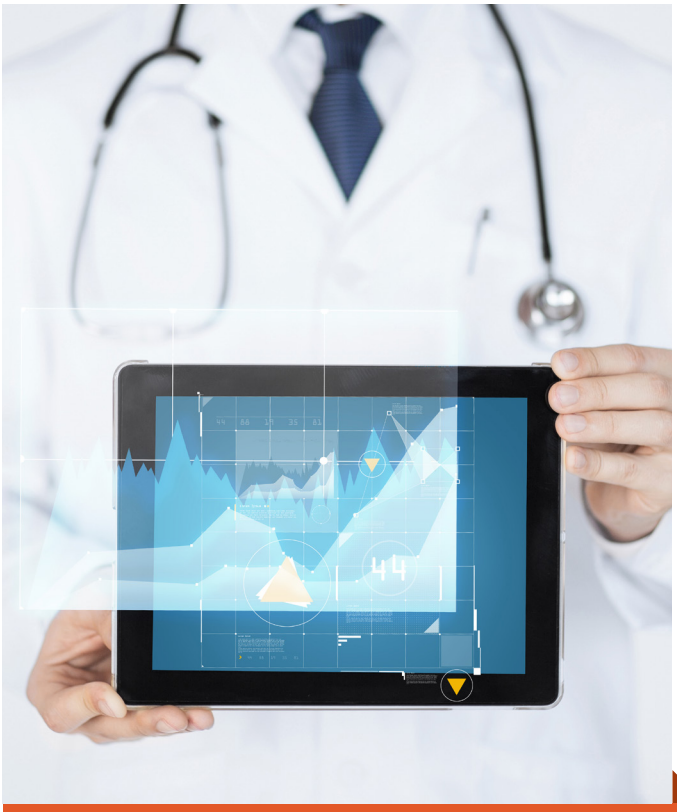
IoT sensors are becoming integrated into many previously non-electronic products, helping us make better everyday decisions. A few interesting IoT examples include integrating mood and activity sensors in dog collars; embedding sensors in diapers that send a message to a mobile phone when the baby needs a change; monitoring swing performance in golf and tennis; determining localized air quality to give early warning to asthma sufferers; and measuring critical environmental parameters in an industrial environment using ruggedized sensors.

Recently, Cisco coined the term "fog computing", which comes from the fact that fog is the cloud closest to the ground. Fog computing concentrates processing at the edge of the network via connected wireless sensors that are closer to everyday things versus in the cloud or Internet infrastructure.

The Internet of Things Will Accelerate Connected Health

The mobility megatrend that has transformed our society so significantly will also alter the practice of medicine in profound ways. Even though healthcare moves at a much slower pace than consumer markets, there is no doubt of the shift that is occurring.

Medical device manufacturers up to now have enjoyed a position of paramount importance in the healthcare ecosystem. Diagnosis, treatments and procedures were performed solely in the hospital or at the doctors' office. High reimbursements for devices in a pay-for-transaction model ruled the day.



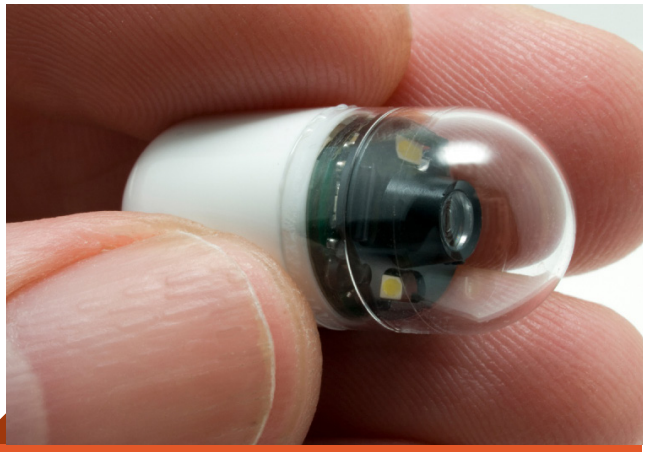
IoT and mobility are helping to accelerate a much more complex and interconnected healthcare ecosystem. Medical devices are now sharing the spotlight with companies that analyze data to deliver much higher levels of intelligence. In the coming pay-for-value environment, and accompanying reimbursement schemes propelled by the Patient Protection and Affordable Care Act (PPACA), a large percentage of profitability will shift away from the stand-alone medical device to other data-focused clinical workflow, population health and consumer engagement elements in the connected healthcare ecosystem.

Solutions that have the ability to significantly bridge the massive gap between what we do now in our pay-for-transaction model to what we need to do will partake in more of the profits. This will include solutions that better define, enable, quantify, analyze, report on and pay the ecosystem properly and fairly for outcomes with true health improvements or quality of life value that drive better usage of healthcare dollars.

A new revolution of data-driven health decisions and care delivery is at hand. A network of linked devices and other objects collecting, sending and receiving data about people, environments and processes without human interaction or input will enable a new model of "connected health" not only for the chronically ill but for the entire population.

Some examples of connected health devices include:

- Sensors in the shoes of an elderly person to detect falls and gait changes
- Sensors in the home to detect activity and lifestyle for "aging in placers"
- Heart rate patches and wireless scales for monitoring congestive heart failure (CHF)
- Baby monitors with temperature, heart rate and other sensors to send warnings and stats to concerned parents
- Dosage counters and activity sensors on drug delivery devices including insulin pens and pill bottles to act as reminders to improve compliance and adherence
- Proteus digital health - www.proteus.com
- Hearing aids and intelligent toilets
- Patient identification and tracking
- Diabetes care devices and mobile ECGs
- Pacemaker monitors
- Neuromodulation monitors
- Continuous glucose monitors
- Pillcams

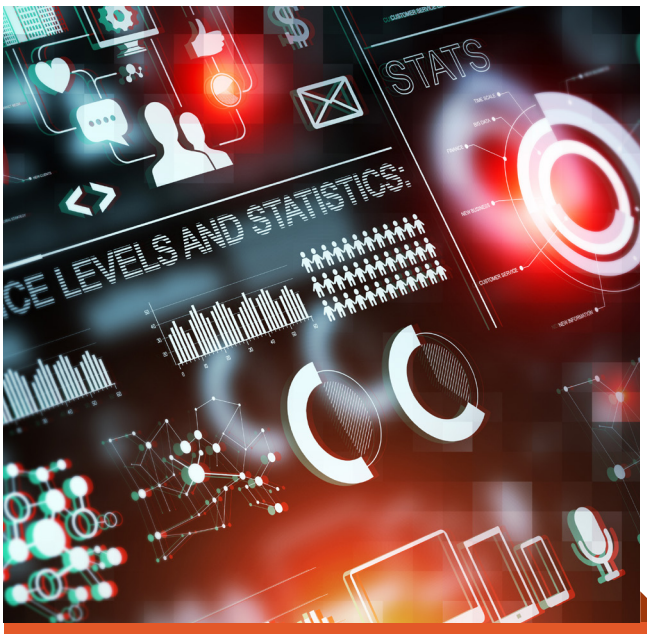


All of these products include sensors and wireless connections to either a mobile network, a Wi-Fi network or via a low power Bluetooth connection to another mobile device. The goal is to get real-time data in the hands of the user, caregiver, health care providers and accountable care organizations to make faster, better decision about both population health and individual care.

It's All About the Data

In healthcare, it is no longer just about performing a diagnosis or treating a patient in a clinical environment with a device. Affecting outcomes requires understanding of a much more complex ecosystem including the individual, environment, culture and many other elements. IoT connected devices and sensors can help us measure and perform analytics on a more expansive array of variables that can affect a decision. IoT can help stimulate and inspire consumers to be highly engaged in their own health.

Stand-alone medical devices will be virtually non-existent in coming years. Data is proving to be more important to achieve the pay for value business models than the device alone. Facebook is one of the best examples of this model. Facebook's product is really our data. The social community and interaction is only the vehicle to capture our data.



IoT is a tectonic change that will cause tsunami-like effects down the value chain, not just those companies closest to the patient. Healthcare and device companies need to recognize this and make this critical strategy switch. Many medical device manufacturers have started planning now to prepare for implementation of this new business model where device is only one part of the solution. The medical device will be the means to obtain physiological data that will be combined with other data including environment, behavior, population statistics, genomic and, possibly even, mental state. It is not what the medical device will do by itself anymore; it is what the device, plus the holistic data plus the app, plus the services can do together working in unison.

Technology Transformation

Still in its infancy, connected health is a wide-open opportunity for medical device manufacturers. According to an IDC report, the Internet of Things (IoT) IT market for remote health monitoring will grow from $8.2 billion in 2014 to over $12.4 billion in 2018.

Connected health has attracted the attention of innovators, who are already unveiling advances that span the technology spectrum – from handheld or wearable network devices to software applications to data analysis tools. Each of these represents a part of the overall ecosystem of connected healthcare. But, regardless of the end application or use case for the data, every one of these devices will need to be connected quickly, easily, unobtrusively and cheaply to a wireless network.

Many device companies and consumer product companies that desire to enter the connected health market lack the required expertise in complex electronics that will enable and support remote connectivity, data collection and data analysis for their particular device and use case.

One solution is to partner with a provider that offers knowledge and technical expertise in design and manufacturing of electronics – particularly consumer electronics – as well as medical devices.

First, the hardware form factor is changing and with traditional functionality becoming distributed across ecosystem. The main user interface might now be on the mobile device with hardware consisting of the core

sensing, diagnostic or treatment IP elements and a wireless connection such as BTLE, WIFI or even a 3/4G connection. In many cases, these new form factors are being miniaturized but, due to cost requirements, cannot support expensive advanced technologies. A strong partner can help device companies evaluate a wide array of technologies that could be implemented at a lower overall cost.

Recently, the Federal Communications Commission (FCC) announced it would allocate 40 MHz of the broadband spectrum specifically for medical devices. This coincides with the launch of Internet Protocol version six (IPv6), which provides much longer, 128-bit addresses that introduce much needed additional address space for devices and objects connected to the Internet beyond today's 32-bit IP address. The IPv4 standard only allowed for 4.3 billion addresses (or 4.3 x 109) while the new IPv6 standard allows for 3.4 x 1038 addresses.

These infrastructure changes are necessary for networks to support the anticipated flood of data that will emerge from connected healthcare devices.

Next, supply chain management is changing. No longer do the medical device suppliers have to manage only the hardware components of the device supply chain. New machine-to-machine (M2M) services are emerging to design and integrate wireless technology onto devices as well as establishing and certifying the wireless devices on global mobile networks, provisioning the devices for a specific patient or user and managing the devices behind the scenes to collect, send and bill for this valuable data. Now, the entire ecosystem with mobile apps, technology partners, M2M services and other new elements all has to be developed and managed.

Connected health is also a global phenomenon with many countries ahead of the US in implementation of these new connected, data-driven solutions.

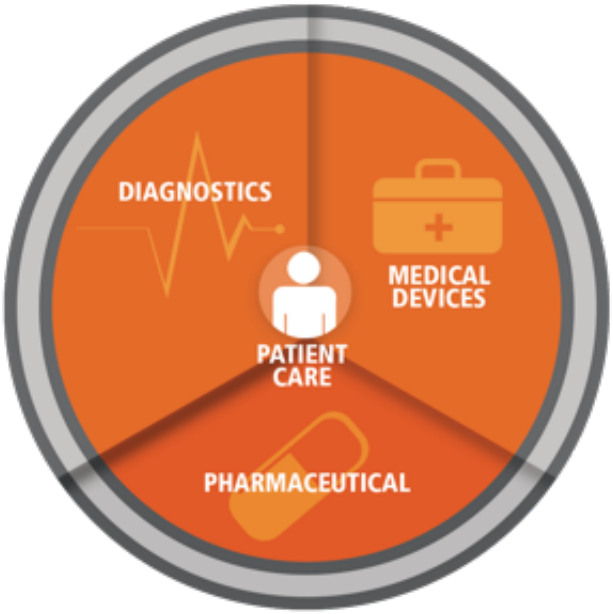
Device companies should be actively looking at how they internally manage their supply chain. They need to re-evaluate companies and identify which of their suppliers can become a larger part of their ecosystem in areas that will help develop and execute on the new strategies around data and services, combined with their device.

Those who can quickly bring their innovations to market with the right global partners to help manage the complexity of the solutions will have the advantage. For companies who wish to proactively influence and be the disruption in their market rather than react to the market, the time to develop that strategy is now.

What Nypro Brings

A Safe Pair of Hands to Unleash the Full Potential for Innovation

Nypro offers healthcare and pharmaceutical customers the widest array of design and manufacturing services in the industry. Our highly specialized teams meet the complex and regulated demands of the Diagnostics, Medical Devices and Pharmaceutical markets enabling the world's leading brands to fulfill their market potential.



We meet and exceed customer needs by providing a comprehensive array of global solutions in ideation, product design, human factors engineering, tooling, intelligent supply chain management, value engineering, device assembly and packaging. Our expert teams leverage over 40 years of industry experience, fueling speed-to-market, ingenuity and agility. Our customers can focus on core competencies knowing Nypro's experience and capabilities are behind them.

Nypro leverages capabilities of the whole Jabil family. Technologies used in Consumer Lifestyle, Industrial, Computing & Storage and Automotive are being leveraged to the Healthcare areas as Acoustics, 3D Printing, User Experience Design, RF & Wireless, Optics, Automation, Fluidics, Printed Electronics, Adhesives, Low Power Electronics, Cameras, Materials Technology, Precision Mechanics, Sensors and Wearables – all of great value to innovate connected devices.

Extraordinary Capabilities

Synergy of Design Through Manufacturing

What Jabil Brings

Flexibility and cost avoidance are keystones of Jabil's Value Engineering Team. In fact, value engineering drives 40 percent of active design. That's how we play an integral role in intelligently designed and engineered products that improve the value, speed and long-term success of customers across multiple industries.

With deep expertise and global partner relationships, Jabil supply chain experts utilize best practices and regional know-how to partner with some of the world's most notable brands. One of the most comprehensive examples of how Jabil manages complexity lies with its homegrown business intelligence tools and entrepreneurial engineers who build innovative, sophisticated, business intelligence tools for the entire supply chain. These tools provide real-time, actionable insights to customers and business managers throughout the entire supply chain organization.

About Nypro

Healthcare markets around the globe are going through a perfect storm of change. Technologies, regulations, patient and consumer behaviors, population demographics and dynamics, and even business models are all undergoing simultaneous transformations that make the future of healthcare increasingly difficult to predict and navigate.

With this risk and disruption come great opportunities for companies that embrace change, manage complexity and achieve greater agility, scale, intelligence and control in manufacturing. Nypro Healthcare offers healthcare and pharmaceutical customers the widest array of design and manufacturing capabilities in the industry.

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