Dawn of Future

IoT-driven medical devices service enterprises

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Industries across segments are moving from selling products to selling services; even wind turbines, locomotives and jet engines are now sold as services. The emergence of the Internet of Things (IoT) has now enabled medical devices companies to create a new business model premised on services, personalization, and other innovations.

IoT, where physical devices are instrumented to capture and transmit data covering everything from environmental conditions to usage patterns and user behaviours, is arguably the next wave of information technology advancement. The 'things' in IoT can refer to a wide variety of devices including implants, physiological monitors, wearables, capital intensive diagnostic equipment, and so on.

The expanded sensing and communicational capabilities of these 'things' herald the next big wave of the Internet. Estimates indicate that some 12 billion devices[1] are already connected to the Internet. This figure is expected to grow to 50 billion devices by 2020. IoT's power lies in connecting dots in an innovative fashion. The transformative possibility is evolving across a broad spectrum: connected homes, connected healthcare, connected factories, and connected enterprises.

The healthcare industry is well on its way to a smart, connected future enabled by IoT, as market leaders recognise that sensors connected through IoT can transform business models and harbinger new possibilities. Healthcare organisations that integrate these 'connected health' trends into their practices, processes and workflows can offer patients better care and greater satisfaction while reducing the cost of care. The global healthcare IoT market is expected to grow from USD 32.47 billion in 2015 to USD163.24 billion by 2020[2].

Game-Changing Possibilities

Physicians and patients increasingly believe that 'wearables' could help them better manage health and potentially improve long-term care. Roughly 72 million wearable devices were shipped in 2015[3], a figure that will nearly double to 156 million by 2019. These trends indicate strong growth in the sector.

With IoT, the medical device manufacturer can usher in true customer-centricity. There are three types of transformational opportunities:

- Greater operational efficiency, as a result of preventive maintenance of devices and remote diagnostics and software upgrades, improving customer satisfaction
- Digital innovation around the communication of vitals and device information, and new services that can help customers contextually understand the insights
- Connected ecosystem, as a result of the ability to link devices and systems together, bringing superior intelligence to the customer.

Let's look at some opportunities for digital disruptions. The number of product recalls of medical devices has increased nearly 100 per cent[4] between

1 http://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf

2 http://www.marketsandmarkets.com/PressReleases/iot-healthcare.asp

3 http://archive.eetasia.com/www.eetasia.com/ART_8800713348_499488_NT_cf5904f0.HTM

4 https://www.fda.gov/downloads/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDRH/CDRHTransparency/UCM388442.pdf

2003 and 2012. By investing in real-time predictive analytics powered by IoT, manufacturers can proactively determine quality issues to reduce the number of product recalls and strengthen brand image.

According to the US Food & Drug Administration (FDA), the number of serious complications from medical device use has outpaced industry growth by 8 per cent each year since 2001[5]. By gathering information about the device and its usage environment, medical device manufacturers could reduce these complications by informing future product design and proactively improving post-sales service support.

A leading medical device manufacturer logs an average of 200,000 product-related customer services complaints[6] every year. The ability to predict and proactively address even a fraction of these complaints would spell significant competitive advantage for the company. IoT powered devices have brought such services within the realm of possibilities.

Managed care at home can now be a reality, providing relief to patients, insurance companies, governments, and hospitals. Devices can communicate patient vitals in real time. Alerts can be generated to flag patient need for attention. This can be creatively used in post-discharge care as well, such as monitoring patients after a major cardiac surgery.

Harnessing IoT Analytics to Transform the Medical Device Value Chain

Traditionally, manufacturers have introduced new efficiencies to their value chain by employing lean manufacturing and Six-Sigma quality techniques. While this can certainly drive optimisation, manufacturers can also accelerate transformation by introducing new business decision services powered by IoT and big data analytics.

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Success in developed markets varies greatly from emerging economies, which require a very specific understanding of stakeholder needs. By using data mining techniques, such as Natural Language Processing (NLP), medical device manufacturers can cost-effectively obtain this information and influence the product development lifecycle for each market. When these data sets are assessed in isolation, their meaningful impact on the value chain is limited. By identifying effective ways to integrate these data sets and apply analytics capabilities to them (for example, predictive analytics and NLP), organisations can more effectively optimise the value chain. By analysing IoT and an array of big data assets, for example, an insulin pump maker can enhance various components of its value chain.

From a 'process' standpoint, IT would need to engage with the business much earlier in the lifecycle to build a comprehensive data and analytics strategy. From a 'technology' standpoint, companies would need to invest in IoT capabilities, such as changing device design (for example, installing sensors to monitor real-time device usage), and building or buying predictive analytics systems and NLP tools to analyse the information gathered through these devices. From a 'people' standpoint, investing in knowledge management and learning systems would go a long way in improving the organisational adoption of these new capabilities.

IoT should be viewed as a business solution. The true value of IoT will be realised when systems are designed to provide impactful business outcomes. For example, a medical device manufacturer can offer a service to labs around the most profitable categorisation and bundling of tests. Fertile ecosystems that connect the dots must be visualised where IoT can provide deeper insights into a device's operating environment and its internal state.

There are some challenges that we need to be wary of: the diversity of data communication protocols, energy needs, exposure to new security vulnerabilities due to data exfiltration, and privacy apprehensions. These concerns are not intractable and will abate in the coming times. The dawn of services-based medical devices and connected ecosystems for greater customer centricity positions us on the cusp of digital disruption and presents a great opportunity to shape the future.

AUTHOR BIO

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5 *https://www.fda.gov/downloads/AboutFDA/CentersOffices/CDRH/CDRHReports/UCM277323.pdf*

6 *https://www.cognizant.com/perspectives/how-iot-analytics-can-transform-the-medical-device-value-chain*