THE CURRENT STATE OF IOT BY INDUSTRY

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The Internet of Things (IoT) has grown significantly in recent years and its impact can be felt across industries. For example, in agriculture, the sensors in the fields provide near-real-time data about the health of the crops. In healthcare, IoT enables pharmaceutical companies to trace and track medicine from production to patient.

IoT's impact doesn't stop there as smart solutions can be found in cities across the U.S. to help manage public safety, manage traffic, and even attract new business. As a result, it's safe to say that this innovative technology is now at the heart of digital transformation.

In fact, it's changing the playing field for businesses in every industry by enhancing efficiency to drive growth and create new business opportunities. However, the growth of IoT has largely been invisible to consumers who associate this technology with connected cars, smart homes, and wearables.

According to research conducted by IDC, global spending on IoT software, hardware, networking, and services will reach approximately $1.3 trillion by 2020. The current spending by industry breaks down as follows:

• Manufacturing is significantly ahead of other industries spending $178 billion on IoT technologies in 2016

• Transportation and logistics spent approximately $78 billion on IoT last year

According to a study conducted by Ericsson, the IoT maturity model across industries consists of the following steps:

Monitoring by enabling devices to gather data through sensors

Control by remotely controlling connected products

Optimization of products automatically by implementing analytics

Autonomy enabled by artificial intelligence (AI) and machine learning (ML)

System autonomy where a network of connected things communicate and synchronize with one another autonomously

As IoT evolves, it has the potential to have an economic impact of $3.9 trillion to $11.1 trillion a year by 2025. As a result, business both large and small need to have an in-depth understanding of the latest IoT technologies that can help build a secure ecosystem of connected devices, cost-effectively.

This also makes it critical for enterprises to understand that IoT goes far beyond wearables and connected cars. Let's take a look at the current state of IoT in finance, commercial real estate, legal, manufacturing, and theme parks.

SMART THINGS IN THE FINANCIAL SERVICES INDUSTRY

The financial services industry has been historically averse to new technologies and change. So the current adoption of IoT technology may come as a surprise to some. But it shouldn't as we are all now living and working in a customer-centric experience-based economy.

For the financial services sector in particular, machine-to-machine (M2M) connectivity represents a huge opportunity to better understand customers in real-time. By gaining valuable insights derived from the customer's actual behavior, there's an opportunity to develop more advanced products that serve them better and enhance user experiences (UX).

It's an important step for financial services firms as the modern customer now expects services and products to be customized to meet their specific needs. For example, by incorporating IoT, financial services in stitutions can offer their customers specific pricing for a loan or an insurance contract.

But it doesn't stop there as IoT can be at the core of fraud prevention. This technology can also be utilized to better segment customers and limit defection to competitors. As a result, this has created a technological race as several startups have popped up within FinTech to disrupt the traditional financial services model.

This hasn't gone unnoticed. According to PWC, 81% of banking CEOs are concerned about the rapid evolution of technology (which is more than any other industry that is currently being impacted by IoT).

However, there are some real benefits that are already being realized by the industry. Some financial services firms have now achieved enhanced transparency by incorporating IoT solutions. As a result, they are now empowered to effectively manage risk by gaining valuable insights from real-time data (from both their own, and their customers' assets).

This is most notably evidenced in the insurance industry. For example, the insurance giant Progressive now utilizes onboard diagnostics (OBD) devices along with ML algorithms to analyze driver behavior and adjust pricing accordingly.

As a result, through 1.7 trillion claims and observations, the insurance provider's pricing model changed from what was once based on the type of car to one that focuses on how well the policyholder drives.

Beyond automobile insurance, smart sensors can also be utilized to better manage physical assets from office buildings to homes. This is evidenced in Liberty Mutual's partnership with Nest that is focused on effectively reducing risks for homeowners.

When it comes to dental insurance, we have Beam Dental that prices their dental insurance around smart products that help customers monitor their oral health. This is a completely new business and revenue model for insurers that was born out of IoT.

The company also engages with their customers by sending notices to help them improve their brushing habits whenever they fall short. The company currently gives away a smart toothbrush to every customer and hopes to cut dental insurance premiums by as much as 25%.
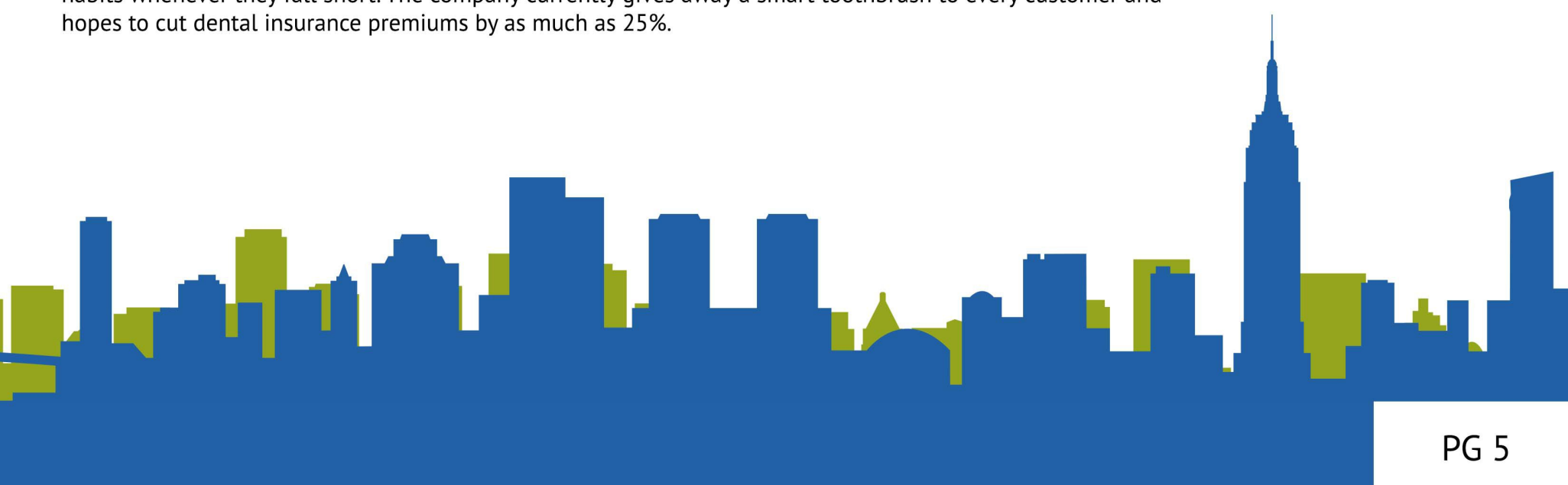
Retail banks can also analyze sensor data and biometrics to better engage in credit underwriting for customers with no credit history. Furthermore, through the development and evolution of the Internet of Value, financial services of the future also have the potential to become fully automated.

There are already smart ATMs developed by the U. S. Financial and Security Services Corporation. In this scenario, whenever you want to withdraw some money, all you have to do is schedule a session via a mobile app and then walk to the nearest ATM and choose available verification options like an iris scanner, NFC, or QR code.

These types of transactions that can be completed in under 10 seconds are much more secure than the traditional debit card and pin model. This, in turn, also has the potential to enhance customer experiences and customer service satisfaction.

However, there are some significant challenges that financial institutions need to consider. For one, when you incorporate smart devices and sensors to your IT infrastructure, there will be a huge addition of endpoints that need to be protected from ransomware attacks and other security breaches.

It's a serious concern as 90% of connected solutions are subject to a malware attack. Most often, these vulnerabilities result from the manufacturers' reluctance to encrypt data and release firmware updates on a regular basis.

This phenomenon might be directly attributed to the significant shortage top IoT developers. As a result, financial services firms who want to embrace the limitless potential of IoT technology need to address these issues during the planning stages as it could present a significant barrier to adoption.

COMMERCIAL REAL ESTATE 2.0

When it comes to the commercial real estate (CRE) industry, IoT is changing the way the industry operates. This is because this technology has enabled owners, managers, and tenants to all have more control over a variety of functions within a particular unit or building.

The smart cities of the future will require intelligent buildings that are architecturally designed to maximize efficiency with the help of the latest technology. This phenomenon has created a new dimension to the property market.

Historically, physical spaces were only differentiated by the following:

• **Location**   • **Layout**   • **Size**

But today, IoT enables the creation of more detail and ability when it comes to property evaluation. For example, the enormous amount of data generated by smart things provides an opportunity to conduct better risk evaluations.

Furthermore, operating costs can be better managed by homeowners when it comes the following:

• **Administration**   • **Maintenance**   • **Repairs**   • **Utilities**   • **Waste**

As a result, these types of smart buildings will be highly competitive in the market as they will be more sought after. However, it will probably be the end of the transaction-focused brokerage business model. This is because a broker traditionally represents clients, finds the property that fits their requirements, and then collects a paycheck. But with the emergence of IoT in CRE, real estate brokers will be expected to be more than just real estate experts.

In the near future, brokers will also be expected to operate as technology strategists that help clients acquire properties that will help them achieve their technology goals. According to the Deloitte Center for Financial Services study, sensor deployment within CRE is expected to grow at a compound annual growth rate of 78.8% between 2015 and 2020 to nearly 1.3 billion. This makes sense as several CRE owners have already started to implement business management systems (BMS) little-by-little to automate individual tasks like lighting control, elevators, and energy management.

As a result, tenant and end-client experiences can be enhanced significantly without the added expenses associated with continuous manual interventions. In this manner, IoT will continue to create real value for CREs through increased efficiency, differentiation, and new revenue sources.

CREs have the ability to offer analytics-as-a-service models to help the end-client change behaviors and access real cost savings, but this hasn't happened yet. What's more, CREs also have an opportunity to incorporate innovative technologies like footpath sensors to monitor traffic and help retail tenants design better layouts for their stores.

The recurring challenge here will continue to be related to security. Furthermore, the shortage of appropriate skill sets also has the potential to slow IoT adoption within this space. At the same time, CREs that are slow to adopt IoT technologies are in danger of rapidly becoming irrelevant as they won't meet the increasing demands of the marketplace.

LEGAL SERVICES SUPPORTED BY IOT

When you think about law, IoT may not be the first thing that comes to mind. In fact, you will probably be thinking about how lawyers are going to regulate all these smart devices and the data that's generated by them. But just as any other service-based business model can be disrupted by IoT, so can the legal industry. For example, at its most basic, lawyers can access the internet or make calls through wearables like smartwatches.

Furthermore, they can also be provided access to critical data through smart glasses in real-time. As a result, law firms will have to adapt their infrastructure to support IoT devices and the data that will be generated from them to perform real-time analytics.

However, the biggest benefit of IoT for law firms will probably come in the form of digital assistants. This can mean utilizing digital assistants to track billable hours, schedule deadlines, order food, or even conduct research to support lawyers working on active cases in real-time.

By accessing multiple valuable sources of data, lawyers will also be able to leverage this information in real-time to rapidly and efficiently resolve client issues. This, coupled with automation of administrative functions, will enable legal professionals to spend more time on their cases.

Additionally, as cars get connected and CREs get connected, it creates an opportunity for lawyers to benefit from a virtual office that can be accessed while in traffic, at home, or in the hallways of the courthouse. Law firms eager to embrace this cutting-edge technology will have to take security seriously right from the planning stages. As privacy will be paramount for clients and the outcome of court cases, it would be best to approach it with the help of a proven technology partner.
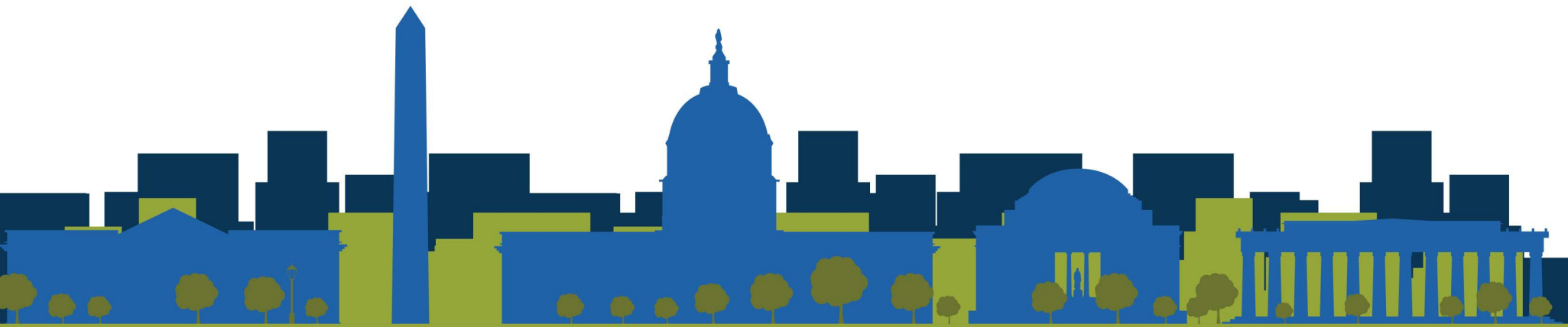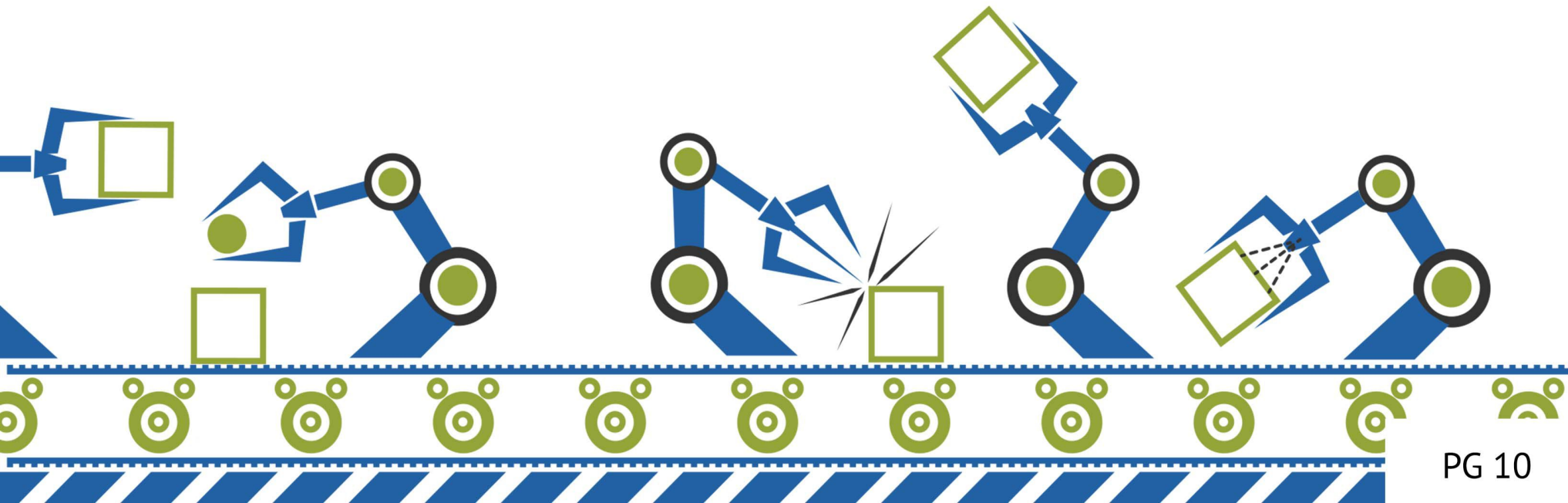
MANUFACTURING IN THE DIGITAL AGE

IoT within manufacturing has been going through a long period of acceleration. As a mentioned earlier, this industry is leading the curve when it comes to IoT adoption with a total spend of $178 billion in 2016 alone.

Enhanced IoT adoption by industrial enterprises can be directly attributed to their focus on optimizing factory processes. Furthermore, there is also an initiative to automate maintenance functions and quality assurance processes by leveraging edge computing and predictive maintenance solutions.

The smart factories at present already employ IoT-powered remote sensors to inspect raw materials, track products, identify operator bottlenecks, and enhance productivity. What's more, they also now track performance in real-time, even after the product is in the hands of the end-customer.

The latter will transform manufacturers to be perceived as service providers as well. From business-related services to product-related services, this scenario will drive growth and create new revenue streams for manufacturers.

IoT will also be a key differentiator for manufacturers in a hyper-aware and hyper-connected digital age (along with industry-leading organization and management tools). This will be critical going forward as the demand for manufactured products is growing at a snail's pace (with output to only increase by 3.4% in 2017).

Slow growth can be directly attributed to global news and political uncertainties that have emerged since the occurrence of major political events like Brexit. Coupled with this is the fact that foreign trade is also at historically low levels.

As a result, efforts to optimize operations to cut costs while creating new revenue models will drive IoT adoption within the industrial enterprise space.

However, the challenge will again be security along with securing and retaining IoT talent. Furthermore, there might also be an aversion to making changes while industrialists adopt a wait-and-see approach to see how global political events play out.

Additionally, manufacturers will also have to figure out what intellectual property they want to develop and what they actually want to share. This can be a highly complex endeavor because of legacy enterprise resource planning (ERP) systems (with some utilizing as many 100 independent ERP systems) that have now created a tangled mass of disparate networks.

All this software and related hardware along with new technologies like IoT can make it overwhelming for IT departments. As a result, manufacturers need to overhaul their legacy systems and build robust infrastructure that can form the backbone of IoT for both internal and external initiatives.

This means that it's imperative to build systems that standardize protocols to efficiently manage data from over a thousand different sources, enhance visibility in the supply chain, and consistently generate customized analytical reports to immediately serve business needs.

INTELLIGENT THEME PARKS

As all businesses become more customer-centric, it's now more important than ever to provide superior end-user experiences. As a result, even theme parks have now adopted IoT and related mobile technologies to deliver omnichannel experiences that can enable growth by converting interactions into new revenue opportunities.

This is evidenced in Disney's investment of $1 billion in IoT. But this has been a long time coming as the company first started their MagicBand project back in 2008. While the MyMagic+ band doesn't load any apps or even tell the time, it leverages radio-frequency identification (RFID) technology to allow guests to pay for anything from food to drinks to souvenirs at the Disney World Resort in Orlando, Florida.

But it doesn't stop there as the band also provides access to different areas of the theme park (including rides), faster lines, and hotel rooms. As all guests at the venue will be transmitting data, Disney can also easily track crowd movement to better manage the park while finding new ways to optimize logistics. These smart bands can also be used by parents to locate lost children within the theme park. In fact, this concept has already been tested successfully at the Disney World Resort.

This approach also creates a unique opportunity to provide special offers in real-time. For example, if there are a few seats still available on a ride, operators can potentially fill it quickly by offering a special discount for customers who are nearby. As a result, this new type of context-aware mobile user experience is changing traditional engagement models. The new user modeling and personalization at theme parks now incorporate sensors, mobile phones, and biometric data and will probably continue to evolve to provide a new class of mobile IoT applications.

Additionally, just like factories, theme parks can also utilize IoT technology to automate maintenance functions. Beyond that, sensors on rides and different parts of the park can also help better manage risk and avert any potential incidents.

Again, the challenge here will be maintaining security as IoT devices and sensors will create multiple endpoints that need to be secured. Furthermore, as these smart bands will be connected to payment channels like credit cards, you also have to actively secure that data.

According to the report, "The Hunt for IoT Vol. 3: The Rise of Thingbots," IoT attacks exploded by 280% in the first six months of 2017. However, 83% of these bot-enabled attacks originated from a single hosting provider in Spain (that and a great reputation).

As a result, regardless of the industry, security has to be the primary concern for any business implementing IoT technology. This means that long after the technology has been deployed, security has to be actively monitored and maintained.

Even when sensors are not working or rendered obsolete, they can potentially be exploited to hack into network systems. As a result, new security standards will also need to be implemented across the organization.

While the insurance industry is already exploring security standards for this technological innovation, it will ultimately come down to the business to maintain enhanced vigilance and actively improve their own security standards.

LEARN HOW WE CAN IMPLEMENT IOT IN YOUR INDUSTRY

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