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Optimizing the Internet of Things: Key Strategies for Commercial Insurers

By aligning their business requirements with the capabilities of the Internet of Things, commercial insurers can sharpen operational efficiencies, open new revenue streams, drive profitable growth and keep customers close.

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Executive Summary

The Internet of Things (IoT), the global network of small, powerful sensors and interconnected “things” that enables physical objects, devices, vehicles, and equipment to link and share data through the Internet, is among the disruptive technologies that are compelling commercial carriers to question their role in underwriting risk. What is the scope of my risk coverage? Is it merely a tangible asset (e.g., a car), or does it include software that makes it smart and controls its behavior?

These questions surfaced following a fatal electric car accident.¹ The car manufacturer, Tesla Motors, held both the driver and Tesla’s technology (the car was operating on Autopilot mode) responsible for the crash, pending a federal investigation. This raised a key question: How can insurers assess risk and assign liabilities among a car’s occupant, another vehicle, the car manufacturer and/or even the developer of the autopilot software?

And the questions don’t end there. Consider the following scenario: A mining equipment manufacturer shares component design files with its replacement parts dealer. The dealer uses 3-D printing to replace the component on demand, then subsequently sells the part to a customer. Some months later, the customer’s vehicle is involved in an accident, which the customer blames on the printed component.

This is where the problems begin: How can the carrier determine liability? Who would be liable for damages – the equipment manufacturer, the parts dealer, or the 3-D printer manufacturer? How would the insurer cover the risk if the printed component was protected by intellectual property (IP) rights, or was printed and used in a foreign country? Can a lost asset be re-printed as a claim replacement? If so, will it be acceptable to customers? Moreover, new data sets generated by smart products connected via the IoT will provide manufacturers, dealers, and suppliers with the opportunity to offer preventive maintenance products that will compete with carriers’ offerings.

These are among the known and unknown² challenges facing commercial insurance players, some of which must contend with significant disruptions created by their insureds' use of the IoT and a host of new technologies such as 3-D printing, which will soon become mainstream.

To address these issues, commercial insurers need to adopt these technologies and reset, if not rewire, the way they conduct business. This means moving from a reactive approach to a proactive strategy for assessing risk and determining liability. But first, they must develop and align new capabilities in areas such as real-time risk assessment, failure and loss prevention, and predictive behavior assessment.

There are many ways insurers can optimize the data generated by IoT-connected devices – from adopting basic analytical solutions to investing in a full-fledged IoT ecosystem complemented by various data-sharing options. With an IoT infrastructure, carriers can create new business models to better serve customers. This requires proficiency in areas such as sourcing quality data, securing and protecting customer privacy, and creating a supportive IT architecture.

This white paper presents our vision of how commercial carriers can take the best advantage of the changing business landscape by leveraging and implementing IoT technologies, identifying the business/technology challenges that will likely ensue, and finding ways to overcome thorny obstacles that might impede business-critical objectives.

The Internet of Things: A Macro View

As a key component of the Fourth Industrial Revolution³, the IoT is already having a significant impact on consumer-facing and commercial businesses alike. At a consumer level, this can be seen in the many sensor-based and wearable smart devices available in the marketplace. Yet the larger economic impact is currently felt in industrial and service-based segments. This trend, coupled with technological breakthroughs such as telecommunication signals to power Internet devices, will dramatically change how business is conducted around the world. However, the IoT presents several challenges; specifically, integration with existing operational technologies, a lack of interoperability among communication protocols, and the need to create a unified, analytical approach to seamlessly accessing both structured and unstructured data pools.

Carriers need to adopt IoT technologies quickly to support the smart assets they insure, and develop an application environment to consume the data that is generated.

IDC, a leading market research firm, forecasts that worldwide spending on the Internet of Things will grow at a 17.0% compound annual growth rate (CAGR) – from \$698.6 billion in 2015 to nearly \$1.3 trillion in 2019. Maximum growth will be seen in industries that are dominated by physical products/assets that must be IoT enabled. Industries such as discrete manufacturing have already made significant investments. Others, such as logistics and healthcare, have a lesser stake, but are expanding quickly (see Figure 1).⁵

From an economic perspective, companies are seeking new revenue sources, along with significant cost savings. The IoT's trajectory is fueled by the benefits it is affording early adopters. For example:

- Rolls-Royce, a leading aviation engine supplier, offers its flagship service, “Power by the Hour”⁶, a complete engine and accessory replacement service provided on a fixed-cost-per-flying-hour basis over a period of years. This aligns the interests of the manufacturer and the operator, who only pays for engines that perform well.
- GE, the industrial giant, markets digital power plant solutions⁷ that help customers achieve operating efficiencies that can translate into significant cost savings. GE is also equipping its critical industrial products with digital “eyes and ears,” or sensors, that monitor a plant’s performance 24x7 and afford a single, consolidated view of performance data within an integrated ecosystem. The analytics service detects anomalies and sends early warnings to response teams to control the process, prevent downtime, maintain production levels, and avoid catastrophic situations.
- John Deere is using IoT solutions⁸ to make agriculture smarter. By linking its heavy equipment to an online platform, John Deere enables farmers and dealers to remotely access its fleet locations, find information on equipment utilization, and utilize real-time diagnostic services. The platform also provides reports on crop and soil conditions, and integrates with third-party, real-time weather data services.

Given that such advancements are already underway, commercial insurers would be well advised to stake their claim in this evolving landscape and assume the role of a value-added partner. They need to rethink how liabilities will change with the advent of new smart assets, and how risk should be assessed and managed to remain competitive. Carriers also need to adopt IoT technologies quickly to support the smart assets they insure, and develop an application environment to consume the data sets that will be generated. Data-driven risk modeling will be needed to provide a clear picture of what insurers are facing. This requires close collaboration with customers in areas such as data sharing, asset monitoring and prevention, and predictive analytics.



The IoT's Projected Growth

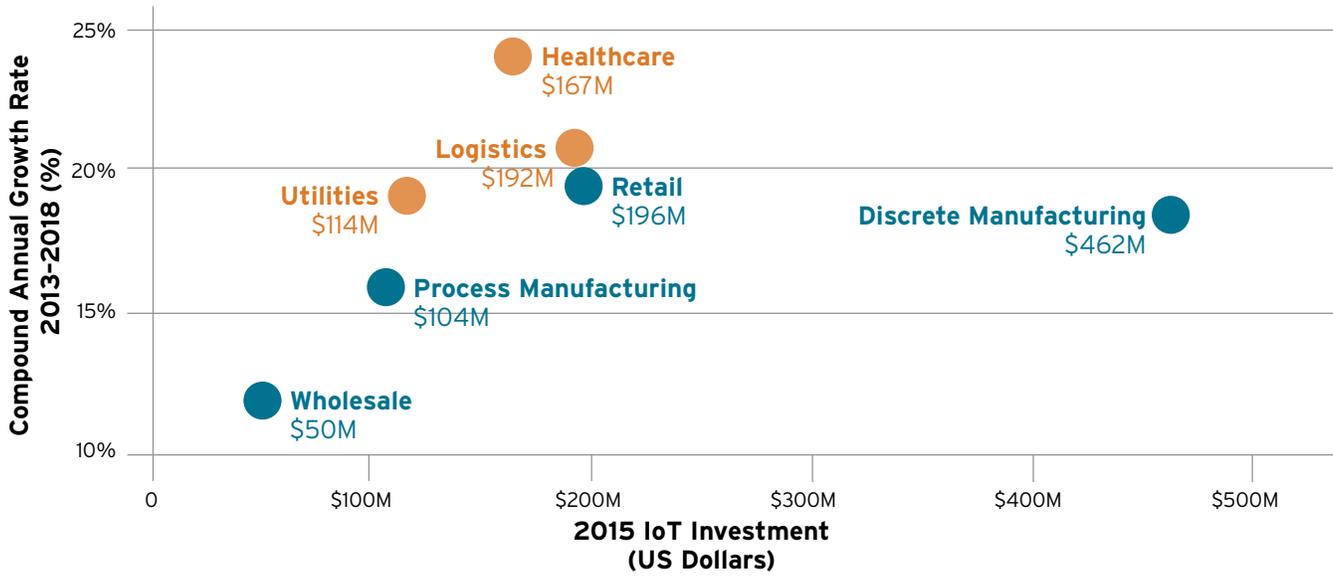


Figure 1
Source: IDC, 2015.

 Industries expected to offer the most IoT potential

The IoT: Early Days for Commercial Lines Carriers

Leading commercial insurers are working with top IoT innovators to understand how real-time analytics from sensor data will impact commercial lines insurance and the future of risk, and open new opportunities for global reinsurance and specialized primary insurance businesses. Players such as Munich Re and Hartford Steam Boiler (HSB) are going the extra mile to promote innovation by mentoring and investing in incubators such as Plug n Play's IoT accelerator.⁹ (For additional insight, please read "The Internet of Things: P&C Carriers & The Power of Digital".)

Applications that have received the highest attention include:

- **Smart buildings:** Commercial carriers are working to replicate the connected home model in large facilities through intelligent building management systems that can communicate metrics such as energy usage tracked through connected thermostats, electric asset performance, and HVAC system conditions. Another key use is the monitoring of building structures to detect structural damage from leaking pipes, moisture seepage, smoke detection and fire damage, for example.
- **Multi-modal fleet tracking and management:** Fleet usage tracking, predictive maintenance and itinerary redefinition take place in real time, depending on traffic and weather conditions across all modes.
- **Connected supply chain:** Instantaneous information that combines data from various sources (e.g., temperature, humidity, verification when a package is opened, vehicle arrival time, driver fatigue) makes many applications possible for commercial insurance carriers. International logistics giant FedEx offers an IoT-enabled advanced tracking device, SenseAware, that can share key parameters of a shipment in real time.¹⁰
- **Manufacturing operations:** Investments in technologies and platforms to assess how manufacturers can use intelligent interconnected tools enable various components to exchange information autonomously, trigger actions and activate machine control.



- **Drones:** Drones are being tested by insurers for claims adjustment and risk analysis of high-risk events, property damage and risk assessment. Insurance Australia Group (IAG)¹¹ has used drones to assess damages caused by bushfires over a large area and speed the claims process.
- **Blockchain:** Although blockchain technology remains in a nascent state, carriers are exploring blockchain transactions such as smart contracts in the supply chain for tracking the exact origin of a loss event. (For more insights, see our white paper, "[The Blockchain Imperative: The Next Challenge for P&C Carriers](#)".)
- **3-D Printing:** 3-D printing can disrupt commercial property insurance by reducing the transportation risk on an asset. Insurers can offer replacements of lost/stolen bespoke items by "printing" a new replacement in agreement with the customer.

Emerging IoT applications present a unique set of challenges. In-depth analysis is required to align the technologies with various real-life scenarios involving an insured's assets. In the case of 3-D printing, for example, it could be challenging to precisely determine liabilities in the event of a product failure or IP infringements regarding product design. Carriers need to work closely with the customer, encourage the use of reputable designs, inquire about the insured's quality assurance in 3-D printing, and ensure that no IP-related risks are revealed.

Moving Forward

Given the scale of IoT investments across industries, the next logical concern is how insurers can plug, play, and remain relevant and resilient. Multiple approaches to implementing a strategy should be considered, with a focus on adjusting business models to align with the potential revenue streams that the IoT will generate. Internal processes must also be synchronized with carriers' new IoT-aligned product offerings, and work seamlessly end to end. For example, claims processes should be revamped to operate with a real-time asset-monitoring application following a reported failure of customer equipment, which in turn would trigger a claim.

Insurers need to embed digital thinking into their organizations, with the aim of creating new revenue flows through a connected ecosystem that can enable more timely and relevant customer engagement, and reduce claims through a data-centric risk assessment methodology.

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A Staged Approach to IoT Adoption

We recommend a phased approach to IoT adoption. This encompasses:

- **Smart risk assessment:** Create proof of concepts to determine scale, and encourage customers by offering incentives for IoT adoption. Develop smart devices and partner with industry players.
- **Smart risk detection and claims processing:** Develop an ecosystem that enables the collection of real-time data from smart products. Understand how to make the best use of data and develop capabilities for anomaly detection and alerting mechanisms.
- **Risk prevention/mitigation, building a partner ecosystem:** Include third-party data providers in the ecosystem; develop risk models that can process real-time data generated by sensors to help mitigate risks.
- **Re-thinking business models:** Shift the emphasis to value-added services and connected insurance products based on data and analytics that can help target new markets.

A Smarter, Proactive Business Model

To achieve optimal benefits from the Internet of Things, carriers must shift from traditional ways of working to a smarter, proactive business model. A radical change in foundational thinking is mandatory, and should revolve around the IoT as the heart of the enterprise information fulcrum.

An enterprise-wide overhaul will be needed in terms of products, people, and processes (see Figure 2 for more detail). Conventional products must give way to sensor-based connected systems that help carriers “write risk right” based on real-time risk modeling of asset condition. With an accurate assessment of risk, capital provisions for risk can be reduced – cutting costs and allowing for better capital allocation.

Furthermore, a higher rating on asset risk profiles would increase premiums, while healthy assets could lower them. This would motivate customers to follow best practices for equipment maintenance and generate repeat business for the insurer through a transparent model for calculating premiums.

Customer-facing employees will need to be reskilled in new products and trained to think about how customized offerings could be created from the data sets generated by customers’ assets.



The Elements of Smart Insurance

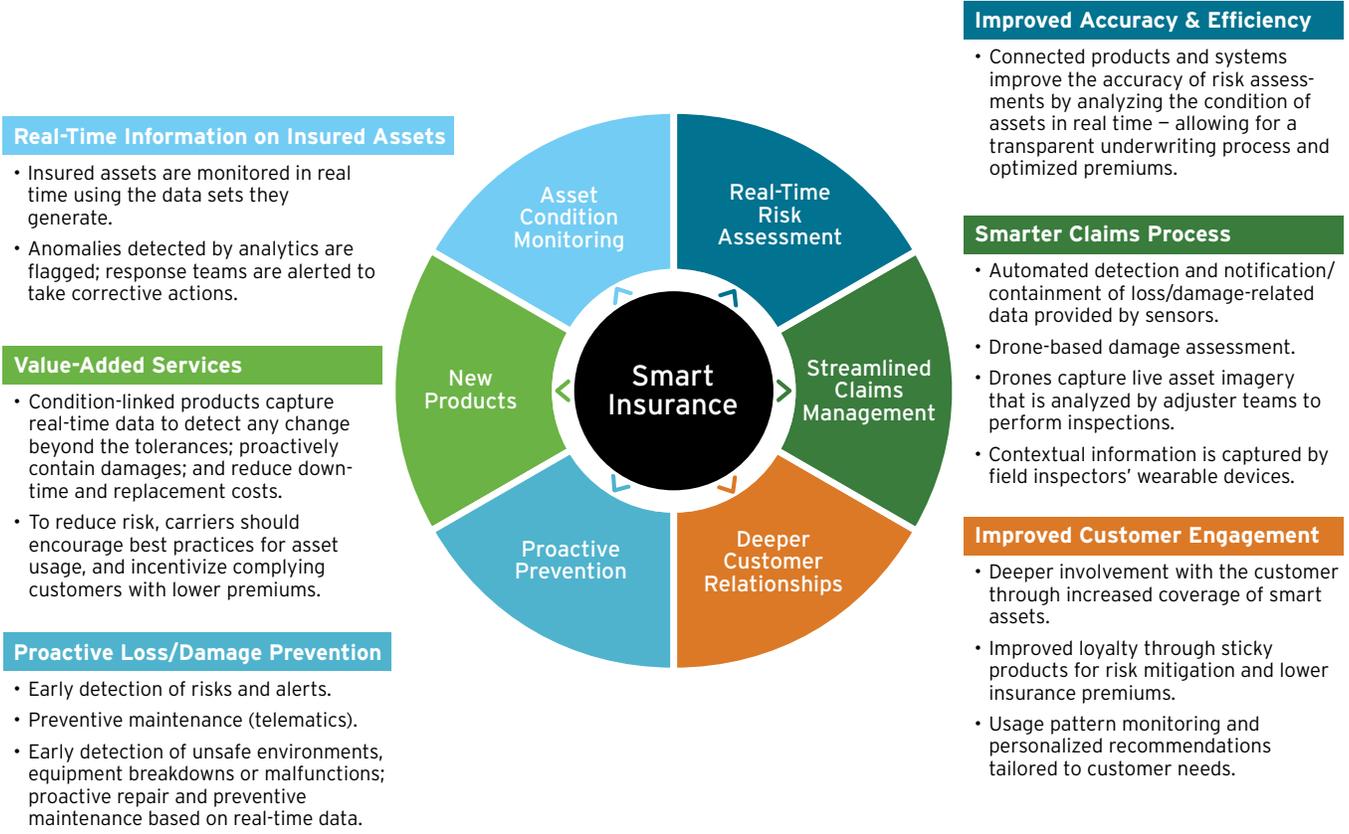


Figure 2

Roles Carriers Can Play

The success of any offering depends on the quality of data and the actionable insights it affords to make insured assets run like clockwork. Based on how they approach IoT as an opportunity, carriers can take a “big bang approach,” start with a minimum investment, or take an intermediate stance.

IoT implementation patterns can range from a basic setup to an advanced ecosystem with third-party integration. We characterize these as:

- **Primitive:** The carrier has a basic partnership with the equipment vendor from whom it buys data through web service calls. Alternatively, the carrier can leverage customer-provided data to generate predictive insights, but the investment is limited to cloud-based analytical services.
- **Intermediate:** The carrier delivers IoT-linked insurance and assistance services by forging partnerships with a platform owner and a machine/equipment vendor. The data is pushed to the insurer’s IoT cloud by the gateway provider.
- **Mature:** This role requires the greatest investment. The carrier owns and operates an end-to-end IoT ecosystem. This obliges the insurer to deploy sensors to collect and aggregate data on its IoT platform to generate valuable insights – a unique value proposition for customers. The data can be monetized by sharing it with third parties that offer complementary analytical solutions based on the data.

Confirming a Data Sharing Model

The type and level of offerings will depend on what data is available for the insurer to roll into a product. Data sharing models can include:

- **Basic:** An entry-level partnership with a vendor. Provides basic data on proof of ownership, proof of activation, power on data, etc.
- **Developing:** An intermediate partnership with equipment/machine/gateway vendors, with data available on asset usage, breakdowns, and maintenance. Products incorporate usage-based pricing and underwriting.
- **Advanced:** Real-time data is generated by equipment/machine/gateways developed in-house, or by a qualified service provider. The carrier's ownership of the data helps derive meaningful insights and the full benefits from data-driven product offerings, like real-time event handling and straight-through claims processing. Leading multi-line insurer Zurich offers predictive analytics to its customers to manage and mitigate risk.¹²

Creating a Partner Ecosystem

Carriers can create the right ecosystem by forging partnerships with multiple entities throughout the data value chain (see Figure 3). They then need to develop relationships with relevant partners that can act as the critical link in the IoT value chain. The real-time data is owned by the carrier or connected device vendors and equipment manufacturers, and is typically transmitted by communication infrastructure providers to the insurer's cloud platform.

Third-party providers will generate external intelligence data that can be used in conjunction with IoT data. State Farm Insurance is working with IoT device makers to offer a unified connected device to customers to drive long-term revenue growth.¹³ Liberty Mutual has partnered with Google to implement Nest smoke alarms in homes to reduce the risk of fire and in turn lower insurance premiums.¹⁴

An IoT Ecosystem Emerges

INDUSTRY OF INSUREDS	EQUIPMENT/MACHINE/GATEWAY MANUFACTURERS	CONNECTIVITY	CLOUD PLATFORMS	THIRD-PARTY DATA PROVIDERS
AVIATION	Rolls-Royce <i>Connected Flight Engines</i>	AT&T	Axeda ThingWorx <i>Medical Devices</i>	Pitney Bowes ESRI <i>Location Intelligence & Analytics</i>
MARINE	Hyundai <i>Smart Ship System (Sensors & Platform)</i>	Ericsson	GE Predix <i>Industrial IoT, Energy, & Logistics</i>	NOAA IBM The Weather Company <i>Weather & Catastrophe Analytics</i>
PROPERTY & CONSTRUCTION	ABB <i>Building Automation Gateway & Platform</i>	Cisco	Amazon Web Services IBM Watson Microsoft Azure <i>Generic</i>	
LOGISTICS	Morey <i>Wireless Tracking Devices & Platform</i>	Verizon	Niagara Bosch IoT Cloud <i>Specialized</i>	Hubio TomTom <i>Vehicle & Driver Analytics</i>

Figure 3
Source: Cognizant.

A Reference Architecture for IoT-Enabled Insurance Processes

A typical IoT reference architecture involves three stages: data collation, core processing and action, and information dissemination. Large data sets are generated by smart industrial assets, which are then collated via the connectivity infrastructure and sanitized for core processing on the cloud service platform. The data is consumed by analytics engines and processed per the configured business rules. The core apps for risk assessment, condition monitoring, and preventive/predictive maintenance consume the data and generate actionable insights for the insurer and emergency response teams in case of any anomalies. User interfaces on multiple devices, such as tablets, mobiles and laptops present the findings and provide reporting dashboards (see Figure 4).

The Anatomy of an Enterprise IoT Environment

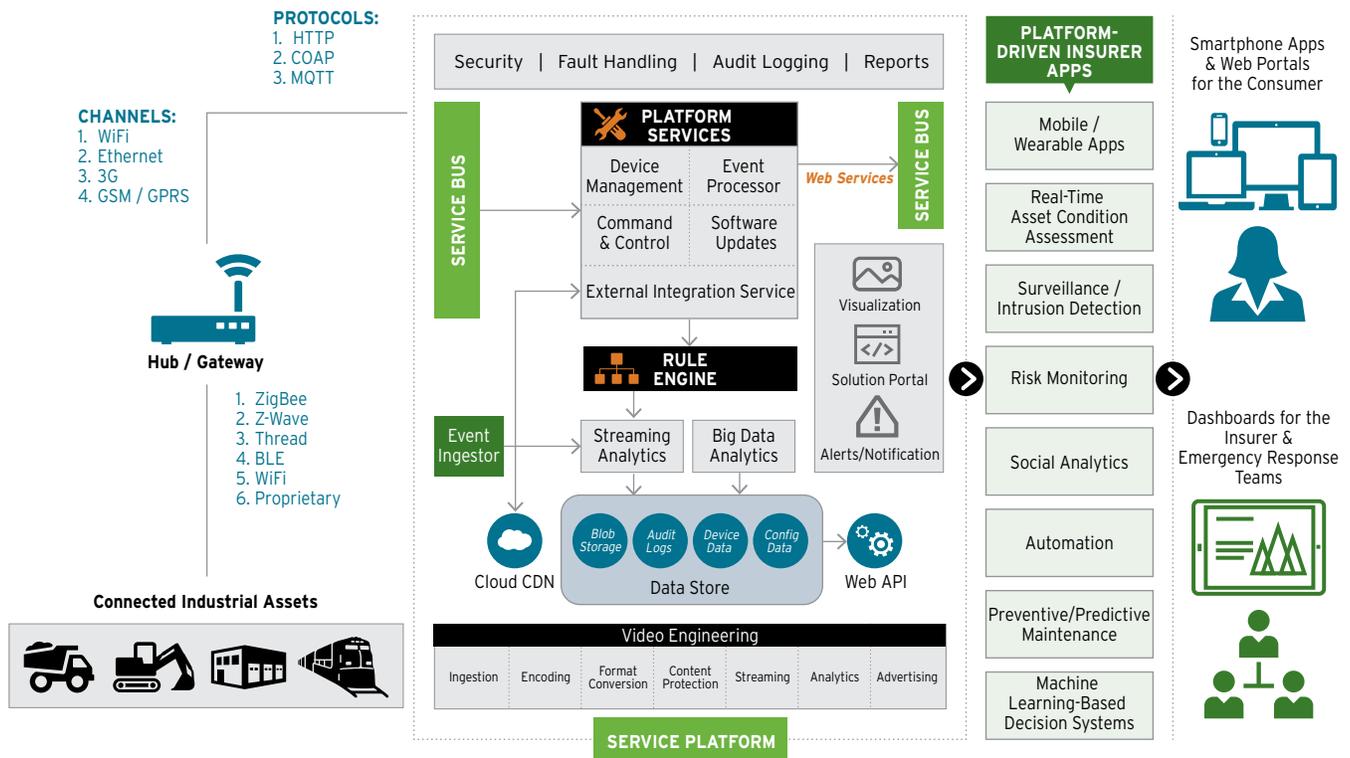


Figure 4

Key Challenges and Considerations

Every opportunity has its challenges, and the Internet of Things is no different. Carriers need to take this into consideration and focus on the following:

- **Product differentiation:** In an increasingly commoditized insurance space, the IoT and its smart connected products will be a key differentiator. A product should utilize the most critical data sets available, and generate insights that will be the most relevant to customers and unique within the market.
- **Data ownership and quality:** Huge volumes of data create quality issues; the accuracy of analytical results typically depends on the quality of inputs. Although third parties might own critical data, it may not be accessible or readily available in the right format for a carrier's consumption. Data needs to be obtained from authentic sources, with periodic "sanity checks" performed to ensure quality. Carriers can then plug the data into their analytical models.

Connected devices generate exponentially large data sets that must be stored and processed by a capable architecture. Real-time data should be processed at the edge before moving to the cloud.

- **Data security and privacy:** Assessing cyber-security risks and identifying a mitigation strategy are mandatory. Personal data must be secure at all times and comply with industry and government regulations.
- **The right partnerships:** Insurers must continuously look for technologies and partners that enable them to take full advantage of new analytical opportunities.
- **Device and architectural capabilities:** Expertise in device installation and servicing when building vs. sourcing devices from third-party vendors is a critical requirement. Connected devices generate exponentially large data sets that must be stored and processed by a capable architecture. Real-time data should be processed at the edge before moving to the cloud. This will help carriers extract relevant data points and cancel data noise.
- **Transformation, adoption and alignment:** Successful IoT adoption will require employees to accept and trust the tools, understand how they work, and use them correctly. Assure alignment with existing internal data, and establish ways to exploit it to determine growth prospects across products and markets.

Cost Considerations

When including IoT as part of their core strategy, carriers need to focus on how services can be rolled out with optimal cost efficiencies. The ultimate objective is to improve productivity, enhance return on investments and strengthen marketplace competitiveness. Depending on the carrier's IoT strategy, multiple approaches can be taken. However, key cost considerations should be addressed when devising an IoT strategy:

- **Optimize the IoT ecosystem:** There are multiple aspects to an IoT solution, such as compatible hardware, third-party applications and connectivity. Many of these come in the form of off-the-shelf products. Instead of reinventing the wheel, carriers should have these components identified and integrated by a capable systems integrator. This can save time and money on in-house development; the resulting solution will likely be more robust and reliable since it was built and tested using proven skills and components.
- **Perform low-cost assessments:** Even if the long-term IoT strategy is clearly charted, carriers should perform pilot assessments in a specified business area – targeting a minimum viable product rather than launching with a “big bang” approach. This will facilitate more effective course corrections, if needed, and fine-tune the strategy for a full-scale implementation.
- **Future-proof solutions with compatible technologies:** IoT solutions should be designed and deployed with a forward-looking approach that considers the scalability of the solution and reaffirms the assessment through pilot programs. The technologies chosen should support this objective to avoid expensive technology migrations and retrofitting.

Quick Take

The IoT in Action

The success of any technology is gauged by how effectively it solves real-world business challenges and creates long-term benefits for all stakeholders. The business problem should be tackled methodically – taking into account the industry domain and business dynamics, the existing technology landscape, and assuring that internal processes and people are closely aligned to achieve stated business goals. A future-proof, innovative solution should include the IoT platform and technologies that can help achieve the targeted business benefits and comply with regulatory and security standards.

Solutions for the Real World

Smart Mobility: Teen Driver Safety for a Leading Irish Insurer

- **Business opportunity:** Traditionally, insurance firms charge high premiums for covering teen drivers given their aggressive driving habits that can lead to higher accident rates. But generalizing the driving patterns of young drivers is a sub-optimal approach to premium calculations, with no incentive for customers. IoT-based devices that monitor teenage driving practices can result in lower insurance rates and reduce heartache for worried parents. Insurers are generally willing to offer policyholders discounts if they have permanently installed these devices, which are also used as anti-theft tracking mechanisms.
- **The solution:** We developed a “Young Driver” mobile app to capture and score driving behavior and provide feedback using raw, real-time telematics data from insureds’ vehicles. The analysis is transformed into a driver scorecard for ratings and other vital information. Results extend to a web portal where drivers, parents, and the insured can access analytics reports. Safe driving is promoted with rewards for driving behavior and premium discounts to safe drivers.
- **The benefits:** The solution is cost-effective and highly scalable – allowing insurers to reduce losses by utilizing meaningful data from telematics devices across networks, and rapidly launch or augment telematics-based insurance programs. Advanced analytics provide insights to predict loss frequency, and identify risky driving behavior and dangerous driving zones. GPS-based trip data is continuously recorded on the app and can be uploaded to the insurer’s server regardless of spotty cellular coverage and Wi-Fi connectivity glitches.



A Smart Building for a European Commercial Insurer

- **Business opportunity:** Commercial insurers typically take a proactive approach. They look for real-time monitoring of commercial buildings owned by their property customers and analyze the streaming data for hazards/malfunctions captured by sensors and data-crunching algorithms from IoT-based devices. The idea is to instantly recognize accidents/breakdowns, and proactively monitor and report any structural deterioration to avoid incurring damages.
- **The solution:** Controllers are used to capture insurance-specific data at commercial buildings. The data links to various sensors that are installed across a building. An analytics engine consumes the data to continuously monitor the building’s health, and sends alerts and notifications to the building owner, the insurer, and the emergency response team in the event of an anomaly. The solution can detect and track water leaks, heating levels, ventilation, air conditioning and electric malfunctions that could jeopardize the building’s health. Output reports and monitoring statistics are shared with authorized users across multiple devices such as smartphones, tablets and desktops.
- **The benefits:** A proactive approach using analytics modeling to gain prognostic insights for underwriting gives policyholders a better overall experience through fewer claims and optimized premiums made possible by actual, risk-based pricing mechanisms.

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Footnotes

- ¹ Tesla's official statement. <https://www.tesla.com/blog/tragic-loss>.
- ² During the Iraq War in 2002, erstwhile U.S. Secretary of Defense Donald Rumsfeld coined the phrases – Known Unknowns and Unknown Unknowns – to describe difficult and unclear situations that we know, and even worse, know the ones we are unaware of.
- ³ IoT: The Fourth Industrial Revolution. <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>.
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