



REPORT

November 2021

Industry insights report.

A look into how the Internet of Things (IoT) is being deployed across the insurance industry in the areas of:

- IoT for Home Insurance
- IoT for SMB Insurance
- Industrial IoT for Insurance



Foreword - Tokio Marine

IoT offers insurers the opportunity to rethink how they underwrite and do risk management by designing tailor-made products and services for a rapidly changing world. Effective utilisation of these devices will offer new functionality, wider coverage, and risk prevention opportunities. It has been widely documented by analysts that insurers could cut the cost of claim processes and lower premiums by becoming earlier adopters of this technology. Our role in the Tokio Marine Innovation Lab, London is to work with our partners, like SOSA, to conduct technology scouting activities and consider the 'art of the possible'. TM Group has already made progress in their journey, with deployed solutions and investigations across industry sectors.

Without doubt there are applicable use cases for IoT deployment into industrial sectors e.g. Industry 5.0, the revolution in which human and machine adapt to find ways to coexist to improve the means and efficiency of production. However, our research to date in the London Lab has identified further opportunities for IoT in small commercial lines e.g. SMB, and for personal lines e.g. homeowners. This market opening will also drive healthy competition and possibly even disruption for new entrants to enter the insurance market through affinity programs. Those who embrace the new world of harnessing IoT data will create business resiliency and remain leaders amongst their peers.



Daljitt Barn

Global Head of Cyber
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Daljitt Barn is TMHD's Global Head of Cyber Risk. He is an industry leader in cyber risk and cyber insurance, combining insurance value chain expertise with a cyber security technology background. He is responsible for the continued development of Tokio Marine Group's cyber insurance strategy, performance management and accumulation. He also leads the Tokio Marine Innovation Lab in London and holds several different Board advisor roles within the start-up community.

Foreword - SOSA

It may not come as a big surprise that today, every industry has their eyes on innovation. Even before the world as we know it changed in 2020, the need to innovate was top of mind and the term 'digital transformation' was prioritised in executive assemblies and strategy meetings alike. When it comes to the insurance industry, the race to innovation is no exception and its posture towards innovation has reached an inflection point. The increasing unpredictability of risk offers many opportunities for smart insights to reduce claims and generate dynamic data. As the application of IoT in insurance is still in a premature stage, substantial research and funding are already underway to harness the enormous potential for new risk prevention services. Needless to say, the frontier in understanding and learning from these early innovations is notably gaping.

This report covers a number of relevant and pressing IoT projects for insurance organisations. The following chapters will delve into how IoT is taking risk prevention and mitigation to the next level and what these indicators relay about the future of Home, SMB, and Industrial insurance. We are pleased to present this report in collaboration with Tokio Marine Innovation Lab, London. We hope that this research will pave the way for embracing new IoT technologies in insurance, and translating it into services that can offer tangible benefits to society.



Uzi Scheffer

CEO, SOSA

Uzi Scheffer, CEO of SOSA, is an entrepreneur with more than 20 years of experience building and scaling innovative ventures. Uzi has a deep understanding of corporate open innovation processes, building businesses, and profound insights into the rapidly evolving innovation sphere. His expertise is focused on FinTech, InsurTech, Cybersecurity, Digital Health, Big Data, IoT, IIoT and Industry 4.0. Since joining SOSA in 2015, Uzi has propelled the company toward its vision in bridging the gap between the supply and demand aspects of open innovation for international corporations, governments, and cities.

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Executive summary

The use of sensors and smart devices is increasing rapidly at nearly all levels of society, resulting in more data being generated in real-time. Insurance companies can gain valuable insights from such data. In addition to improving risk assessment, the data from sensors allows for the prediction and prevention of risks, as well as offering broader insurance coverage.

One of the key drivers behind this trend is the IoT, a rapidly expanding network of connected devices that can exchange data. With the rise of IoT devices, the insurance industry has arguably found its "coverage match"; as the infrastructure touchpoints of IoT devices are endless, so are the coverage possibilities offered by insurance agencies. While the application of the IoT to insurance is still in its infancy, research and funding initiatives have already been established to harness its enormous potential.

In this report, we examine a number of relevant and pressing IoT projects for insurance companies. The following chapters will discuss how IoT is driving risk prevention and mitigation to a new level and what these indicators tell us about the future of home, small business, and industrial insurance.

IoT for Home Insurance

Numerous types of internet-connected devices have become commonplace in homes, including security cameras and thermostats. Smart-home generated data has the potential to simultaneously benefit both homeowners and insurance companies; insurers can use the data to prevent or reduce homeowner losses, while also improving their operational efficiency.

The insurance market held early reservations in embracing smart housing, as the technical space was limited in potential, narrow in focus, and lacked relevant data insights. Due to the rapid maturity of smart housing solutions, the situation has notably shifted. The introduction of smart products by many big-tech companies, including Google, Amazon, and others, is making the technology hard to ignore.

IoT for SMB's

The adoption of IoT has expansively increased since the onset of the COVID-19 pandemic, particularly in small and medium-sized businesses (SMBs). Companies have been able to streamline and automate processes, modify supply chain strategies, increase remote access to systems so employees can perform tasks remotely, and implement processes to monitor empty storefronts thanks to the IoT.

IoT services have not fully penetrated the market for SMBs since they have primarily targeted large and medium-sized enterprises. As the use of smart home technology has grown rapidly in recent years, and predictions suggest they will only become more prevalent, both homeowners and SMBs are beginning to take advantage of them as the risks both face are similar.

IoT for Industrial

Several industries are impacted by Industrial IoT (also known as IIoT), including Manufacturing, Energy & Power, Oil & Gas, Healthcare, Transportation, and Logistics. As the IIoT market has experienced significant growth in recent years, insurance companies must ensure that they are capturing the value of IIoT solutions in order to provide better services to their clients.

Insurers are still in the initial stages of developing their IoT strategies; even insurance leaders that are forging the path of developing IoT offerings are still in pilot stages. In spite of this, a number of new startups are emerging in the IIoT landscape, especially in supply chain and logistics, that are transforming the way the industry operates, and insurers will form partnerships to minimize risk and keep pace with customer adoption.

IoT for insurance

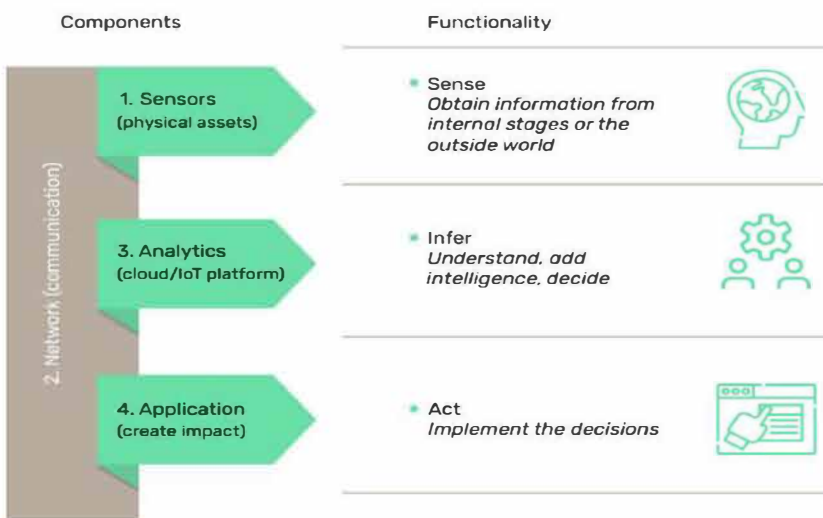
Introduction



IoT overview

The IoT can be defined as the rapidly growing network of connected objects able to collect and exchange data.¹ IoT consists of data-collecting sensors that are connected to the internet, where the data transmitted by the sensors is captured, stored and analysed digitally.

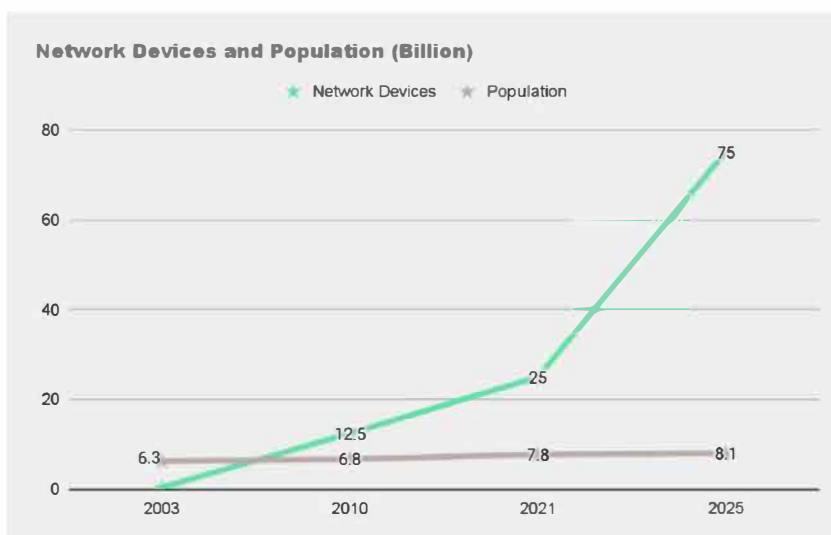
The insights generated can then be used by machines or humans. If necessary, the activity being monitored can be adjusted or modified.² IoT requires a number of components to work together in order to form a complete system.³ Four key components make up an IoT solution: sensors, a network (communications), analytics (cloud) and applications.



Source: The Geneva Association, From Risk Transfer to Risk Prevention

With these four components, information can be leveraged to make smarter decisions that are otherwise impossible in a traditional, disconnected, physical world. Interconnectivity of people, machines, and organisations is a pervasive megatrend seen at almost every level of society, and is expected to disrupt and reshape traditional businesses at an unprecedented rate.⁴

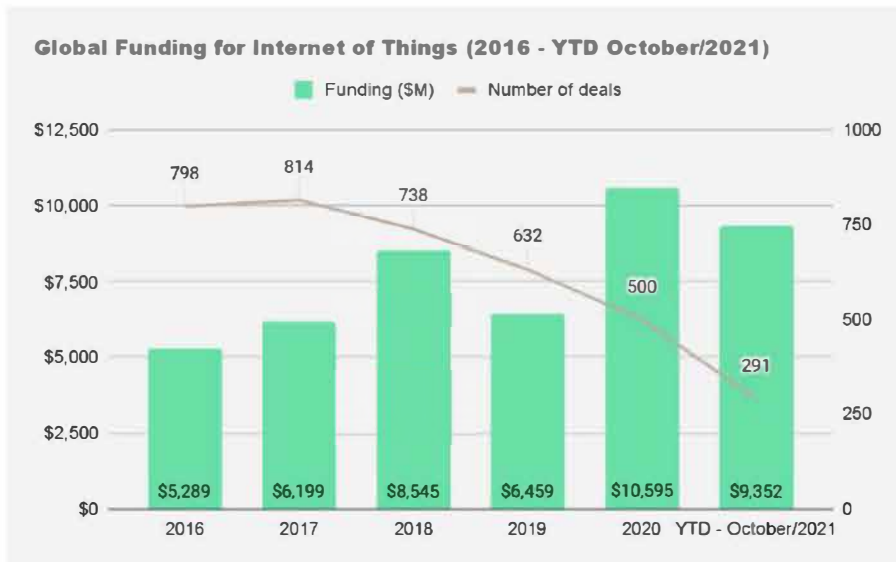
Smart sensors are continually evolving, becoming smaller, increasing in computing power and connectivity (5G), with artificial intelligence (AI) being able to analyse data generated by connected devices. By 2025, the number of connected devices is expected to reach 75 billion.⁵



Source: McKinsey, International Data Corporation

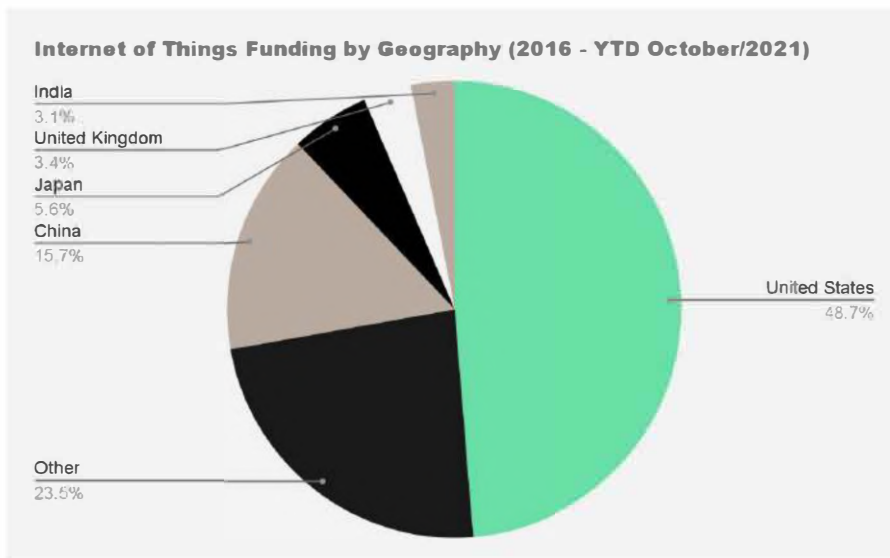
The continued growth of the IoT industry will be a transformative force across all industries, with the IoT market on pace to grow to over \$2.4 trillion annually by 2027. As such, the evolution of the IoT cannot be ignored, and the insurance industry must adapt to this new world.⁶

Funding for IoT startups generally increased between 2016 and 2020, reaching \$10.6 billion in 2020, an increase of 64% from the year before. The number of deals decreased by 22% from 2019, indicating an increase in mid-to-late stage transactions.



Source: CB Insights

The United States is home to nearly half (49%) of all IoT deals globally, followed by China, Japan, the United Kingdom, and India, respectively. The large share of “other” geographies indicates that IoT innovations are relatively distributed around the world.⁷



Source: CB Insights

There is no limit to the range of potential IoT applications. Many IoT applications already exist to measure everything from the number of steps people take each day to the rate at which jet turbine blades wear down. Sensors and cameras are embedded in everything from clothes to industrial machinery. The auto industry has integrated hundreds of sensors that monitor everything from seatbelt usage to engine condition to tire pressure.

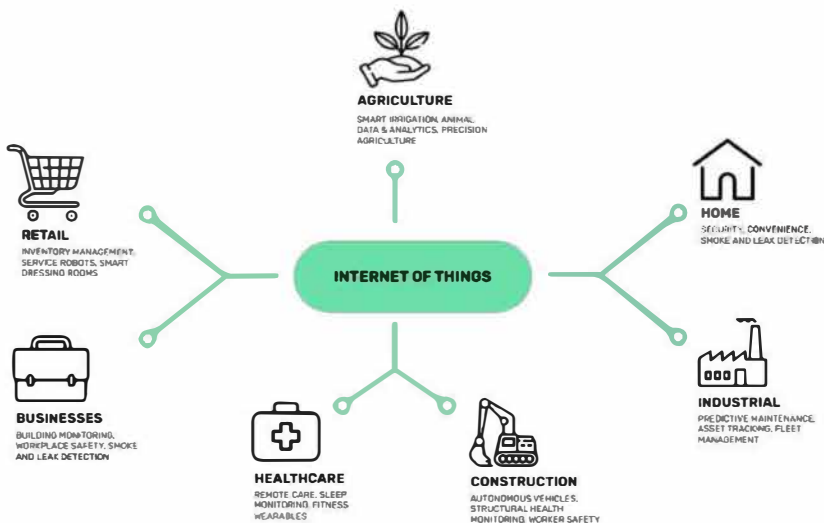
Many homes have a smart speaker system that answer questions, play music, relay the news, etc. Additionally, the analytical engines used to generate the insights are becoming more powerful. Insurance companies have arguably found their “coverage match” with the pervasive interconnectivity of IoT devices. At the end of the day, the infrastructure touchpoints of IoT devices are as endless as the coverage opportunities insurance companies can devise.

IoT data provides a distinct perspective on risk pricing compared to traditional methods. The granularity and consistency of this data allows an individual, in real time, to monitor individual assets and environmental conditions constantly. For an insurance company, this means that more information and data is available regarding hazards, catastrophes, and incidents faced by clients and businesses. Using this data, it is possible to predict incidents and address risky situations in a proactive manner, preventing property damage, injury claims, and other types of claims.

Overall, IoT adoption has been slow in the insurance industry, and it varies greatly by coverage line. IoT has not yet cemented a scalable position for the majority of insurers despite many of them experimenting with different IoT concepts.¹² Currently, IoT is most widely used in insurance for personal auto and home, while commercial applications are still in development and experimentation. Despite the potential applications of IoT for insurers, many have not yet determined how to make the transition from "interesting technology" to "scalable ROI".

Increasing risk variability and complexity have ushered in a critical turning point for the insurance industry. The IoT is at the forefront of this change and is making data more accessible to offer greater insights and opportunities to influence behaviour.

IoT's diverse applications & potential for market penetration

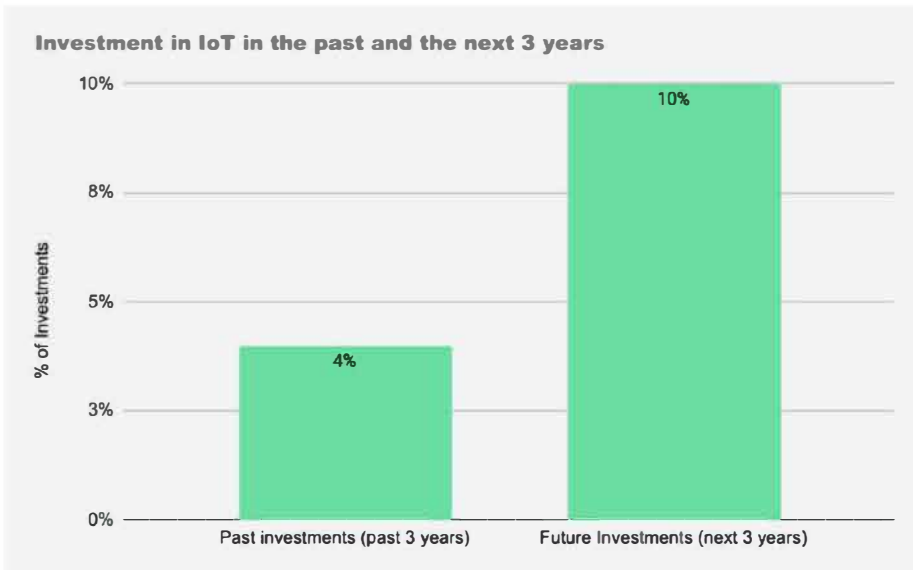


Source: SOSA

IoT for insurance overview

Individuals and businesses have long relied on the insurance industry for protection across a wide range of needs, and despite some digital capabilities available, the sector has struggled to adapt.⁸ The outbreak of COVID-19 accelerated the pace of technological transformation within the insurance industry. As customer behaviours have changed significantly over the past year, technological advancements have come to the forefront of the insurance industry's agenda. According to a survey conducted by Strategy& and of six major European insurance players, investment in IoT is expected to more than double compared with the past three years.⁹ As data and technology become more readily available, insurance has the potential to expand significantly in today's hyperconnected world.

Traditionally, insurance products focused on risk transfer with insurers competing based on their ability to apply a combination of historic loss information, information obtained during the application process, and data from third-party data aggregators to evaluate the likelihood of future claims and price risk transfer products accordingly.¹⁰ As society is becoming more sensitive to vulnerability and mindfulness, this creates the possibility for insurance companies to expand their traditional business models to also provide risk prediction and prevention services. Prevention has always been an important element of insurance; however, the methods for preventing risk are changing, and the IoT is a key factor in this development.¹¹



Source: Strategy&

IoT for insurance - value creation

The data from IoT devices can create advantages across the insurance value chain by enhancing core insurance processes, developing new business opportunities, improving sustainability and improving the customer experience.



Source: Carbone, M. (2021, February 8). Smart home insurance strategy 101. LinkedIn.

Added value to insurance core processes

- **Risk Prevention:** The reduction of risks can be achieved either through real-time risk mitigation solutions or by promoting safe behaviours over a longer period. Adding rewards offers additional economic benefits of enhanced loyalty.¹³
- **Claim Management:** The use of structured data enforces objectivity and consistency in the claims process, optimises the claim assessment, improves the detection of claims fraud, anticipates the first notification of loss (almost in real time), and reduces the claim settlement time period.¹⁴
- **Underwriting Stage:** Using monitored insights to help make decisions on risk terms will improve the overall quality of the risk selection process. An insurer can attain continuous insight into exposure with the use of IoT devices (such as property conditions, external conditions, and maintenance for the home). In addition, IoT data can also be used to improve general insurance models and create bespoke products.¹⁵

Additional areas of opportunity

- **Develop New Business Opportunities:** By leveraging IoT data, insurers can develop new business opportunities, such as up-selling or cross-selling, new approaches to insuring risks, or insuring new risks.
- **Improve Sustainability:** Insurers can utilise IoT to provide solutions to make the environment more sustainable. For example, an IoT insurance solution can benefit the environment by reducing energy consumption and conserving water.¹⁶
- **Enhanced Customer Experience:** IoT enables better customer engagement, and a better customer experience. It allows insurers to offer many value added services, such as remote monitoring and emergency services, and tracking and optimisation tools to manage expenses (energy and water).¹⁷

IoT for insurance - current challenges

The insurance industry is facing many challenges

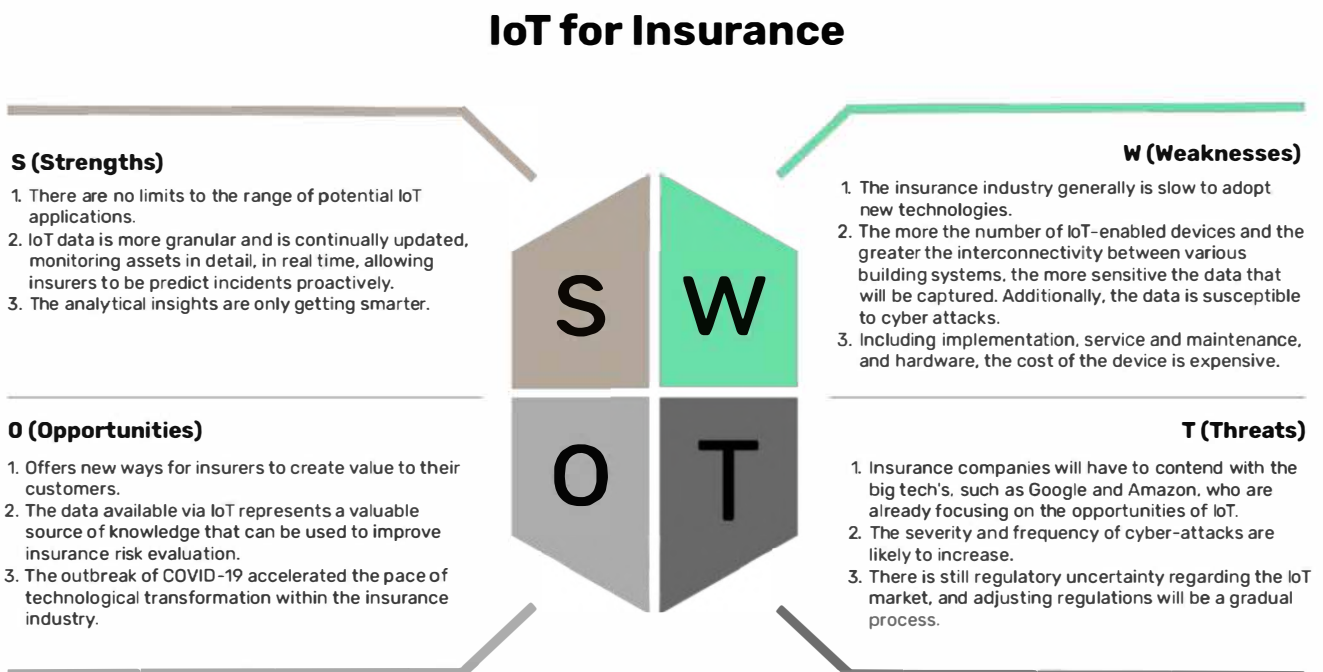
1. **Disruption to Existing Business Models:** The benefits of IoT centre on risk mitigation and lower claims.¹⁸ The competitive nature of the industry, however, will result in lower premiums if fewer losses occur. Additionally, insurance companies will have to contend with new competitors who are already focusing on the opportunities of IoT. In addition, usage-based discounts will be offered through IoT. Risk-averse individuals and businesses may be penalised more. Governmental and regulatory bodies may take action, which could lead to public backlash.
2. **Data Fraud and Privacy:** In the implementation of IoT, data fraud and data security pose major concerns. The data that flows between the home, business, etc. and the IoT devices are susceptible to cyber attacks.¹⁹ Consequently, many consumers may be reluctant to let insurance providers continuously access their personal data through IoT networks, especially if the value-adds or proposed benefits from adopting IoT are not sufficient.
3. **Management of Data:** Data collected by insurance companies can be challenging to manage.²⁰ Certain business decisions, which rely on continuous data access and analysis, only make this challenge more challenging. In order to comply with data privacy regulations, especially for sensitive information, a high level of care must be taken.
4. Historically, the insurance industry had a hard time adapting quickly to change. Both internal and external stakeholders will need time to adapt to the IoT and the changes it will bring.²¹

Looking ahead

- It is not yet clear what the true potential of IoT will be for insurance.²² But, irrespective of the offered product lines, there is one constant: opportunities. Although this technology is still relatively new for use in insurance, its future applications in insurance policies may be vastly different than those that had been anticipated thus far.
- It is evident that the data available from IoT represents a valuable source of knowledge that can be used to improve insurance risk assessment. By understanding the data thoroughly, we can better price, improve customer service, and develop new lines of business that address risks that have previously been overlooked. In the future, companies that have better data management capabilities will enjoy a competitive advantage. Consequently, this advantage may attract competition from outside of the insurance industry.
- As new assets and lines of business are added to the insurance portfolio, insurers will need to adapt to the data IoT can collect, create pathways, and be flexible enough to adjust policy responses accordingly. Insurance companies need to be open to the disruption brought by IoT and be attentive to the demands that come from consumers and competitors.

IoT for insurance - SWOT analysis

The SWOT analysis below examines IoT for Insurance players:



Source: SOSA

This report takes a deeper look into how IoT is being deployed across the insurance industry in the areas of Home Insurance, SMB Insurance and Industrial insurance.

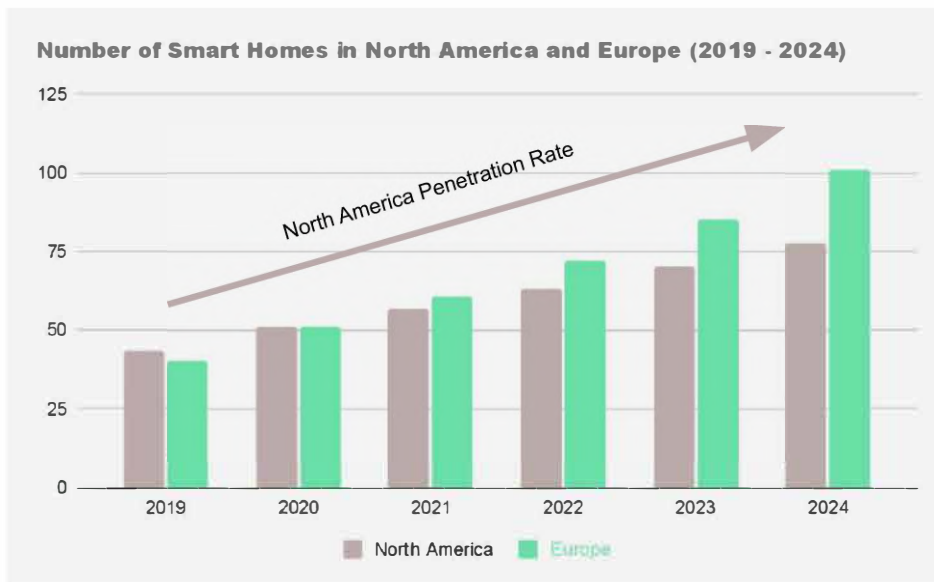
IoT for home insurance



IoT for the (smart) home & funding

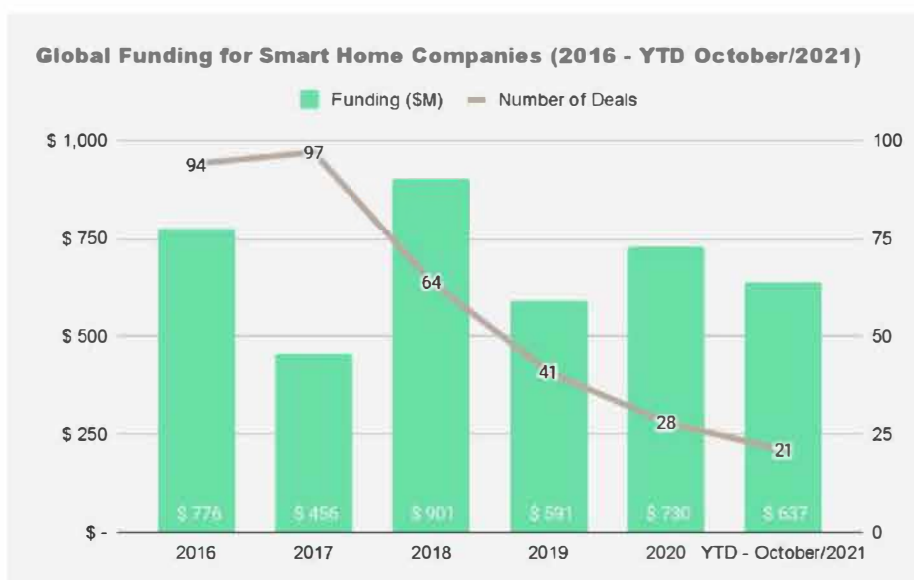
Internet-connected devices, such as security cameras and thermostats, are becoming increasingly prevalent in households. ²³ These technologies allow consumers to manage, secure, and operate their homes efficiently, and consumers are showing no signs of losing interest.

By the end of 2020, the number of smart homes in Europe and North America was estimated to have reached a total installed base of 102.6 million. ²⁴ North America currently has an installed base of 51.2 million smart homes, growing by 18.7% from the previous year, and representing a penetration rate of 35.6%. The strong growth is expected to continue, and by 2024, it is estimated that close to 78 million homes in North America will be smart, accounting for 53% of all homes. ²⁵ In Europe, the installed base is expected to increase from 51.4 million smart homes, to over 100 million by the end of 2024 (around 42% of all homes). ²⁶



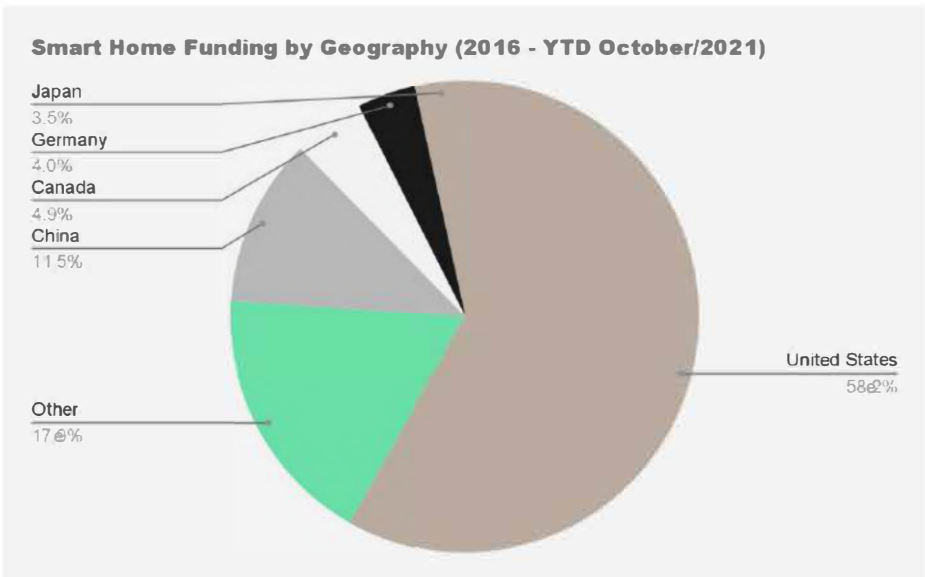
Source: IoT Business News

In 2020, smart home startups raised \$729 million across 26 deals globally, increasing by 23% from the prior year. The number of deals has been decreasing, as investors are focusing on later stage deals in this space, indicating a maturity in the market. ²⁷



Source: CB Insights

The United States represents more than half (57.7%) of all smart home funding deals globally, followed by China, Canada, Germany, and Japan, respectively.

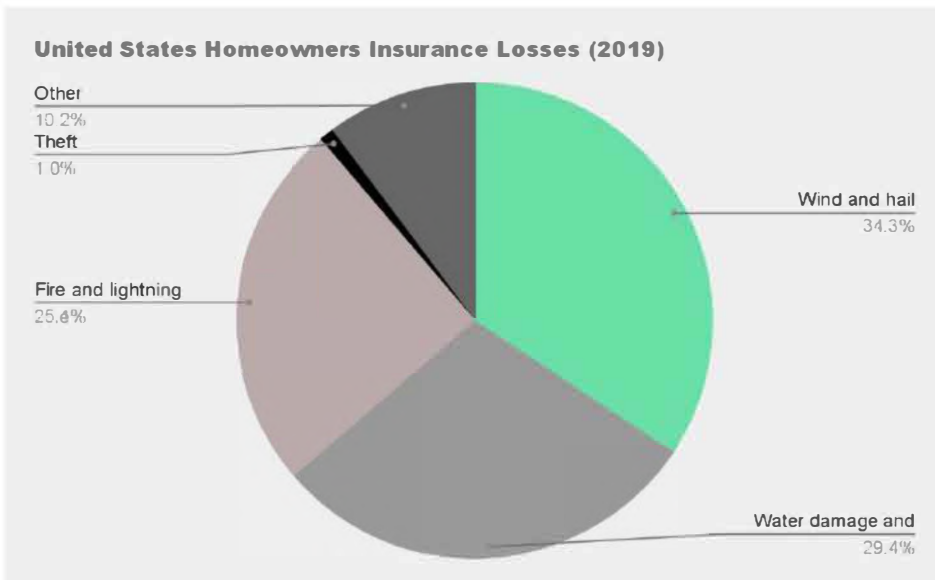


Source: CB Insights

IoT for home insurance opportunities

Homeowners insurance is a major line of business for insurers. In the United States, for instance it is the second largest property & casualty insurance line, with just over \$110 billion in premiums written in 2020.²⁸ Smart-home generated data has the potential to mutually benefit both homeowners and insurance companies. The data can help reduce or avoid homeowners' losses, and can significantly improve operational efficiency for insurers.

For example, water leaks and freezing incidents, which could be significantly reduced with smart-home sensors, represented approximately 30% of annual homeowners insurance losses in the United States in 2019.²⁹



Source: Insurance Information Institute

Additionally, the National Fire Protection Association in the United States reported that around 350,000 homes catch fire annually with an annual price tag of about \$7.2 billion.³⁰ The opportunity to impact just these annual indemnity pay-outs alone is immense. Initially, the insurance market did not embrace smart housing.³¹ The potential market was limited from a technical perspective as the existing solutions available on the market were slow and narrow in focus and held a deficit in relevant data insights.

The situation has shifted, however, as technology has matured rapidly. smart-home technology is becoming hard to ignore in the insurance world, as Big-Tech companies such as Google and Amazon, along with other providers, are putting their smart-home products on the market.

P&C insurance trends to watch in 2020

According to CB Insights’ report, “P&C Insurance Trends to Watch in 2020”, smart home sensors have been identified as one of the most promising technologies that may disrupt the insurance industry. Insurers are increasingly opting for technologies that will enhance the collection and analysis of data, with commercial IoT and commercial data enhancements, among other technologies, having also been identified as leading technologies.³²



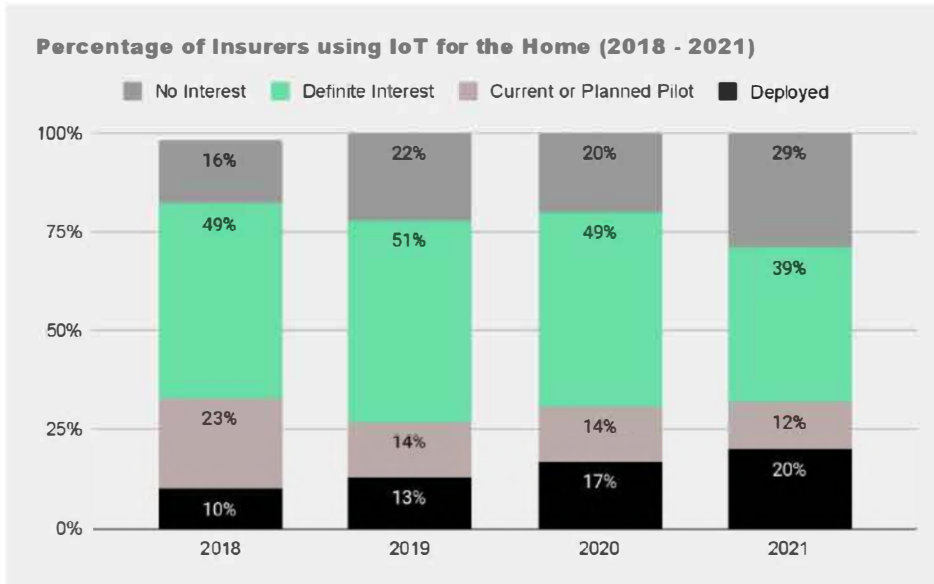
Source: CB Insights

Note: According to CB Insights, the trends have been determined based on the following factors:

Industry Adoption (y-axis): signals include momentum of startups in the space, media attention, customer adoption (partnerships, customer, licensing deals). Market Strength (x-axis): signals include market sizing forecasts, quality and number of investors and capital, investments in R&D, earnings transcript commentary, competitive intensity, incumbent deal making (M&A, strategic investments).

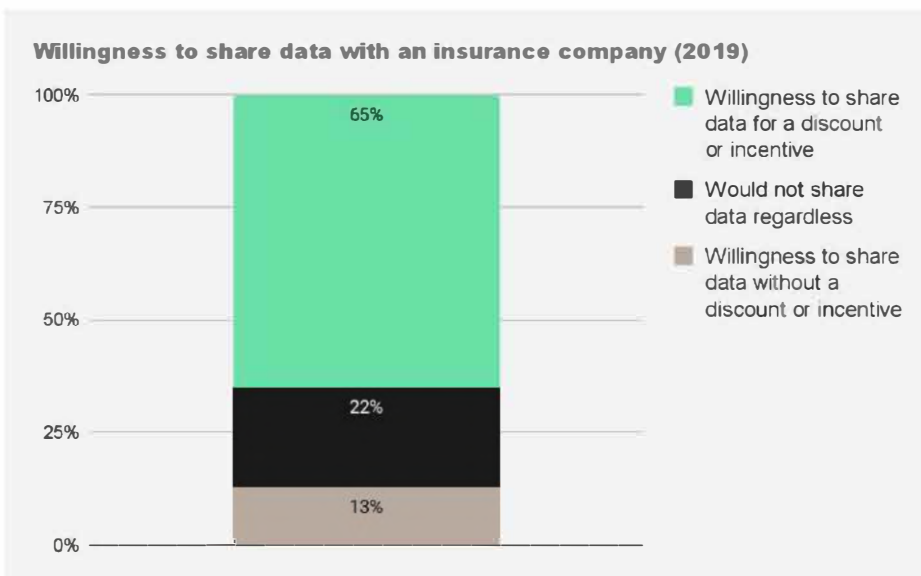
Trends defined as threatening have large addressable market forecasts and notable investment activity. The trend has been embraced by early adopters and may be on the precipice of gaining widespread industry or customer adoption.

A growing number of carriers are encouraging policyholders to use internet-connected devices. Specifically, the percentage of insurers utilizing IoT for the home has doubled, from 10% in 2018 to 20% in 2021. ³³



Source: Actuarial Review

This growth can be attributed to consumers increased willingness to share their data. According to a survey by Lexis Nexis in 2019, 78% of smart home device owners are open to sharing their data with their insurer (69% of which are willing for a discount or incentive). ³⁴



Source: Actuarial Review

In the past 10 years, consumers have significantly shifted their perceptions of sharing personal data and have reaped the benefits of doing so. This cognitive shift is a result of consumers not only getting used to the idea of sharing data but also as a result of regulatory action, such as GDPR and CCPA, and global corporations adjusting their approach to data with respect to growing personal security concerns.

The smart-home insurance market can positively leverage their strategy and embrace IoT devices in order to offset risk and offer innovative consumer solutions to attract and retain customers.

Current challenges & future outlook

The smart home industry is facing many challenges

1. **Consumer Adoption:** The implementation of insurer-based home IoT devices has been difficult as consumers do not understand the value compared to auto-telematics.³⁵ Furthermore, insurers and policyholders are interested in different devices. Research Director and Chief of Staff at Novarica, Harry Huberty, noted for instance, that, "People want insurers to buy their security cameras and window motion sensors, and insurers want water sensors."
2. **Security and Data Privacy:** Security and data privacy pose a real risk to policyholders and insurance companies, as the IoT devices often use new technologies with questionable security.³⁶ IoT devices usually lack the power to run anti-malware tools, and they are connected to the internet directly, which could expose other devices on the home network to malware.³⁷
3. **Cost of the Device:** The cost of the devices is also a challenge, including implementation, service and maintenance, and hardware costs.³⁸ Implementation and hardware for Flo's water shutoff devices, for instance, can cost up to \$800 per unit.
4. **Expanding Capabilities:** It has been difficult for providers to expand their IoT capabilities beyond limited testing, and it is not easy to build the infrastructure to deploy home monitoring.³⁹ Collecting and analysing smart-home data across a large number of homes is still a challenging task.

Looking ahead

Insurers are still in the early stages of smart-home adoption.⁴⁰ It is unlikely that insurers will gain substantial rewards from providing home sensors at a discounted price to their policyholders. As such, effective distribution will be the key to increasing adoption. When insurance companies plan their strategies, they must put a focus on data management, partner management, and security. Determining whether insurance companies will run their own platforms or embed services within device manufacturers' platforms remains to be seen.

It is expected that insurers will continue to experiment with new smart-home devices, partners, and product architectures. Nevertheless, homeowners insurers can no longer ignore this growing trend because of the rapid consumer adoption of smart-home devices.⁴¹



IoT for home insurance - select peer use-cases

Peer overview

The insurance industry often rewards safe and conscious behaviour, and that ties into owning a smart device. Over the past several years, insurers have partnered with smart home device manufacturers to offer discounts to consumers who install the devices in their homes.



Berkshire Hathaway GUARD Insurance Companies announced a partnership with Guardian™ by Elexa to provide smart leak prevention systems to the insurer's Homeowners policyholders.⁴²



Alfa Insurance have recently partnered with Roost, home telematics solutions.⁴³ Alfa will deploy the Roost Smart Water Leak and Freeze Detector with the aim of increasing customer engagement and reduce claims frequency and severity.



Selective Insurance has launched a more comprehensive, end-to-end smart home and security solution for its customers.⁴⁴ Selective developed Smart Secure(sm) in-house and uses Alarm.com products and services.



Nationwide has partnered with Notion and their smart home monitoring technology, to provide an added layer of protection to homes with connected devices.⁴⁵



Insurtech Hippo announced a partnership with ADT to add professionally installed and monitored Smart Home Services and discounts for home insurance customers across 32 states.⁴⁶



Travelers announced a partnership with Amazon to provide policyholders with a free Amazon Echo Dot and the opportunity to purchase smart home kits at discount prices, all while saving on your home insurance premium.⁴⁷



Liberty Mutual offers customer deals related to a multitude of smart device companies. Subsequent to offering cameras and motion sensors, the company has begun offering savings for smart locks and smart smoke detectors.⁴⁸

IoT for home insurance - select startups

Insurance companies are partnering with IoT startups to monitor various factors, including security, fire detection, and leak detection. Insurers can leverage the data from these startups for proactive loss prevention, first notice of loss and claim management. Players across the insurtech ecosystem are also integrating IoT devices in their offerings, by offering policyholders free devices, or offering policy discounts based on the consumers' smart devices.



The market map in this report contains private, active companies and is not exhaustive of every company in this space. The categories featured in the map are not all mutually exclusive. This is one way to segment the market.

IoT for SMB insurance



IoT for small and medium businesses (SMBs)

The COVID-19 pandemic has caused an increase in the adoption of IoT in the last year. This is particularly true for SMBs. ⁴⁹ IoT devices are helping businesses streamline and automate processes, modify supply chain strategies, increase remote access to systems so employees can perform tasks remotely, and monitor empty storefronts.

The opportunity for IoT to help optimise small businesses has never been greater than it is now ⁵⁰, as the world transitions back to the physical workplace, including:

1. **Increased workplace productivity:** IoT enables increased efficiency and productivity throughout all departments. Using IoT systems, for example, buildings can be controlled to reduce energy consumption and adjust lighting to increase employee productivity.
2. **Streamline operations:** Automating repetitive tasks and processes with IoT sensors can streamline operations, saving time and reducing production costs.
3. **Improve workplace safety:** The use of smart locks provides selective access to facilities and ensures building monitoring, thus enhancing security. IoT security solutions can also include smart lighting systems that can detect movement and prevent break-ins, as well as automatically function in case of an emergency, increasing safety.
4. **Business opportunities:** Data from IoT devices makes it easier to understand what customers want. A retailer could, for example, use IoT to measure in-store foot traffic in order to optimize displays based on customer behaviour. ⁵¹
5. **Greater customer experience:** Customers have expectations from businesses that must be met. IoT devices can help businesses better interact with their customers. ⁵²

IoT for SMB - insurance opportunities

A key market for insurers, the SMB segment has historically been underinsured and underserved regarding insurance products. ⁵³

In the United Kingdom, for example, SMBs account for more than 99% of all companies and 77% of the workforce. ⁵⁴ Among commercial property and casualty lines, SMB's account for more than 60% of gross written premiums. The United States has more than 30 million SMBs, consisting of close to half the country's employees. ⁵⁵ According to a survey by Next Insurance of 30,000 US SMB's, 44% of businesses have never had insurance. ⁵⁶

SMBs operate in a variety of sectors including foodservice, beauty, retail, and professional services. The range of insurance coverage that they require ranges from commercial property, business vehicles, and general liability coverage to business interruption protection and workers' compensation. ⁵⁷ Additionally, insurance premiums for small businesses typically range between \$2,000 and \$5,000, which is double those of homeowner's insurance policies, making this underserved sector an even more attractive target market. ⁵⁸

Moreover, COVID-19 has increased consumers' expectations among SMBs, allowing insurance companies to capture more of the SMB market. Insurers need to leverage the power of emerging technologies and data analytics to bring tailored, preventative solutions to SMBs that solve their business needs. ⁵⁹

Small businesses can benefit from smart devices, as commercial properties face similar risks as residential properties. ⁶⁰ Regardless of whether a building is residential or commercial, property loss incidents such as leaks, fires, and burst pipes can occur. Small businesses can lower their insurance premiums by employing detect-and-prevent strategies that reduce the risk of damage.

For insurers, the cost of the smart devices is minimal compared to an insurance claim pay-out.⁶¹ Smart devices will also help agents sell insurance policies in a fragmented market since they are attractive tools for acquiring and retaining customers. IoT services have not yet fully penetrated SMB insurance, primarily because IoT companies are targeting large and medium enterprises.⁶²

As the use of smart home technology has grown exponentially in recent years, and predictions suggest that these devices will only become more prevalent, they are also beginning to gain traction in the SMB sector, as the risks to commercial properties are similar to those faced by homeowners.

Any technology that detects building problems and can send an alert can reduce claims and the resulting business disruptions.⁶³ As an example, store security monitoring through the use of connected video cameras and IoT perimeter sensors not only provides a sense of safety and security for small business owners, but also reduces the chances of burglary and improves the recovery of stolen assets.⁶⁴

Stores with smart smoke detectors can alert security monitoring companies if a fire is imminent. Several insurance companies offer reduced insurance premiums in exchange for access to IoT monitoring capabilities (such as smoke and leak detection sensors) that can reduce the likelihood and scope of preventable losses.

Additionally, smart commercial facilities, such as office buildings, can do more than just control the lighting and temperature. IoT sensors connected to these facilities provide proactive alerts for a range of dangerous conditions, protecting people and property from potential harm and loss.

Current challenges & future outlook

The SMB market is facing many challenges

1. **Diversity of Risks:** in order to deliver insurance products effectively, it will be necessary to offer specialised solutions by segment.⁶⁵ This is an additional challenge that was not present for insurer experiences in personal lines, which are addressed using a universal "one-size-fits-all" approach.
2. **Different Stakeholders:** a number of stakeholders must be involved in the adoption of the solution, prevention and mitigation, and the behavioural change.⁶⁶ The business owner (or the employee who will eventually purchase the insurance), the on-field supervisor (such as a store manager) and the operative employees are all stakeholders. The IoT insurance strategy must take into account all of these factors.
3. **Data Privacy:** the access and protection of customer information is a major concern for commercial property insurance companies.⁶⁷ As IoT is implemented, insurance policies will need to be amended in order to ensure that customers understand the risks involved with the collection and storage of information. The policy will need to consider whether the information belongs to the insurance company or to the customer. Furthermore, with regard to privacy, small businesses are particularly vulnerable to cybersecurity attacks, with 43% of online attacks directed at SMB's.⁶⁸

Looking ahead

For insurers, it will be key to identify and design services that are attractive to customers. The sensors necessary to provide these services will be the basis of the IoT approach in insurance.⁶⁹ Partnerships with technology's latest initiatives and organisations will be essential for insurance companies.⁷⁰ As data sharing and smart devices are increasingly connected, the way that SMB insurance works will be changed forever.

IoT for SMB insurance - select peer use-cases

Since consumers are only just beginning to implement IoT technology in their small businesses, partnerships with insurers are still in their early stages, with a few early adopters leading the way.



Following Covid-19's forced closures, Nationwide invested in Deep Sentinel, a provider of security systems that combine artificial intelligence with human monitoring to prevent crimes before they begin.⁷¹



HSB, part of Munich Re, introduced a cellular IoT sensor solution to help smaller businesses and organisations prevent property damage. HSB's sensors monitor property conditions and issue 24/7 alerts when potential problems are identified.⁷²










Parsyl incorporates sensor technology to provide insurers with accurate data and insights about their customer's supply chain (particularly relevant for perishable retail goods).⁷³



The Hartford, through its IoT Innovation Lab, uses IoT technology to help reduce potential losses at commercial properties. Some examples of the devices are: water sensors, flow monitoring systems, automatic shut-off switches, and temperature and humidity monitoring.⁷⁴

IoT for SMB insurance - select startups

Many startups in the chapter on IoT for Home Insurance are also dynamically applicable to SMBs. Small and medium businesses should take advantage of the opportunities presented by IoT technology and strategically plan for increased integration into business processes. Below are a few additional companies with specific offerings.

 <p>IoT sensors for leak and floods</p> <p>Funding: \$1.33M Partnerships: Acquired by Munich Re / HSB, Hanover</p>	 <p>Parametric insurance for floods using sensors</p> <p>Funding: \$3.38M Partnerships: Aon, Marsh, Lockton</p>	 <p>IoT sensors for earthquake assessment</p> <p>Funding: \$14.06M Partnerships: HDI invested</p>	 <p>Telematics fleet management for businesses</p> <p>Funding: \$24M Partnerships: Nationwide</p>
 <p>IoT smart water sensors</p> <p>Funding: \$0.17M Partnerships: Northbridge, State Auto Van Allen</p>	 <p>IoT sensors to accurately measure occupancy</p> <p>Funding: \$1.5M Partnerships: TBD - product just announced</p>	 <p>Advanced driver-assist to reduce risk & collect data</p> <p>Funding: Acquired by Intel, 2017 for \$15.3b Partnerships: Munich Re, Berkshire Hathaway</p>	

Industrial IoT

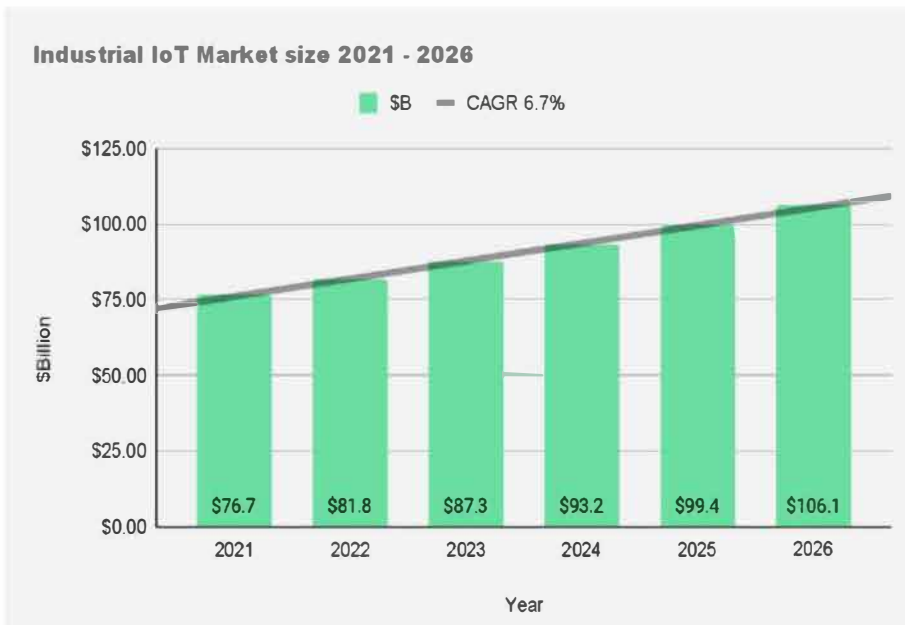
for insurance



Industrial IoT overview & funding

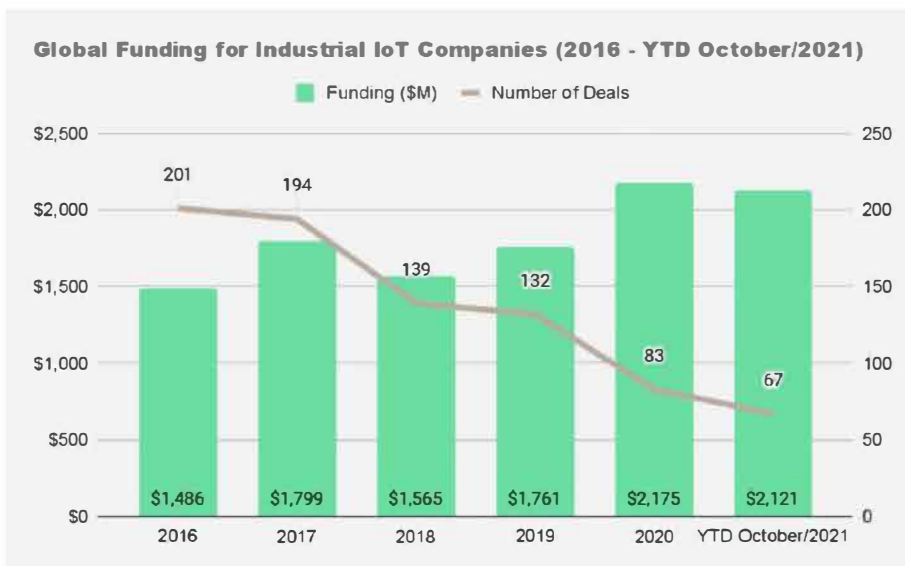
Industrial IoT (also known as 'IIoT') is impacting different industries, including, Manufacturing, Energy & Power, Oil & Gas, Healthcare, Transportation & Logistics. The IIoT solutions connect sensors and other devices to the internet and add software, enabling the aforementioned industries to move toward automated and connected environments. In doing so, the collection and analysis of data can be thoroughly executed, while optimising workflows and processes, as well as enhancing worker safety.

The global IIoT market size is expected to grow from USD 76.7 billion in 2021 to USD 106.1 billion by 2026, at a CAGR of 6.7% during the forecast period.⁷⁵



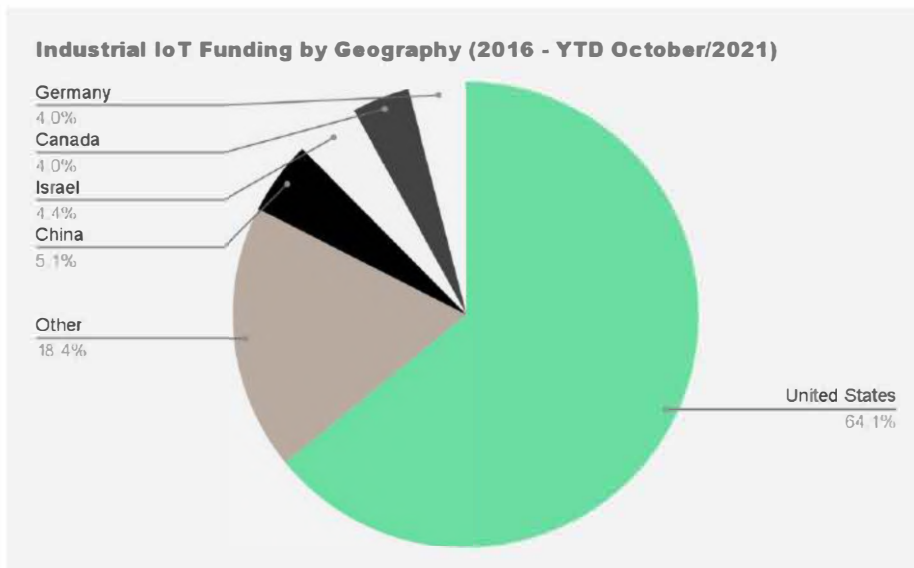
Source: Markets and Markets

In 2020, industrial IoT startups raised \$2.17B across 83 deals, an increase of 23% from the prior year. The number of deals dropped 37% from 2019, while funding has increased, indicating investors are focusing on later stage deals.⁷⁶



Source: CB Insights

The United States represents a significant portion of industrial IoT funding deals globally, followed by China, Israel, Canada and Germany, respectively. The large share of "other" geographies taking a share of the industry's deals indicates that innovations are relatively distributed around the world.



Source: CB Insights

Industrial IoT insurance opportunities

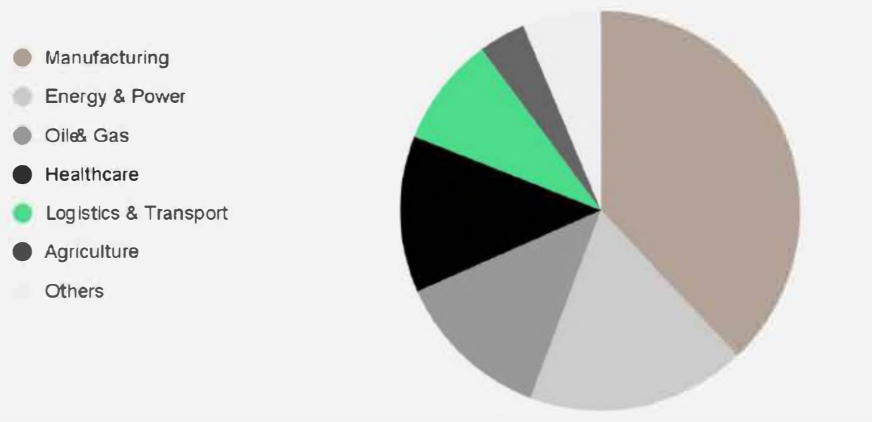
In response to the growing demand for IIoT solutions, the insurance industry must ensure that it is utilising these solutions while ensuring that it provides better products to its clients. Globally, commercial insurance, which includes products like workers' compensation, property and liability insurance, and equipment coverage, accounts for over \$700 billion in annual premiums. Still, only 24% of insurers have begun incorporating IoT into commercial policies.⁷⁷ Insurers should encourage their customers to adopt IIoT, since this will boost profitability by offering new and innovative insurance products.

IIoT solutions are transforming the insurance industry in the following ways:

1. **Predictive maintenance of machines:** Sensors attached to critical assets and supply chains are providing untapped information about the assets' maintenance, lifetime value, and actionable insights for users to improve efficiency. Manufacturers can expedite the claims handling process by getting tailored risk scores through insurance companies.
2. **Integrated systems for supply chain:** Integrating the different components of the supply chain can allow insurers to reduce risk by gaining full visibility of the different components of the supply chain, ensuring its full integrity. A warehouse and fleet humidity sensor, for example, can ensure that end clients are delivered in optimal conditions allowing manufacturers to adjust at any stage of the chain.
3. **Automated KPI based insurance:** As machines and sensors begin to collect more data, integrating machine learning capabilities will become a critical part of the IIoT ecosystem. With advanced analytical capabilities, we will be able to automate and simplify more complex decisions. Insurers can take advantage of these developments by offering new policies that are based on the decisions provided by these algorithms. The use of IoT devices in hospitals, for example, can be useful in monitoring the hygiene conditions and applying machine learning algorithms for calculating the current infection risk at a given area. This will allow insurers to provide a more compatible malpractice policy and reduce a hospital's risk.⁷⁸

Although the IIoT market affects many different industries, the manufacturing industry holds the largest market size, and is expected to continue dominating the market, accounting for 30% of the market by 2028.⁷⁹

Global industrial internet of things market share, by end use, 2020 (%)



Source: Actuarial Review

IIoT is digitising and automating the manufacturing sector, and insurance companies will have to rewire their businesses to take advantage of the IIoT. A new generation of insurance customers requires insurers to adjust to new expectations, develop products for connected environments, and address new risks.⁸⁰

Examples of how IIoT solutions are changing the insurance industry in manufacturing:

- **Equipment related insurance products:** By utilising IoT devices and the data they produce, insurance companies can enhance operations and prevent losses through automatic notifications, loss mitigation and prevention through behaviour modification and active alerts. Additionally, insurance companies offer 'Equipment-as-a-Service', where the customer receives IoT equipment, software to manage the hardware, and insurance coverage for a recurring fixed fee.
- **Property related products for environmental hazards:** Hazardous substances like smoke, mould, and toxic fumes can be detected by sensors embedded in plants; this allows for adjustments to be made to minimise the risk of a harmful event occurring and allows insurance companies to reduce the risk.
- **Worker safety related products:** In high-risk places, wearable sensors could monitor employee movement and transmit data to employers in real time to alert the wearer of potentially hazardous situations, decreasing fraud associated with workplace incidents.

Current challenges & future outlook

The adoption of iot in industrial insurance is facing many challenges

1. **Diversity of risks:** As compared with home and auto risks, commercial insurance involves a variety of risks that differ by industry, region, and company size, making it more difficult for insurers to develop IoT products.⁸¹
2. **Cost of implementation:** Setting up a factory with thousands of IoT sensors is more complex and expensive than installing a telematics dongle into a vehicle.⁸²
3. **Cybersecurity Vulnerabilities:** Legacy systems are generally unable to keep up with digital transformations. Security concerns are arising as factory owners retrofit IoT sensors into their existing systems, since privacy & security are not original features in IoT. Commercial markets are also more concerned with cybersecurity vulnerabilities in IoT devices since the financial and reputational consequences are much greater than in consumer markets.⁸³
4. **Handling the Data Flood:** To ensure that data is properly cleaned and managed, a strong governance program is needed, as there is no standard for recording or reporting data in the IoT. Consequently, each potential product that will be supported will require a significant investment of time and money to incorporate into a data collection and processing program so that all of the information is reliable.⁸⁴

Looking ahead

In the industrial space, insurers are just beginning to develop their IoT strategies. Most leaders are still in pilot stages when it comes to developing their IoT offerings. There are still many startups emerging in the IIoT space, particularly in supply chain and logistics that are transforming how the industry operates, and insurers will partner with startups to mitigate risk and keep pace with customer adoption. Furthermore, insurers should offer a cyber insurance policy in addition to equipment-related insurance products, since sensors and devices exacerbate security vulnerabilities.

Manufacturers can expect 3D printing, or additive manufacturing, to revolutionise the manufacturing industry in the near future as well as related insurance products. Insurance companies should be prepared to meet the challenges posed by this type of manufacturing and introduce new products.⁸⁵

It is likely that IoT will provide high value to insurers and customers due to the magnitude of risks it entails. If IoT-enabled insurance products succeed in reducing costs, they will quickly become a compelling proposition for consumers.⁸⁶

Industrial IoT for insurance select peer use-cases

Peer overview

Insurers are beginning to partner with startups in this space. For instance, insurers have introduced wearables to detect worker safety. IoT sensors can also be used to help manage risk across a company's non-human assets, including agriculture, marine, construction, offices, heavy machinery.



Munich Re partnered with Miura & Armstrong to provide "Steam-as-a-Service". The product combines Miura's boiler equipment and IoT, Armstrong's implementation & maintenance, and HSB's embedded insurance.⁸⁷



Aon's specialised cargo insurance uses IoT to monitor the temperature of vaccines being transported via marine cargo through its partnership with insurtech Parsyl.⁸⁸



Berkshire Hathaway GUARD Insurance Companies has announced a pilot project with Triple+ for water leak damage prevention using IoT.⁸⁹



The Travelers Companies, Inc. partnered with Triax Technologies by providing construction workers with a wearable device to improve employee safety.⁹⁰



American International Group (AIG) invested in Human Condition Safety (HSC). HSC uses IoT to reduce the number and severity of workplace related injuries through the use of wearables.⁹¹



Swiss Re partnered with Hitachi to offer manufacturing and transport companies coverage for industrial IoT risks. The initial product will offer Hitachi's predictive maintenance software.⁹²



HDI partnered with Schneider Electric to predict and prevent electrical fires for industrial customers.⁹³ HDI is expecting the Schneider Electric's IoT platform can reduce the causes of fire losses by up to 75%.










Hartford Financial Services have equipped workers with IoT wearables which generate data about a worker's fatigue and safety throughout the day.⁹⁴ This data is analysed in order to create a safer workplace.




IoT for industrial insurance - select startups

In the industrial IoT world, there are many startups, but some IoT tech vendors have linked their products to insurance, while others have not. There are several startup companies that are linking their platforms directly to insurance risk management programs, providing a roadmap for others to follow.

Select startups with insurance use cases for industrial markets

 <p>IoT sensors for machines</p> <p>Funding: \$114M Partnerships: Munich Re / HSB Carrier, DSV Global</p>	 <p>Video-based safety, sensors</p> <p>Funding: \$930M Partnerships: Progressive, RLI Insurance, Koffie Insurance</p>	 <p>Wearables for worker safety</p> <p>Funding: \$17.7M Partnerships: AIG, Amerisure Nationwide</p>	 <p>IoT sensors for worker safety</p> <p>Funding: \$12.5M Partnerships: AXA XL, Travelers</p>
 <p>Wearables for worker safety</p> <p>Funding: \$18.04M Partnerships: The Hartford</p>	 <p>Equipment-as-a-Service</p> <p>Funding: \$94.04M Partnerships: Acquired by Munich Re</p>	 <p>Digital cargo tracking</p> <p>Funding: \$13M Partnerships: AXA XL</p>	

Select startups that can be relevant to insurance use cases

 <p>Analytics and edge computing</p> <p>Funding: \$82.6M Partnerships*: Porsche, Honeywell, General Electric</p>	 <p>IoT sensors for machines</p> <p>Funding: \$287M Partnerships*: J.D. Power, AccuWeather, DARKTRACE, RTA</p>	 <p>Smart hard-hat for worker safety</p> <p>Funding: \$38.5M Partnerships*: Siemens, Caterpillar, T-Mobile</p>
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The market map in this report contains private, active companies and is not exhaustive of every company in this space. The categories featured in the map are not all mutually exclusive. This is one way to segment the market.

Key takeaways

The rise of the IoT will revolutionise all industries and will have an increasing impact on our everyday lives. With the advent of IoT technology, data-driven processes, real-time remote monitoring, incident mitigation, and proactive customer interactions, will be the new standard. This fundamental shift in 'preventing bad things from happening' cannot be ignored and should be embraced by the insurance industry.

It is evident that the maturity of IoT in the insurance industry is evolving. Currently, information regarding insurance IoT is limited and the ability to translate the data into a sustainable business case is still in its infancy.

Regardless of the product lines offered, there is one unifying theme: opportunity. As this technology is still relatively new for use in insurance, its final applications in insurance policies may differ greatly from what has so far been anticipated.

It is apparent that the data available through IoT can be an invaluable source of knowledge for improving insurance risk assessment. Having comprehensive knowledge of the data can lead to better pricing, improved customer service, and new lines of business that address risks that have otherwise been overlooked. As IoT advances, companies that are better equipped to handle data will have an advantage. Consequently, this advantage may attract competition from outside of the insurance industry.

In order for insurance to maintain its competitiveness in the future, insurers must be able to adapt to the data IoT can provide, develop IoT pathways for each asset or line of business, and adjust their policies as necessary. Insurance companies must be open to disruption from the Internet of Things and adapt to the demands made by consumers and competitors alike.



Background

This report was co-written and published by Tokio Marine's London Innovation Lab and the Open Innovation Company SOSA, with the intention of shedding light on three prevalent IoT technology trends in the industry today and the impacts and effects on global insurance corporations.

About Tokio Marine



Tokio Marine Group consists of Tokio Marine Holdings and its subsidiaries and affiliates located worldwide, operating extensively in the non-life insurance business, life insurance business, and financial and general businesses. As the oldest and largest Japanese property/casualty insurer (established in 1879), Tokio Marine Group has been expanding its business globally from the domestic non-life insurance business to the life insurance business and the international insurance business. With a presence in 46 countries and expanding, Tokio Marine ranks as one of the world's most globally diversified and financially secure insurance groups.

Tokio Marine Innovation Lab's mission is to accelerate digital innovation amongst our companies and clients. The Lab network consists of USA (Silicon Valley & New York), Asia (Tokyo, Singapore, Taipei), London and Sao Paulo, giving Tokio Marine's Innovation Lab true global coverage. The London Lab has been built on 4 pillars: Collaboration, Information Sharing (including technology scouting), Education & Mentoring. These pillars ensure Tokio Marine promote an innovative culture for the benefit of the business.

About SOSA



SOSA is an open innovation company. We work with innovation teams and business units in corporations (like HP, Schneider Electric, RBC, Swiss Re), and governments (like Australia, Brazil, Canada and Taiwan). We scout and validate startups and technologies in order to bring our clients the solutions they need to solve use cases, identify opportunities, or build new products. Think noise-canceling headphones for the endless supply of startups.

Since 2014, we've literally been in the room facilitating discussions between large organizations and tech companies. From the first touchpoint all the way to pilots, implementations, and investments, we bring our clients precisely the technologies they need to advance innovation.

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