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WHITEPAPER



How insurers benefit from partnering with health-tech companies for improving outcomes and reducing malpractice claims

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1. Executive Summary

In the age of continuous technological advancements, global connectivity is on the rise, shrinking the world into a compact space that can be held in one's pocket, courtesy of smart devices. These devices, such as phones, watches, and wearables, serve as connectors for families and friends. Moreover, they enable individuals to monitor the entire journey of their packages, from the warehouse to their front porch, while employers can use them to assess the efficiency and safety of their workforce in package delivery.

The Internet of Things (IoT) encompasses the interconnectedness of people, places, and objects through the utilization of both hardware and software. It represents a fusion of technology and human experience, leveraging devices to improve relationships, foster partnerships, and contribute to successful business metrics. Beyond simple communication channels like emails or messenger applications, IoT tools enable businesses to establish connections with their processes, monitor performances, and, ultimately, enhance profitability.

Businesses are presently establishing connections with both clients and employees in unprecedented ways. This includes linking behaviors to performance metrics and utilizing this data to instigate behavioral changes through alert systems and incentivization programs.

Prominent industrial leaders are leveraging IoT to enhance productivity, while insurance leaders are utilizing it for improved risk prevention. Insurers spanning various business lines, including car, home, life and health (L&H), commercial property, marine, and even medical malpractice carriers, are adopting IoT solutions. This adoption aims to monitor risk more efficiently, bringing about enhancements in both insight capabilities and strategies for risk mitigation.

Insurers have traditionally treated Medical Malpractice, or MedMal, in a manner similar to other insurance business lines, employing reactive management practices. The data utilized has been static, relying on past claims, exposure data, claim reports, and inspections. While one approach involves risk engineers visiting medical facilities to identify risks and offer recommendations for safer practices, the dynamic nature of today's healthcare landscape necessitates a more proactive stance from insurers.

The introduction of electronic health records (EHR) enables hospitals and their staff to gather and utilize extensive sets of patient data. Additionally, they can collect procedural data to assess elements such as surgical performances and their implications on patient outcomes and potential risks.

The challenge lies in the overwhelming amount of data generated by these systems, a significant portion of which is rendered unusable. Consequently, substantial time, money, and resources are dedicated solely to deciphering the information and taking action retrospectively.

Electronic health records (EHRs) are not the sole tools at the disposal of hospitals and their insurers for data collection to identify and mitigate risks. Robotic and minimally-invasive surgeries incorporating cameras and video present a novel opportunity previously unavailable. This entails the capability to collect, analyze, and offer feedback based on video imaging, enhancing the potential for risk assessment and mitigation.

However, numerous healthcare systems and insurers face challenges in determining how to effectively utilize this data. While it is employed to guide surgeries and potentially reviewed afterward, video data is largely underutilized as a tool for identifying behaviors and areas for implementing risk mitigation tactics.

Healthcare systems and their insurers need to adapt to the changing times and discover more efficient methods for handling extensive datasets. The adoption of the Internet of Things (IoT) paradigm enables insurers to revolutionize their approach to Medical Malpractice (MedMal). The challenge lies not in a scarcity of data but in the absence of systems to apply insights effectively. These insights have the potential to drive behavioral changes, reducing risks and standardizing practices in high-performance areas such as the operating room.

Mitigating risks in the operating room has consistently posed a challenge, primarily due to a lack of actionable data. The surgical suite and hospital system emerge as particularly valuable spaces for the application of IoT solutions and tools. From surgeons to insurers, there is a persistent desire for readily available and usable data to expedite interventions, enhancing and sustaining patient safety.

And here comes the role of Caresyntax – Caresyntax, with its vendor-neutral surgical data platform, demonstrates the capability to gather, analyze, and provide insightful feedback by organizing data to streamline processes, offer real-time feedback in the surgery room, and champion behavioral change programs to support surgeons and their teams in improving performance and increasing patient safety. This is achieved through a fluid integration of their software into partners' existing hardware platforms, made possible with IoT tools. These tools enable surgeons to work smarter and safer, incorporating real-time alerts during surgery and standardized assessment tools for training new surgeons or enhancing current practices.

In this article, Caresyntax shares the evolving landscape of how insurers benefit from implementing IoT tools and describes various ways their vendor-neutral platform supports partners in driving behavior changes with objective feedback, utilizing safety assessment tools and AI-driven video analysis.

Caresyntax has significantly contributed to enhancing safety and improving the behaviors of surgical teams, undoubtedly leading to a reduction in Medical Malpractice (MedMal) claims. Through the effective utilization of integrated systems and Internet of Things (IoT) tools, these improvements are achieved with a more economical financial footprint.

This underscores the relevance of the progress and support offered by Caresyntax to providers of Medical Malpractice (MedMal) services. If hospital systems successfully leverage Caresyntax to mitigate risk and instigate change, the potential applications for a MedMal insurance provider extend to numerous possibilities.

Having IoT as a core capability is essential for any Medical Malpractice (MedMal) insurer aiming to diminish claims and enhance profitability in their future endeavors, with Caresyntax leading the way.

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2. The world is getting connected

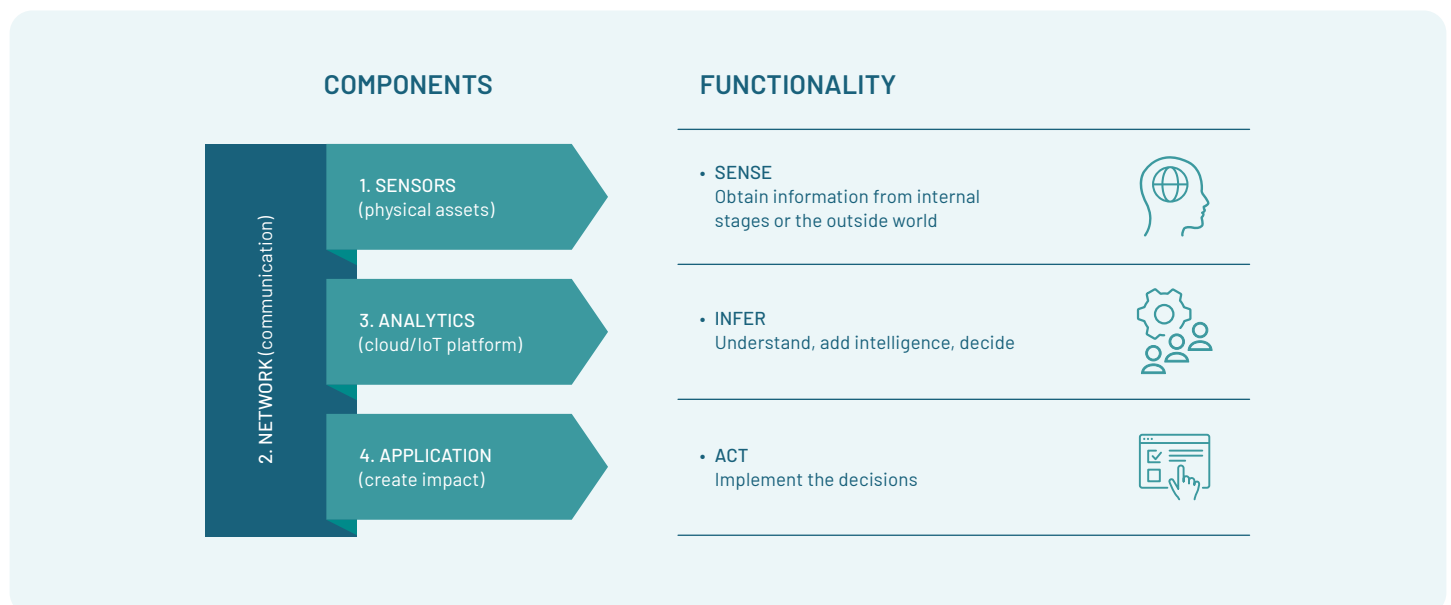
2.1. The IoT paradigm

The Internet of Things (IoT) is a term coined over 20 years ago referencing technology and its ability to connect people and processes. IoT solutions marry the physical and digital worlds and aims to improve both in the process. Anything can be improved with IoT integration and in turn increase ease, efficiency, and safety.

IoT solutions have a pervasive presence in the life of any person and any organization and can be observed at different levels (Norcia and Carbone, 2021):

- At a micro level, single solutions – as your smartphone, your smart-watch, the smart thermostat in your house, your connected car, the QR code on the escalator for tracking the maintenance in your condominium, or the connected tractor in the farm – all have sensors generating data which are connected and enable smart actions;
- At a system level, a group of single solutions are interconnected and combined, as the Apple HealthKit in your phone, the domotic hub in your house, the farm management system allowing for precision agriculture techniques, or the facility management system currently managing the HVAC in your office;
- At a macro level, where different systems are integrated and orchestrated, as smart cities, air traffic control, or the food supply chain to name only a few.

Any of these IoT solutions are based on three elements: sensors, analytics, and applications interconnected by a communication layer (network).



Source: The Geneva Association (2021) (Adapted from the IoT Insurance Observatory based on the interview with Prof. Ahmed Banafa)

More than a tool or new technology, IoT should be seen as a business paradigm. The peculiar characteristic of the IoT paradigm is its function to unlock an organization's ability to sense, infer, and act more effectively.

The IoT paradigm improves the way business is done for organizations. This is where it is so valuable – it allows for smarter actions with a higher scale than in a traditional analog approach.

Leading organizations in every sector of the economy have started leveraging the IoT paradigm to transform their business with healthcare organizations being included by this wave of innovation over the past decade.

There may not be a more valuable space to apply IoT solutions and tools in healthcare than in a surgical suite and hospital system. Surgeons and their teams use a multitude of tools and applications to care for their patients safely and efficiently. But, these tools and applications require analysis by surgical teams in order to be useful.

Moreover, surgeons are responsible for taking large amounts of data – both historical and real-time – and are charged with organizing and interpreting the data as quickly and safely as possible.

This is made more complicated when hospital systems are using several different platforms to collect data. This vital need to succinctly collect and interpret data has been identified by Caresyntax. Caresyntax utilizes IoT solutions to support hospitals, surgeons, and their teams in effectively dealing with this modern day complexity with ease and efficiency.

2.2. Caresyntax Connects Partners and Technology

Caresyntax has recognized the need for innovative IoT solutions to reduce the analytical burden put on hospitals. Our aim is to connect hospital systems, surgeons, and their teams by connecting them with their data. As a healthcare data company, we deliver actionable insights to improve patient outcomes while also improving compliance and efficiency for hospital systems.

Our larger goal is to make surgeries safer and smarter by empowering healthcare organizations with innovative, data-driven solutions.

We do this by using proprietary software and AI to analyze large volumes of data in and around the operating room including:

- Images and Video
- Audio
- Device data
- Clinical
- Operational data including compliance and performance tracking
- Financial data

Caresyntax created a vendor-neutral surgical platform as the first and only software-based routing solution. This means hospital organizations are able to seamlessly integrate our surgical technology software into their existing hardware to make it smarter and more useful. We are able to utilize new and existing healthcare data system wide to streamline workflow, mitigate risk, and improve outcomes.

With our vendor-neutral surgical platform, we have significantly reduced the need for introducing additional hardware components across hospital systems that take up space and require additional training. Rather than bringing in new hardware, Caresyntax adds their entire software platform on top of existing hardware and software infrastructure, by efficiently integrating with a healthcare system's:

- Electronic health records
- Hospital information systems
- Supply/implant data
- Device data
- Imaging
- Surgical video

This means when a new healthcare system partners with us, the transition is much smoother without the traditional headache of learning new devices and hardware.

It's as if their hardware gets a complete system update and overhaul without the price tag of new materials and hardware. Thanks to this innovative approach, when a healthcare system works with us, there is lower capital expenditure and a reduced financial footprint.

Components of our platform feature AI and machine learning with cloud-based infrastructure providing procedural support. Using these tools we're able to utilize new and existing healthcare data systemwide to streamline workflows, mitigate risk, and improve outcomes.

Currently, Caresyntax has partnered with major hospital groups to collaborate in streamlining processes, reducing risks, and improving patient outcomes. Our software is used in more than 3,000 operating rooms across Europe and in the United States providing valuable insights for surgical teams in over two million procedures per year.

Being able to track outcomes like Surgical Site Infections, Length of Hospital Stay, Recovery time, and other metrics can increase patient safety by reducing complications all of which are rooted in operating room performance. But collecting and tracking this massive amount of data can be overwhelming to hospital administrators as well as their insurers. Trying to organize large amounts of data in a timely manner so it can be applied is often unobtainable using current methods.

Caresyntax helps hospitals work towards their existing goals of optimizing safety and efficiency in surgical settings by improving how patient outcome data in these categories is evaluated.

A key way Caresyntax does this is in managing these large databases – specifically image and video data in the operating room. These images and videos are already being collected during laparoscopic and robotic surgeries and Caresyntax recognizes the value in processing and analyzing the data.

Images and videos analyzed with our software can be used by hospital systems to evaluate surgical performance after procedures to drive standardization and overall improvement. Additionally, video and other data can be used to support education and unsafe behavior mitigation.

Not only are the insights Caresyntax provides helping reduce risk in the operating room, but these insights can help improve patient outcomes as they leave the surgical arena.

Here are just a few of the ways Caresyntax and their IoT driven solutions are applied:

- Real-world evidence captured can be used live during a procedure by care teams, and even accessed by those outside the operating room via the platform's dedicated telehealth link;
- After a procedure, the Caresyntax platform provides insights to help surgeons benchmark and improve their care, and help hospital administrators use surgical resources more efficiently;
- High-risk patients can be identified as they head into post-operative recovery by integrating relevant data platforms and using AI-enabled data and video analytics to improve patient outcomes and facilitate decision support;
- Patient safety, experience, and satisfaction can be monitored alongside surgical performance and team work flow.

These insights also provide value for medical device companies to develop better products, and for insurance companies to better understand, manage, and transfer risks.

3. Connected Insurance

3.1. Why IoT?

Insurance is about assessing, managing, and transferring risks. Insurance professionals have done it for centuries relying on historical data and one-off data collection (such as an underwriting questionnaire, a claim report, or an inspection summary). This has mainly meant a reactionary ex-post presence of the insurance sector, responding after the insured event manifested instead of sensing and intervening. The peculiar characteristic of the IoT paradigm (its function to unlock an organization's ability to sense, infer, and act) represents an extraordinary opportunity for insurers. The possibility of being connected to the insured person, asset, or business represents a game changer for many of the core insurance activities: from understanding the risk, to assessing claims, and preventative actions to reduce the expected losses (focus of the next chapter).

A constant flow of information about the risk unlocks infinite opportunities to assess and manage the single policy and the portfolio of the insurance company. At a policy level, all the processes – from risk selection to quoting and renewal – are positively impacted. At a portfolio level, the granular and audited insights allow significant improvements in exposure management, risk appetite definition, and decisions.

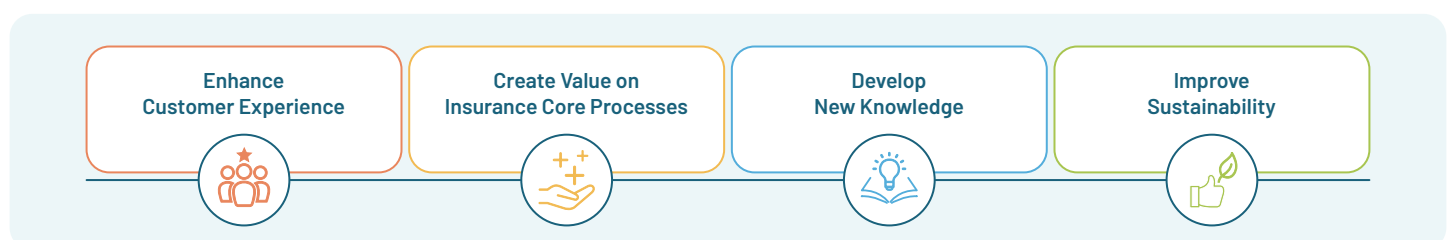
Claims management activities undergo significant transformation, facilitating rapid accident detection, proactive engagement with policyholders, and the utilization of IoT data to expedite decision-making at each stage of the claims value chain. This leads to savings in claim costs (loss ratio), encompassing minimization of inflated claims and fraud measures, and in process costs (loss adjustment expenses).

The most known, and mature, IoT system applied in insurance is telematics in personal auto, frequently defined as UBI (usage-based insurance). The term 'sensor' denotes the hardware components such as GPS antennas, accelerometers, and gyroscopes, which find their placement within the vehicle or are embedded within smartphones for solutions based on the latter. Sensors are "connected" to remote systems thanks to the 'connectivity' offered by the mobile network; sensor data are transferred to the cloud. The remote system undertakes analytical functions, thereby converting unprocessed data – comprising sequences of GPS coordinates and forces of acceleration, among others – into discernible driving patterns, subsequently informing the assessment of the customer's risk profile.

Moreover, this system possesses the capability to discern critical incidents, such as imminent collisions derived from shock measurement data, as well as instances of vehicle theft inferred from anomalous driving behaviors. Finally, applications create beneficial impacts for the customer as well as the insurer.

Insurers worldwide have already successfully introduced a wide range of applications, from the definition of a driving risk score – that is, the most known and expected usage of telematics data for more accurate pricing of risks – to faster and more objective claims handling processes. Some international pioneers have already sold services to auto policyholders, provided devices able to deliver real-time feedback to drivers about risky situations (Pick and Carbone, 2023), and introduced structured behavioral change programs targeting risky driving habits (Vitality Drive, 2021).

The most ambitious players have already defined a vision where telematics capabilities are used throughout the organization (Hernandez and Carbone, 2023).



There are four main reasons for adopting IoT in the insurance sector (source: IoT Insurance Observatory)

Looking at the international best practices across different insurance business lines, the IoT Insurance Observatory has mapped four main ways insurers have used IoT:

1. To improve customer experience
2. To create value on insurance core processes
3. To deploy new knowledge-based business opportunities
4. To improve sustainability (generate positive externalities to society)

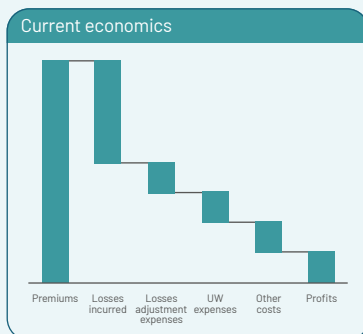
Within the creation of value on the insurance core processes, wrapping prevention services around the traditional risk-transfer contract represents one of the most valuable IoT-based use cases (The Geneva Association, 2021).

Risk mitigation (loss control) has been in the DNA of the insurance industry since the beginning of time, but it was a human-driven activity. The prototypical insurance risk management expert is "The Clipboard Guy" such as an inspector, risk engineering consultant, or coach. Obviously, this is a non-scalable approach that has been applied only to the largest policies, limiting the insurer's ability to mitigate risks (Hui and Carbone, 2023).

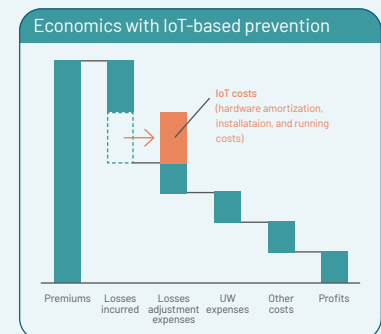
The world of prevention becomes more tangible and actionable with IoT-based prevention services.

When IoT-based prevention strategies are utilized, there is a potential for more accurate and scalable implementation when considering the reduction in expected losses. Identifying the business case at a policy level is a fundamental step for any risk reduction approach.

For any risk reduction approach, the identification of the business case at a policy level is a fundamental step



Let's assume an IoT solution where **benefits** in terms of (conservative estimation) expected losses reduction **are adequate to cover at least the emerging IoT costs**



Church Mutual business cases is based on the proposal of a risk mitigation solution (free) without any service fee

Limiting the perspective to the 'risk reduction' use case, the IoT costs represent additional loss adjustment expenses, so insurers are looking to scale solutions where the expected reduction in the losses is at least bigger than these costs.

A recent article, "The Tipping Point for Insurance IoT" (Hui and Carbone, 2023), among six recommended best practices to execute IoT insurance programs highlighted "Consider the full spectrum of potential IoT applications". Because leveraging a series of use cases creates mutual reinforcement between the use cases, boosts IoT's impact on the insurance business, and reinforces the program's ROI. Focusing simply on safety programs inevitably projects weaker business cases.

3.2. Implementation of IoT Risk Reduction Strategies

Based on the research of the IoT Insurance Observatory, the IoT risk reduction initiatives have been focused on reducing the consequences of three different situations:

1. **An incident (insured event) already happened**, such as the detection of water leakage or a crashed car. Here, the insurer's goal is to **act as quickly as possible to mitigate the event's consequences**.
2. **A risky situation**, such as a distracted driver or anomalies in an electrical control panel. The insurer's goal is to **act in real-time to avoid the risky situation from escalating in an accident**, and so generating a loss, a complementary insurance approach is to introduce programs that promote less risky behaviors, in a way to reduce the frequency of occurrence of these risky situations.
3. **Missed safety tasks** – such a scheduled inspection or maintenance– **and out-of-order (or absent) risk mitigation-systems** – such as a frontline employee missing their personal protection equipment or a smoke alarm out of battery power. The insurer's goal is to **act proactively to restore the prevention capabilities**. Even in this scenario, a complementary insurance approach is introducing **programs that promote compliance with the safety task and the presence/correct use of risk mitigation tools**.

Insurance companies can utilize IoT solutions in all three scenarios with real-time risk mitigation solutions and by promoting less risky behaviors by policyholders. How?

First of all, insurers can – directly – leverage systems able to address the specific situation by acting in real-time with IoT actuators triggering automatic or human actions. However, to maximize prevention, insurers can also – indirectly – use the IoT to develop structured programs focused on championing safety culture creation over a longer period (Insurance Nexus and IoT Insurance Observatory, 2018).

a. IoT Incentivize Behavior Change in injury reduction service provider Kinetic

Many of today's insurance companies are utilizing IoT-based prevention solutions with a clear focus on real-time risk management and risk detection. These insurers vary from car insurers, to property insurance companies, and even workers' compensation players.

One example of an insurance provider implementing IoT solutions is New York City-based Kinetic. Kinetic is an injury reduction service provider utilized by large companies, including Pepsi and UPS. These large corporations rely on Kinetic and their belt-mounted wearable sensor to instantly recognize employees' unsafe body mechanics behaviors, which could lead to injury over time.

The sensor monitors for bending, twisting, overreaching, and jumping and provides real-time feedback of light vibration similar to what your Apple watch does when it reminds you to move around.

This feedback has been shown to reduce high-risk posture counts by over 41%, which could translate to as much of an 18.4% reduction in lost-time claims.

The beauty of this IoT solution is that employers not only get real-time risk mitigation thanks to feedback from the device itself the moment it occurs, but the feed-back between shifts also promotes behavioral change over time to reduce unsafe body maneuvers by up to 30%.

The AI in the device is able to identify the baseline of each employee and provide dynamic achievable improvement targets to be reached over time. Some of the enterprises using Kinetic's technology have even integrated employee improvement performances in the remuneration system.



Kinetic is a risk prevention (injury reduction) service provider with a proprietary wearable for frontline workers

b. Amazon Utilizes Multiple IoT Driven Risk Reduction Solutions

Another example of IoT risk reduction solutions with both real-time actions and a structured behavior change approach put into practice is Amazon. As the world's largest online retailer, Amazon utilizes an impressive number of drivers to deliver goods, including contractor vehicles.

Every driver uses a behavioral change telematics app that monitors and detects risky driver behavior using a FICO Safe Driving Score predictor. Based on these results, drivers participate in a behavioral change program that may include micro-training and even gamification to improve driving behaviors.

The Telematics app creates daily reports shared with the driver's manager, with data from the report used to potentially impact driver compensation and bonuses.

Amazon also rolled out an AI-powered camera by Netradyne in 2021 to nearly half of its branded fleet vehicles. This camera mounts to the rearview mirror and provides nearly a 360-degree vantage point to help spot unsafe driving behaviors. The camera also alerts the driver in real-time to do things like maintaining a safe distance while driving.

The AI camera sends reports to managers with data, including workers' performance scores, and can influence the chance of getting bonuses or extra pay providing additional incentive to drive behavioral change.

Amazon reports a reduction in accidents and other safety violations since installing the Netradyne cameras.

These two examples highlight the role of IoT solutions both reducing events from risky behavior in real-time with feedback and being a driver of behavioral change to lower the level of risk behavior over time.

3.2.1. Real-time Actions to Avoid Claims

The Amazon use case is the perfect implementation of an IoT solution used in real time: a sensor (AI-powered camera) monitors what is the object of the risk transfer contract (the driver), and this sensor is connected to the cloud. The system recognizes situations that necessitate an escalation (risky driving behavior) and triggers smart actions to mitigate/resolve such circumstances (performance scores and compensation).

There are limitless applications of IoT-driven solutions when it comes to reducing and avoiding claims and seeing measurable outcomes quickly. IoT devices can be used automatically based on triggers, such as an automatic shutoff valve on a water line, or by human intervention, such as a frontline employee alerted through a text message sent by the system. These IoT systems help lower costs and reduce claims.

Over the past few years, different US commercial property insurers have obtained exceptional results with IoT tools including in the mitigation of water escape losses. The IoT Insurance Observatory mapped multiple programs which saved between \$4 and \$9 in loss reduction for each dollar invested in prevention.

Another example is TMNF's Drive Agent service. This service provides camera-based in-vehicle alerts to over 1 million Japanese drivers when they are distracted, sleepy or in danger of crashing and this has generated a 13% drop in claims frequency among the portfolio of users (Pick & Carbone, 2023).

The collaboration between technology, insurers, and organizations is a partnership that can lead to increased safety and decreased claims with IoT solutions connecting them all and connecting them quickly.

But it is not enough to bring the IoT technology to the insured risks. It is necessary to identify and engage with right employees inside the policyholder's organization in order to obtain the adoption of the risk mitigation solutions to obtain these results (Campany and Carbone, 2023).

3.2.2. Increase Safety with IoT Behavioral Change Programs

Approaches to change behaviors over time have been discussed at many of the IoT Insurance Observatory's peer discussions, including the last one in Las Vegas on October 31st 2023, between the over one hundred executives from carriers who have participated in the seventh edition of this think tank. The key takeaways from the discussion are the necessity:

1. **to create awareness about the level of risk and critical areas detected.** In personal auto, there are numerous examples of telematics apps providing a detailed analysis of the driving behavior to policyholders. In the same way, in commercial auto, structured reports are systematically shared with fleet managers;
2. **to suggest actionable changes to reduce risk.** The same personal auto telematics apps provide, acting on the rational angle, suggestions to improve the critical areas, and gamification mechanisms to engage the policyholders in a journey to change. In commercial lines, insights inferred from the IoT data are provided to loss control teams to support their risk advisory to enterprise clients and suggest changes to reduce the incidents more accurately. Some worker's compensation approaches have also introduced suggestions displaced directly to frontline employees between shifts.
3. **to reward compliance with the suggested actions.** Based in the IoT Insurance Observatory research, awareness and suggested behaviors are necessary but not sufficient to keep engagement and change habits. Rewards appear as a fundamental aspect in maximizing the effectiveness of behavioral change programs. For example, a recent Federal Highway Administration's research (FHWA, 2022) on driver distraction mitigation demonstrated the superior results obtained with weekly rewards. In commercial lines, the incentives should be designed at both enterprise and employee levels. There are examples in cyber insurance where the policy has a dynamic deductible: it is reduced when the level of compliance with the prevention tasks is above a defined threshold. Some insurers around the world have started introducing frequent but inexpensive rewards – such as free coffee or meal vouchers.

The best practices in introducing IoT-based behavioral modification programs in commercial lines:

1. share a structured flow of information about the level of risks with the loss control team, the enterprise, and the frontline employees,
2. provide feedback and suggestions for improvement to all these stakeholders,
3. continuously reward the enterprise and the frontline employees for the improvements they achieve.

The last aspect – rewards – is the most novel for commercial line insurers, instead has a longer track record in personal lines. It's as if it taps into the innate desire for praise – a human is saying "Look at what I changed" and when insurers acknowledge it with a variety of benefits, the behavior changes are more likely to stick.

The South African-based financial group Discovery and its Vitality program has revolutionized the insurance customer experience in the life and health insurance segment over the past three decades. Instead of selling insurance policies that are protecting in case of death or diseases, they have sold individualized wellbeing improvement programs. Based on the individual health baseline, they act as a health coach responsible for the individual's health. This approach leverages the IoT paradigm with remote sensing capabilities – from their gym's system automatically notifying the insurer that the policyholder checked in for a workout to wearable data (Swartzberg, 2019) – analytics applied to this data, and applications to drive the customer engagement, such as the active reward programs.

Policyholders receive a benefit by showing improvement in activity or other lifestyle changes. This approach has been demonstrated in different geographies – from South Africa, to Japan and the Asian market, to Europe, North and Latin America – which is the effectiveness in engaging with clients and motivating them to make an effort to disclose verified behavioral information to their insurer.

Looking at the evolution of this behavior change approach over the years, the dynamic application of active rewards and loss aversion mechanisms, exemplified by the method to reimburse for an Apple Watch, has proven remarkably effective in engaging members. This strategy directly fosters the adoption of desired healthy behaviors among Vitality's members.

The Vitality program, rooted in promoting less risky behaviors that delay diseases, has demonstrated – over three decades – robust actuarial evidence about the achievable health benefits. Notably, increasing physical activity reduces mortality by 49% for individuals aged 45 to 65 and by 61% for older adults. This translates to the insurance portfolio's technical profitability improvements: the most active participants experience 15% lower annual medical claim costs, adjusted for age and medical conditions. Furthermore, a longitudinal study revealed that individuals initially low in physical activity, who later increased their engagement, experienced a 14% reduction in hospital medical costs over four and a half years (Carbone, 2023).

In a nutshell, this approach enhances policyholder engagement and nudges them to adopt less risky behaviors, producing superior results for the insurance enterprise. A portion of these benefits is shared back to the policyholders (e.g. rewards), realizing a virtuous shared-value model.

3.3. Medical Malpractice Mitigation Using Video and Data Analysis

This new collaborative model between insurers, providers, and technology is currently being applied by Caresyntax in the surgical suite using tech-enabled surgical intelligence. This model is inspired by a similar, novel partnership in Europe that Caresyntax deployed at scale with Relyens, a leading European mutual MedMal insurer and risk manager.

Relyens sells prevention as a service and has become a pioneer in tech-driven insurance and mitigation services.

Their model was successfully scaled across multiple European countries via a unique Risk Management Software as a Service (RMSaaS) offering powered by a Caresyntax-driven Risk Management Digital Assistant. This technology combines the insurance, risk management, and patient safety services of Relyens with Caresyntax's technology driven surgical intelligence and patient pathway solutions.

By utilizing Caresyntax's platform, Relyens customers are able to monitor and analyze any surgical or post-operative care variations and be have higher success rates when it comes to reducing these variabilities and reduce gaps in surgical practices.

Relyens has used their Surgical RMSaaS model to connect hundreds of operating rooms providing a multi-year all in one solution to impact clinical, operational, and financial areas. Utilizing Relyens' program which also includes on-site services and partner support, hospitals and their insurers are able to achieve a higher return on investment while reducing MedMal costs.

The benefits of uncovering solutions using technology integration was further illustrated in the United States surgical market with a Caresyntax and ProAssurance partnership. ProAssurance is a specialty insurance company focused on healthcare professional liability serving healthcare systems, physicians and physician groups, and other allied professionals. They rank in the top 20 medical professional liability (MPL) insurers according to the 2023 overview from the Medical Professional Liability Association.

Their Risk Management department aims to promote patient safety, reduce risk, and improve defensibility of claims for their clients.

One attempt to do just that was partnering with Caresyntax to utilize our platform providing additional tools to their insured clients.

ProAssurance partnered with Caresyntax to implement our surgical intelligence capabilities for their ProAssurance insured surgeons. Caresyntax powered usable video and data for ProAssurance insured surgeons to use to display their expertise and surgical experience.

By implementing Caresyntax's vendor-neutral technology, ProAssurance insured surgeons are able to integrate video and useful data from patient outcomes to grow their reputation and subsequent surgical practice.

This model allows for improvement and standardization of surgical care with real-time feedback in addition to usable data driving behavioral change and reducing costs related to surgery.

3.3.1. Risk Mitigation in the Operating Room

There are many reasons why Caresyntax focuses on the operating room and surgical processes with cost and risk being near the top of the list. When looking at healthcare and the vast systems involved in mitigating MedMal events in a hospital, the operating room carries the highest concentration of both cost and risk.

Current estimates are that U.S. surgical care composes 50% of overall hospital costs (Agency for Healthcare Research and Quality) and 50% of all Medicare spending (Annals of Surgery).

Not only is spending high, but operating rooms are inherently dangerous places statistically. Post-surgical deaths account for 6% of all deaths worldwide due to complications.

Statistics also say of the complications, half of them could have been prevented.

While it's easy to blame the person in charge (surgeons), complications and near misses are often a result of a lack of systemic support including integrated technology to enhance performance and improve safety.

Hospitals and operating rooms require standardization and optimization to reduce risk and prevent incidents from occurring.

Caresyntax provides surgeons and hospital systems with the digital safety net they need through organized data points covering operating room function and surgical team performance. This is all in an effort to maintain quality, consistent care, and ultimately reduce and avoid claims.

Caresyntax AI services are based on both unstructured and structured data from over ten million surgical records. Unstructured data includes video, imaging, and operating room notes while structured data is ingested from electronic health records.

From these data points and further technology advancements, Caresyntax has developed a variety of tools and processes surgical teams can implement and gain pre-operative, real time intra-operative, and post-operative insights to enhance experience within the surgical care continuum.

But this data isn't only useful to surgeons, professors, and hospital administrators. Insurers are also in a constant chase for usable data and instant connectivity in order to effectively mitigate risk. They can access and use this data to track performance, risk, and develop unique risk prevention strategies based on these insights. Insurers can use this information as a catalyst for behavioral change programs to reduce unsafe behaviors and in turn reduce costs and claims.

IoT steps in and tackles the challenge of integrating data across multiple platforms quickly and highlights a fundamental change in thinking of how hospital systems and insurers not only access, but utilize data.

Caresyntax utilizes IoT solutions to promote risk mitigation for it's partners in multiple ways by providing:

- Guides for teams to reduce surgical variability and risk by evaluating actions and processes
- AI guided real time support to surgeons
- Systematic check lists and alerts to identify risky behaviors or potentially risky scenarios
- Data for remote collaboration to drive education and procedural optimization

a. ClipAssistNet Provides Real-Time Feedback

One example of Caresyntax's impact is how they're enabling improvements in minimally invasive surgical safety.

The world of surgery is shifting away from open surgery and towards laparoscopic and robotic procedures and for good reasons. Laparoscopic surgery does not require large incision sites and can reduce bleeding risk, reduce patient pain, reduce wound complications, reduce incisional hernias, and shorten hospital stays.

While optimized assessment tools can improve objective surgical rating, there is still a human component requiring time and effort to use the tool. This is why computer-assisted surgical analysis using AI and machine learning advancements could help save time and provide more usable insights.

Caresyntax recognized this and identified gaps in current surgical video analysis.

Caresyntax's ClipAssistNet helps fill a major gap by providing real-time feedback using a neural network-based image classifier. ClipAssistNet provides instant feedback on the visibility of a clip applier being used during laparoscopic cholecystectomy procedures which is a crucial part of this extremely common surgical procedure.

The feedback is provided in real-time layered into the video surgeons already utilize to guide laparoscopic surgery. A solid green line around the frame of the video indicates a clearly visible clipper tip (something deemed a safe behavioral practice). If there is poor visibility of the tip – the video frame instantly becomes a dashed red line alerting the surgeon to adjust their approach.

This novel tool was used to evaluate 300 laparoscopic cholecystectomies and was found to be highly specific and sensitive, making it a widely useful tool for surgeons to improve safety and increase surgeon attentiveness to this crucial step.

b. Predict Surgical Site Infections with AI algorithm

While laparoscopic surgeries are on the rise and is often a preferred method, there are still patients who need 'open' surgery. Unfortunately, a major risk of open surgery is the surgical site becoming infected. This risk is so prevalent and telling of patient outcomes and potential claims, surgical site infections (SSI) are monitored by hospital systems as well as reimbursement companies as a way to rate safety and proficiency.

Caresyntax has developed a hybrid tool including both manual and automated models to predict SSIs in patients before they leave the recovery room. Both models were found to be highly sensitive at 80% and were able to accurately identify patients at increased risk of an SSI ([Woods et al, 2023](#)).

This model can be used to advise the surgical and general ward teams in real time so they can implement specific protocols when patients are identified at increased risk to mitigate an infection from occurring.

3.3.2. Driving Behavioral Change Where it Matters Most

Technology advancements pave the way for short-term and long-term behavioral and policy changes to standardize care and improve patient outcomes. The Caresyntax platform provides the tools needed to collect useful data for surgical teams and hospital systems so they can both evaluate performance and implement assessment tools to identify and reduce risk.

By implementing IoT into the operating room, surgical teams have access to a new set of resources that don't require cumbersome installation and training – these resources are integrated into their existing systems to enhance safe decision making, refine skills, and train supporting staff.

In addition to analyzing data using AI-technology, Caresyntax has developed objective assessment tools surgeons and their teams can use to evaluate performance. The assessment tools and data provided by Caresyntax help support surgical team dynamics by reducing bias evaluations as well as enhance surgical performance. This is done with easy to implement tools to evaluate performance objectively which in turn can improve surgical safety and potentially reduce costs related to complications or claims.

a. Minimally Invasive Surgical Safety Assessment

Assessing minimally invasive (laparoscopic and robotic) surgical performance can help standardize and elevate care and support optimal team dynamics. With accurate assessments, behavioral changes can be implemented with risky behaviors identified earlier and more accurately to mitigate risks and subsequent accidents.

The challenge in assessing surgical performance is it's difficult to remain objective and unbiased when colleagues are evaluating their peers and traditional tools don't always provide reliable results measuring technique. This could lead to delays in necessary behavioral changes required to reduce risk and improve performance.

Caresyntax worked with expert laparoscopic surgeons to create the Global Assessment of Surgical Skills (GASS) tool. Rather than evaluating skill or knowledge, the six-item GASS tool focuses solely on perceived safety. The experts used operating room videos to refine and test the reliability of the assessment.

When tested, the GASS tool demonstrated high inter-rater reliability across all six items which means it could be used as a reliable way to evaluate safety and competence. The tool was designed with simplicity in mind making it easy to use and requiring no training or formal instruction prior to implementation.

The simplistic design makes it an ideal assessment tool in busy environments and can be used to evaluate surgical students during supervised training (low-stakes) as well as providing feedback to help determine a surgeon's ability to move on to autonomous practice (high-stakes).

The GASS tool can be used in a teaching hospital to help professors educate surgical students and to onboard medical staff as they join a new team. (Nau et al, 2023).

The development of the GASS tool is an example of how video technology can be applied to develop more effective assessments to drive down risk and standardize care in the operating room.

b. AI-Enabled Objective Procedure-Specific Assessment (OPSA)

In addition to creating objective assessment tools for hospital teams to use, Caresyntax's integration platform brings new potential to objective AI-driven assessments.

One example is their latest development and testing of an objective procedure-specific assessment (OPSA) that utilizes AI to support surgeons. While ClipAssist has been proven to improve safety by ensuring visibility of surgical clips during laparoscopic procedures, an AI-driven OPSA can provide even more data quickly to surgeons.

This was developed and tested by having surgical experts rate surgical practices in six specific tasks related to a laparoscopic cholecystectomy. The experts rated the task performances as either safe or unsafe with their feedback being applied to a new automated OPSA program.

A program like this can help reduce the burden of using multiple and ever-evolving surgical assessment tools often faced by surgical mentors. Automated OPSA programs also streamline how mentors and hospital administrators track progress of surgical performance with an easy to use and interpret safe versus unsafe scoring system.

Not only does Caresyntax bring insights and endless potential for analyzing patient data, we ensure the information we are provided is safe. The integration platform utilizes personal data anonymization and enforces security controls to protect privacy of patient information.

The surgical OPSA is another example of how Caresyntax is shortening the learning curve with more useful data acquisition and validation to promote safety and standardization in the surgical arena.

4. IoT: A Necessary Capability for the Insurer of the Future

Utilizing IoT tools and strategies allows surgeons, hospitals, and insurers to operationalize large amounts of data faster than ever before. This data is used with the aim of improving and standardizing surgical techniques, reducing risk, and, above all else, improving patient safety and outcomes.

But this is just the beginning of how IoT platforms can support hospitals and insurers in developing new processes, internal technologies, and innovations to promote safer procedures and experiences.

Concentrating on the insurance aspect of this opportunity, the decision to embrace the Internet of Things (IoT) paradigm for engaging insured healthcare organizations is a strategic choice that requires a structured transformation journey, a multi-year commitment and strong leadership (Carbone, 2020). However, developing the capability to master the IoT insurance paradigm opens up a wide array of strategic possibilities.

This study explored the potential to develop a mitigation strategy for medical malpractice risks. It involves healthcare enterprises sharing data about surgical procedures with an insurer using the Caresyntax platform. The insurer then utilizes this data for risk mitigation, reducing expected losses. A portion of the created value is shared back to the healthcare enterprise, thus establishing a virtuous cycle that strongly incentivizes these enterprises to share data with insurer.

A natural extension of this approach is to use data for additional processes along the Med Mal insurance value chain, taking smarter actions at policy and portfolio levels.

Nevertheless, an insurer with the capability to connect with a healthcare enterprise and receive operational data can seize the tangible opportunity to create a digital twin of the insured entity. This is achieved by integrating the shared information, existing data within the insurance company, and other relevant data sources. This is the foundation for enabling the insurer to:

- Take smarter actions on other risks the insurer is already transferring for that insured entity;
- Up and cross-selling that insured entity;
- Insure in a different way existing risks (e.g., pay-per-use coverages and parametric);
- Transfer new risks not insured before (e.g., insuring the performance of AI solutions)
- Go beyond insurance selling services to the healthcare enterprise.

The role of integrated data systems appears to be nearly limitless when it comes to how many aspects of surgical care and overall healthcare can be improved.

Where will medical IoT take your business?

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Caresyntax worldwide

3,000
ORs

32,000
Surgical
Teams

3M+
Procedures
per year



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