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Whitepaper

Analytics of Things for Insurance Industry

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Synopsis

While various industries that have or use physical assets, devices and equipment - hook on to the wave of Internet of Things (IoT). This way they define several business use cases for new business models, better customer experience and increased operational efficiency. Since they have to pay huge amounts towards Insurance, they look forward to those Insurance companies that can provide them more value for money. They are aware that such a need also comes from their ability to provide more data to Insurance companies, so they can make truly "Data-driven Decisions". In this white paper, we discuss how Insurance companies can leverage "Analytics of Things", and offer new business models for their customers.

Analytics of Things Background

Many organizations in industries such as Manufacturing, Logistics, Healthcare, Oil & Gas, Construction, etc. have all embarked on digital programs to realize the active use of Analytics, Internet of Things, Mobility, Social Media and Cloud. These programs are aimed at value derivations namely:

- New Business Model Definitions (Staying Ahead of Competition)
- Personalized Customer Experience
- Operational Efficiencies

IoT is in revolutionary adoption, causing a lot of data to be collected from those "Things". As a result, organizations have started Big Data projects, which can ingest such large volumes of data. Sensorization has resulted in collection of large data volumes. The next question that arises is how to use such data. That is where a number of analytics use cases are defined, and data scientists & analysts are brought onboard to identify patterns and provide insights. Such insights then help to accomplish one or more of the above list of objectives. In other words, such organizations make use of "Analytics of Things" in a large way.

Connected Insurance: New Business Models, New Value Proposition

As consumers, both personal and commercial, adapt to an 'always connected' environment, there will be a tremendous shift in the expectations from the Insurance Industry. Insurance industry – be it carriers, brokers, reinsurers – who provide products and services for such industries, will have to evolve themselves aligning to this mega trend. This new reality will challenge not just the way insurers traditionally have been conducting their business, but will impact the core business model itself. The 'Analytics of things' offers significant opportunities to innovate all facets of the insurance value chain.

Business Challenges

- Shift from loss Indemnification mindset to proactive risk prevention
- No or low touch claim with quicker damage restoration, Dynamic reassembly of Insurance products tailor-made for the context of the consumer
- Advice-led customer interactions that are more frequent, context-rich and real-time
- Variable pricing incentivizing positive risk behavior

No doubt, the leaders of tomorrow will be the ones who acknowledge this trend, and convert it into an opportunity.

Connected Insurance: Adoption Trends & Use Cases

Connected Insurance is already being well-adopted in Auto Insurance, and Property Insurance to an extent. Several national carriers are offering UBI (Usage-based Insurance) for Auto Insurance. Companies like State Farm are extending the same model for Property Insurance. The promise that Connected Insurance holds, can be evidenced from the fact that within InsurTech, Connected Insurance startups represent 81% of all venture funding, and 32% of the total startup companies. Insurance companies themselves are making aggressive investments in this area. Four separate insurance investors, AXA Strategic Ventures, AmFam Ventures, MunichRe/HSB Ventures, and USAA have made three or more investments across the IoT space. Significant investments have also been done by leading companies such as AIG, Aviva, Liberty Mutual and Mass Mutual. Conclusively, it won't be long before Connected Insurance becomes pervasive across lines of businesses. Following is a larger canvas of value propositions across lines of business:

Connected Auto

Incentive to inculcate good driving behavior

Partner ecosystem for new Claims Services

Ring-fencing

Connected Home

Focus on energy conservation & safety

Minimum downtime of appliances, Utility lines, etc

Connected Building

Real-time monitoring of risks such as fire, water damage, etc.

Emphasis on Preventive maintenance

Connected Self

Health monitoring, mobile treatment and practical nursing

Alert notifications for guarding against health-hazards

Connected Enterprise

Minimum downtime and business interruption

Worker safety and risk control

Predictive maintenance

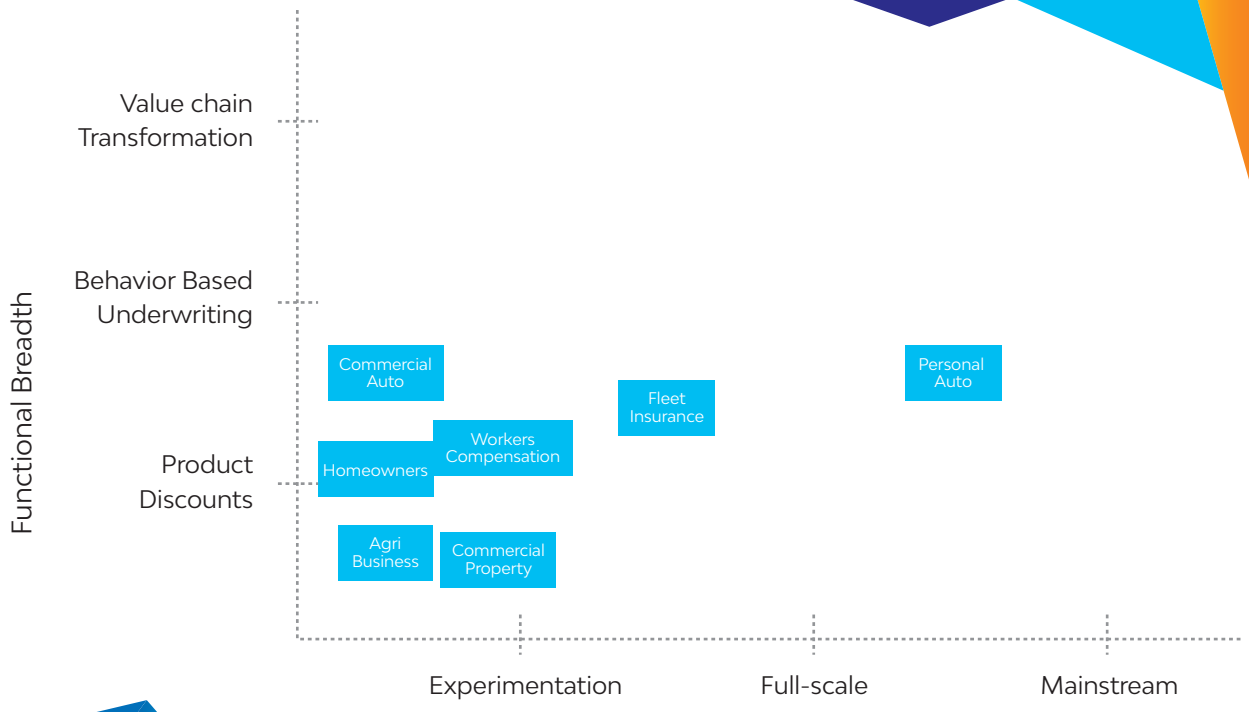
Connected Infrastructure

Engineering equipment monitoring

Real-time project status

Efficient work management

Analytics of Things can be applied across Insurance functions with varying degrees of maturity. The level of maturity to be targeted is primarily a function of: Functional Breadth and Market Penetration, as illustrated in the diagram below:



Functional Breadth

The functional coverage for Analytics of Things can range from applying sensor data for variable pricing to using it for risk modeling or automated claims. Below is an illustration of how AoT could be applied across maturity levels.

Maturity Levels	Description
Value Chain Transformation	▪ Peril level risk modeling using what-if analysis & prediction techniques ▪ Use of Artificial Intelligence for automated underwriting decisions ▪ No / Low touch claim triggered by sensor data ▪ Cognitive analytics for providing personalized risk advisory services
Behavior-based Underwriting	▪ Sensor data trend analysis for Loss prediction and prevention ▪ Cross-sensor data aggregation and analysis for loss pattern identification and risk benchmarking ▪ Real-time risk monitoring, Automated alerts (Web/Mobile)
Product Discounts	▪ Provide minor discounts based on adoption of sensors that prevent or limit losses

Market Penetration

The level of adoption of Connected Insurance by end customers ranges from non-existential to a point, where mass adoption is within reach. As of today, there is no line of business which has really made it to 'mass adoption' level.

Maturity Levels	Description
Mainstream	▪ Becomes a preferred product and gains prominent market share as against traditional products
Full-scale	▪ Product is enriched with features with a clear value proposition
Experimentation	▪ A minimalistic product is launched to evaluate market acceptance

What data can be used to accomplish AoT?

While IoT and huge amount of data collection is becoming mainstay across industry verticals, including Insurance, many companies are struggling to use that data for effective competitive advantage. Although data comes from various disparate sources and in various forms, a newer set of technology had solved the problems of data ingestion. However, data consumption is still an issue for lot of insurers. With the advent of wearables and other connected devises, the boundaries between various industry verticals are blurring, hence there exists a lot of potential for Insurance companies to adopt the best practices from other industry verticals.

For e.g. In construction industry, large multibillion international conglomerate faced constant challenge of:

- Utilization of high value assets/machines, thereby reducing idle time
- Handle real-time information from 33k+ moving assets
- Facilitate asset location tracking
- Measure fuel consumption & efficiency
- Predictive maintenance for reduction in failure of assets

To address these, various real-time data such as asset breakdown, asset in transit, asset operator's availability, engine temperature, fuel sensors, oil pressures, is collected and analytics is applied on 33,000 moving assets resulting in-

40% Improvement	10% Increase	15% Reduction	20% Reduction
in Asset Utilization	**in Fuel Efficiency**	**in Asset Downtimes**	**in Consumables Malpractices**

In healthcare & pharma domain, a global pharma major was facing production yield losses in contact lens manufacturing. After analyzing 8 analog and 8 digital inputs in terms of linearity, signal noise, temperature drift and performance to improve contact lens production, yield from 85 to 90%. In Manufacturing, a leading multinational elevator manufacturer was grappling with huge maintenance problems and escalating customer complaints. AoT came to rescue, where data is collected on key attributes such as type of elevator, utilization, capacity, vibration, DoorGap, DoorLimit, AirCordTension, DoorTrackCleanliness, FloorLevel, etc., and helped the company reduce MTBF – Mean Time between Failures, by 20%

Elsewhere, AoT can be implemented in:

Remote Diagnostics: Operational Intelligence from Machine Data & Remote Configuration and Firmware upgrades

Predictive Maintenance: Fixing it before it breaks, Dynamic tracking of Product lifecycle based on field parameters & Lever for Customer Satisfaction

Intuitive Elevator: Smart elevators to know, where the user wants to go without having to press a button.

Real-time data about soil, air quality, water levels, etc. can help farmers in making a much informed decision about planting and harvesting crops, thereby increasing the overall yield of the crops.

Such type of AoT adoption in the Insurance Industry is very low, and the industry is grappling with heavy losses due to natural catastrophes. Adding to this, the industry is also witnessing dynamic environment and low investment returns. In such a scenario, a focused approach on AoT can help insurers to improve top line & bottom line. Some of the use cases are outlined below:

- Fraudulent claims are increasing rapidly. It is estimated that 30% claims could be fraudulent, and this figure is increasing in the US. To tackle this newer set of analytical solution can be implemented like text mining, social media and behavior patterns analytics, geospatial analytics, thereby reducing costs, improve margins & improve overall customer experience.
- Traditionally, Actuarial and Underwriting is done by only historical data and empirical evidences. By using advance statistical models, insurer can predict not only probability, but also impact of natural disaster.
- Claims is one of the big spending areas, and AoT can play very active role. As an example, an Insurance company based in the UK, used claims analytics that resulted in 30 percent reduction in the number of claims; another UK insurer similarly used telematics and analytics to help a large client reduce accident-causing risky driving maneuvers by 53 percent.t

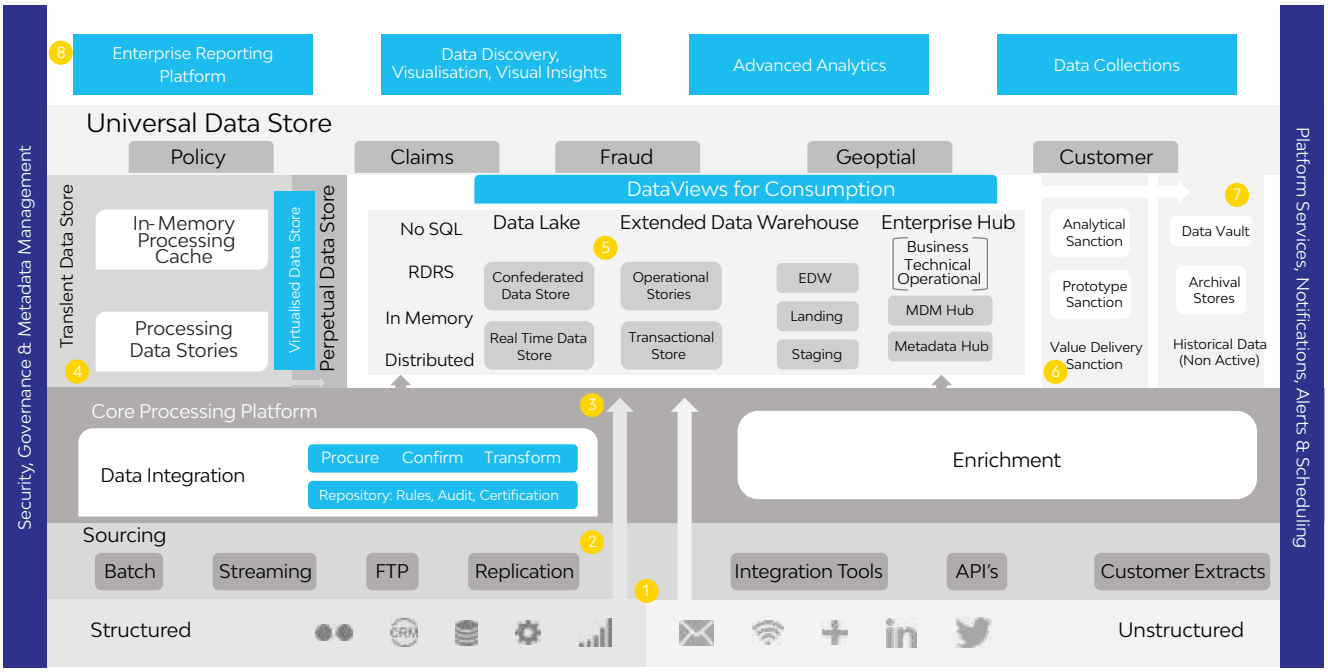
What technology architecture is used to create AoT?

In a typical data management environment, there are several layers that data passes through. Traditional databases and data architectures will always be crucial, but managing diverse data constantly streaming from immensely high number of sources, calls for specific capabilities - as this data is complex, vast, and fast-moving. Organizations that previously derived majority of their insight from transactional data are shifting their focus to IoT data. Even conservatively estimating, enterprise data will double within three years. Not only is data growing, it is also diversifying. One of the major challenges is storing large amount of real-time data generated by IoT devices. The data generated by each sensor is humongous, and storing and managing such huge amount of data is a big challenge. Also, not all the data transmitted by IoT devices is meaningful and useful. So the challenge lies in how only the necessary data can be transmitted to avoid junk data, thereby making its storage and analysis easier. Another challenge faced is that of privacy of data. It is important that the data generated from devices especially at confidential places, is secured, and its privacy is maintained in order to protect the integrity of the overall system. The success of AoT in these cases, depends upon the standardization of the communication protocol between IoT devices. Hence, standardizing the communication protocol is another big challenge faced by AoT. Organizations are therefore concerned that their analytical tools and infrastructure are not equipped to handle modern data demands. Many lack the tools and infrastructure needed to leverage non-traditional data formats, such as unstructured and streaming data. Power users and decision makers know they have the data they need, however they cannot convert this into insight yet. Data accelerates, so does the pace of business. Organizations need data management solutions that facilitate rapid decisions, no matter how many end points are involved.

The landscape of data analytics is changing necessitating:

- **JSON-like structures**: complex collections of relations, array, map of items
- **Graphs:** storing complex, dynamically changing, not static relationships
- **Binary/CLOB/specialized data:** ability to execute specialized programs to interpret and process

To solve these challenges, the Insurance industry can look forward to implement the logical architecture depicted below:



Layers of the architecture are as follows:

- **Data Sources:** The sources of the data could be the internal systems like the CRM, Operations, Claims, Underwriting Systems, in conjunction with telemetry data from various devices / vehicles, geospatial data capturing location information, and also other external sources such as weather, news, social media, etc.
- **Data Acquisition**: The data scattered across all these internal and external systems should be captured for integration. Data acquisition or capture has various dimensions such as :
- **Capture Mechanism:** Capture mechanism could be through Flat File, ODBC Connectivity, XML, Middleware, Replication, etc. Flat File, XML and ODBC connectivity are most commonly used
- **Capture Latency:** Capture latency could be Real-Time, Near Real-Time or Batch
- **Capture Heap:** Capture Heap would mean the volume of data Ex. Full Refresh, Incremental, Replication
- **Capture Mode:** The capture mode could be Push or Pull
- **Capture Volume:** Ex. Low, Medium, High or Very High
- **Data Integration and Enrichment:** Data Integration tools should be leveraged to extract, cleanse and transform the data from divergent sources into consistent target data warehouse. Here, all the data quality checks should be executed based on the specified rules to validate the correctness of the data. It will facilitate transformation, enrichment of data and its loading from across the various source systems. Data quality checks should beexecuted based on the specified rules to validate correctness of the data.
- **Transient Data Stores:** While the data is being processed to make it available for consumption, it can leverage in memory storage for faster processing, or the entire processing could be pushed onto the source / target systems.
- **Data Views for Consumption:** This can include data storage on-premise, or on Cloud, or could have integration across both on-premise and cloud systems. This layer will stage the data, store granular data, and also aggregate or summarized data. Metadata and Master Data will be stored and maintained here.
- **Proof of Value:** A sandbox environment for depicting the proof of value
- **Data Archival:** The historical data should be preserved, but can be stored separately on low storage devices to facilitate data mining, reporting and analytics on archived data.
- **Advanced Visualization & Advanced Analytics:** This layer will further facilitate to visualize the various patterns, statistics and organization information in the form of dashboards and reports with the ability of slicing/ dicing, drill up/drill down, etc. to not only highlight the health of the key performance indicators, but also visualizations for predicting condition based maintenance. The reports could be viewed through web / mobile applications. Through predictive modeling, statistical programming , hidden patterns in the data can be realized to generate insights, and apply machine learning to build in artificial intelligence.

LTI has Mosaic Decisions, which is an Analytics-as-a-Service offering that helps organizations undertake quantum leaps in business transformation, and accelerate the insights-driven organization maturity. It helps deliver pioneering Analytics solutions at the convergence of Physical and Digital worlds. Mosaic Decision is powered by a Cloud-based, infra-to-insights Analytics platform, designed to simplify analytics and deliver real-time, secure and actionable insights to business for competitive advantage.

Who should be involved in establishing the business context?

Many organizations have come up with a new role called "Chief Data Officer". This role would play an important part in the strategic governance layer, along with the data stewards. Some additional roles to be considered are:

- Compliance officers to interpret regulatory compliance requirements, and information retention requirements. They can also help determine audit schedules.
- The legal team has responsibility for assessing information risk and determining whether the information capture and deletion are defensible.
- Business users would understand the value of external data and its impact on business decisions.
- Data scientists who sieve through the data and provide interpretions for the business users on its correlation with internal data and the business use case. They are also expected to interpret and deliver the results of their findings, via visualization techniques, data science apps, or narrating interesting stories about the solutions to the underlying business problems. Typically, this role requries a combination of skills i.e. Technology, Business knowledge and Data navigation skills.
- Data engineers who prepare the "big data" infrastructure to be analyzed by Data Scientists. They design, build and integrate data from various resources, and manage big data. Then, they write complex queries on that, make sure it is easily accessible, works smoothly, and their goal is optimizing the performance of their company's big data ecosystem.
- Data stewards play a key role, that involves planning, implementing, managing the sourcing, and using & maintaining data assets in the organization. Data stewards enable an organization to take control and govern all the types and forms of data, and their associated libraries or repositories.

AoT Program

Any large initiative should start small, and then expand over a period of time. When it comes to applying an AoT program for insurance companies, it is all the more important to start with small experiments. In our experience, a 3C approach works best.

- **Consider:** The differentiation would start with considering a pilot implementation with one customer within a Line of Business (LoB). The results should be so dynamic that the pilot gains popularity.
- **Correlate:** The success with customer can then be correlated with other customers in that LoB, and can then be made as the norm for that vertical. This also enriches the data repository within the Insurance company, resulting in better risk evaluation, better pricing, etc
- **Consume:** As the evolution happens, it would take time to consume the technique at a larger level across other LOBs. Opportunities to innovate increases multi-fold with higher data volumes and cross functional analytics.

  Each of these steps can be executed as agile projects with appropriate project governance and data governance.

Conclusion

Analytics of Things has the promise of New Business Models, New Value Proposition, and is also known as Connected Insurance. From a simple scenario of sensor data-based Variable Pricing Model to Cognitive Analytics for providing personalized risk advisory services, Insurance companies are at varying levels of use case identification. A specialized architecture that covers big data platform & processing, advanced analytic algorithms, and an advanced visualization can place the power of AoT to many dynamics of the organization. Finally, AoT should be run as a program with several mechanisms to capture the learnings and continuously improve. Thus, this is an area that Insurance companies should focus on in the next few years. The framework and approach presented in this paper, incorporate several guiding principles for data governance, specifically in a big data environment.

About the Author(s)

Usha Venkatasubramanian heads the Technology for BI/DW Service Line of LTI. She consults on Big Data, Data Management, BI and Analytics initiatives of large global organizations. At L&T Infotech, she has set up the Big Data Analytics Practice, which focuses on various emerging trends in this area. She holds a Masters Degree in Electronics Engineering, and a Bachelor's degree with Honors in Electronics and Communications. She has 26 years of industrial experience in IT consulting. She specializes in Data Management and Analytics.

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