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Dev Ops Driven Digital Transformation: Accelerating Innovation In The Insurance Industry

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Abstract—While insurers face strong customer demands for ever-faster innovation, their still relatively low levels of au- tomation made it difficult for them to keep pace. Certainly, at the core of every insurer is a foundation of mature and well- established business processes, but many of them still depended heavily on manual effort. Similarly, the constant demands of a highly regulated industry can often put in place certain constraints—often inadvertently making it even more difficult to maintain that pace of innovation. Yet, far too often, the drag of insurers on the pace of innovation is perceived to be a consequence of those regulatory requirements rather than those inherent constraints. Increasing interest around DevOps is taking those constraints, which traditionally separated op- erations from development activities, and turning them into positive drivers of any implementation of DevOps practices. By building collaboration and shared insights, companies can automate a much larger portion of their current processes and provide valuable, real-time feedback dashboards at every stage in their own delivery pipelines. What observers have identified as functional bottlenecks turn out to be the natural separating points between functions and one of the primary reasons practitioners perceive the culture as an organizational behavior that's every bit as important as the automation. That culture of shared insights and joint responsibility is what finally steps on the accelerator pedal and breaks through those traditional bottlenecks.

Index Terms—DevOps, Digital transformation, Digital trans- formation in insurance, Insurance innovation, Continuous deliv- ery, Collaboration.

I. Introduction

The digital revolution in business demands processes that are digital in nature and designed to enable business inno- vation. Insurance companies that take longer to put a prod- uct or service in the market become uncompetitive. Market innovation is essential to delight the customer and establish long-term loyalty. Thus, the key question posed to insurance organizations is: How to innovate and deliver these innovative products and services to customers as quickly as possible? The compelling answer is that organizations must adopt DevOps practices.

DevOps originated as a method to deliver an application more frequently—rapidly, without errors, and with automation. The insurance industry has understood that the same DevOps principles not only allow rapid delivery without error but also can facilitate cultural change and increased collaboration across the business, transforming the entire value chain and driving innovation to the next level. It has therefore become the principal driver for digital transformation in insurance.

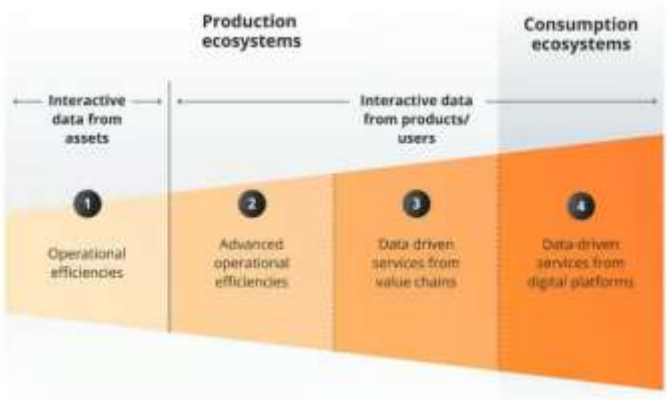

Fig. 1. Insurance digital transformation

A. Background and Significance

Digital transformation is revolutionizing the insurance industry. Leading carriers recognize that survival depends on boldly embracing innovation. However, innovative thinking and processes are only part of the equation; delivering innovation and new functionality to clients expeditiously requires operations efficiency and agility. DevOps is a practice that promotes closer collaboration between development and operations teams, as well as the use of automation and continuous delivery. DevOps culture and practices help organizations deliver higher-quality software faster. It both enables and accelerates digital transformation by shortening feedback loops and increasing the organization's capacity to embrace change. Applied to insurance claims processing, DevOps can accelerate innovation and enhance the customer experience.

Eq-1: Innovation Speed Index (ISI)

Let D be deployments in an observation window and T_{avg} the window length in hours.

$$\mathbf{ISI} = T/avgDunits: \text{ deployments/hour.} \quad (1)$$

Units: "deployments per hour" (if T_{avg} in hours).
Re-arrangements:

$$D = \mathbf{ISI} \cdot T_{avg} \quad (2)$$

$$T_{avg} = D/ISI \quad (3)$$

Fig. 2. Innovation Speed Index (ISI)

II. Understanding DevOps

The Insurance industry is on the verge of a significant shift toward digital. Digital Transformation in Insurance needs to deliver new products quickly and improve operational efficiencies of their business processes to remain compet- itive in a transformed ecosystem. Faster product delivery and operational efficiencies have helped the industry respond better to the COVID-19 pandemic. While the landscape of the industry is constantly changing, so are the expectations and demands of customers. The Insurance industry exists to help people reduce the risk of financial loss in their lives and livelihoods. Many of the Insurance products are dealing with customer ”what-if” scenarios such as death, disability, illness, terrorism, hijacking, diversions, business interruption, natural calamity, loss of revenue, supply chain failure, credit default, and financial loss. Innovation has always been the key to evolving with the changingsocietyandimplantingnewbusi- nessmodels.Innovationwithin the industry can mean delivering new products that help customers to focus more on risks from the business perspective and not in financial terms alone. Innovative ideas can be capitalized on for two main reasons: new processes that are introduced internally can help to deliver new product lines and services faster; and insurance poli- cies designed around new customer needs must be delivered quickly to stay competitive.

A. Definition and Principles

View of business processes increasingly achieved through the exploitation of digital technologies and data is labelled “digital transformation”. All parts of the insurance business must contribute if “intelligent insurance” is to be achieved. In other words, insurance business processes must become increasingly digital. Without innovation insurance products, as we know them today, will become obsolete. Innovation is now a strategic imperative for insurance firms seeking to survive in the sector. Definition of DevOps. The approach of “DevOps” is a set of practices that automates the processes between software development and IT teams, in order that they can build, test, and release software faster and more reliably. The goal of DevOps, including automation and continuous delivery, is to increase organizations’ ability to deliver applications and services at high velocity: evolving and improving products at a faster pace than organizations using traditional software development and infrastructure management processes. De- vOps is cloud-aware, cloud-oriented. In its goals, it enables organizations to better serve their customers and compete more effectively in the market. Organizations are more productive when developers and operations work collaboratively, share responsibilities, and combine their workflows. Indeed, this enables faster incident response times, fewer deployment fail- ures, and faster mean time to recovery.

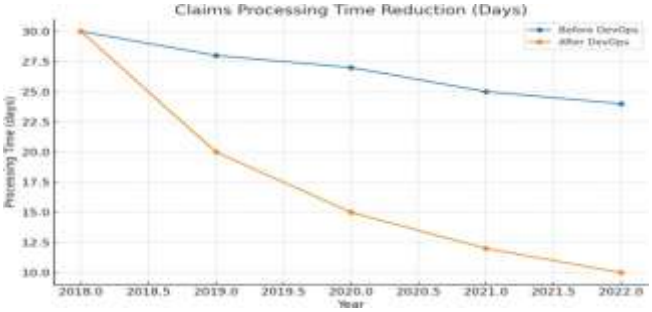

Fig. 3. Claims Processing Time Reduction

B. Benefits of DevOps

Insurance companies are integrating DevOps into their digital transformation initiatives to establish a culture of improved collaboration, extensive automation, and enhanced ability to control disparate systems. DevOps accelerates the delivery of applications and services and supports rapid alterations to existing processes and procedures. This approach shifts IT from transaction processing and support

toward enabling innovation in the business process. DevOps principles govern the collaboration between Development teams and Operations, automating the software delivery process and increasing the frequency and reliability of changes deployed to production. These automation practices enable businesses to respond more swiftly to the evolving needs of the organization and customes. DevOps practices lower the cost of securing environments, enhance the reliability of delivery, and improve the quality of services, as provisioning, build-and-release, and configuration activities are managed preemptively. The quality of delivery is further advanced through early and dependable test coverage, using automated test suites integrated into the build pipeline.

Eq-2: Customer Retention Impact (CRI)

$$CRI = RbRd - Rb \times 100 \quad (4)$$

Interpretation: percent lift vs. baseline.
Re-arrangements:

$$Rd = Rb(1 + 100CRI) \quad (5)$$

$$Rb = 1 + CRI/100Rd \quad (6)$$

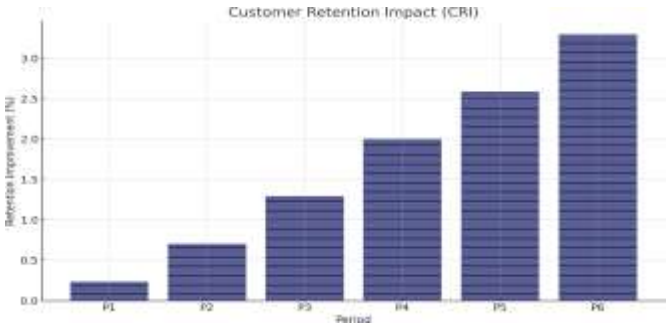

Fig. 4. Customer Retention Impact (CRI)

Fig. 5. DevOps Digital Transformation

III. The Role of DevOps in Digital Transformation

Driving change toward a digital mindset and infrastructure depends on a cultural shift and a functioning DevOps concept. A precise implementation of the DevOps concept in digital transformation is a prerequisite for faster introduction of inno- vations, provision and support of digital service platforms, and improved operating conditions. The main DevOps approach is characterized by forming multidisciplinary teams where the formerly separate departments of Development (Dev) and Operation (Ops) merge and work closely together on projects. The goal is a continuous information exchange hub between development and operation tasks. This enables providers to deliver new changes and features rapidly and with high quality while maintaining high operational stability and availability.

A. Enhancing Collaboration

Silo mentalities at the team or departmental level diminish business agility and productivity. End-to-end collaboration and throughput-based KPIs are key to accelerating delivery beyond the innovative use of

DevOps for automation. Companies are now using the DevOps approach to increase profitability and improve customer experience, by reducing the claims process- ing turnaround time for auto insurers. One company achieved this by creating separate teams for underwriting, claims, and billing. These teams use a DevOps approach to keep the un- derwriting business system operational, integrating new infor- mation and capabilities almost constantly into the process. The benefits are undeniable, especially when claims handling times are cut drastically, leading to increased customer satisfaction. Other companies are adopting the DevOps approach to reduce the claims processing turnaround time for auto insurers. For example, frequently scheduling repairs in just a few days saves about USD14 per claim spot inspected fewer times leads to about USD28 savings per claim claims handled in 30 days creates a 1 percent improvement in customer retention speed of damage evaluation and appropriation increases policy renewal rates, reduces attrition and strengthens a company's brand reputation. However, cultural and legacy systems challenges continue to plague many insurance IT organizations. The operations team needs to be involved during the product development phase, so automating the operations process will be seamless. Infrastructure as code is the foundation of any deployment automation, processes like build, deploy, recovery and monitoring should be automated using suitable tools and technologies.

B. Continuous Delivery and Integration

Continuous Delivery (CD) represents the process of making software available for release in a short period, sometimes immediately following development. It enables organizations to deploy new products or features swiftly. Continuous Integra- tion (CI) involves merging code changes at regular intervals, often multiple times per day. Ensuring that all code integrates seamlessly allows for early testing and the detection of devel- opment anomalies. These practices offer various advantages across technological, financial, and organizational dimensions. Automation implemented during CD enhances product and service quality while reducing errors, costs, and time-to- production. Additionally, accelerated delivery processes help increase customer satisfaction.

The underlying concept of CD builds upon CI. Despite these technologies remaining relatively new, a growing number of professionals recognize their importance. For organizations evaluating whether to adopt these methodologies, insights into their benefits, limitations, and implementation challenges can provide valuable guidance. This comprehensive perspective assists in the planning and execution stages, helping teams circumvent common obstacles and achieve optimal outcomes. Applying these principles within insurance contexts, where speed and quality of delivery are paramount, offers the potential to address emerging organizational needs effectively.

Eq-3: Operational Efficiency (OE)

$$OE = PA100 \tag{7}$$

Meaning: percent of processes automated.
Re-arrangements:

$$A = 100OEP \tag{8}$$

$$P = AOE/100 \tag{9}$$

IV. Challenges in Implementing DevOps in Insurance

Desire and organizational support for DevOps transforma- tion will not eliminate challenges. Several barriers frequently and predictably appear as organizations set out on their De- vOps journey: Cultural Resistance: Ingrained organizational culture, processes, and tools can stymie DevOps adoption. Employees entrenched in legacy practices may show resistance

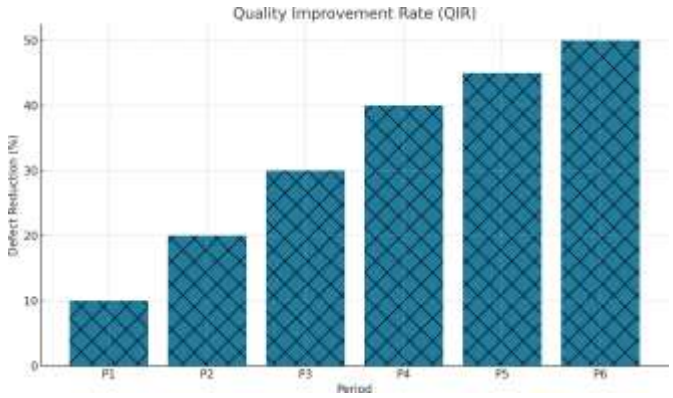

Fig. 6. Operational Efficiency (OE)

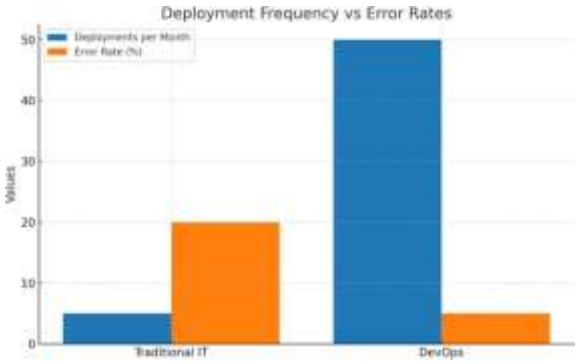

Fig. 7. Deployment Frequency vs Error Rates

Fig. 8. Quality Improvement Rate (QIR)

are highly complex and not easy to replace, the risk of failure does exist. Resistance within the insurance industry to replacing legacy environments on the basis that "they work" also contributes to a slower pace of change. However, many of these business-critical systems are tightly coupled with outdated business processes, underpinning the biggest internal pain points. Claims management is often one such process. Improving those services which are most difficult to use or slow can have the greatest impact for customers, freeing them to develop products that satisfy the evolving needs of today's more demanding customer base.

Eq-4: Quality Improvement Rate (QIR)

$$QIR = \frac{Qb - Qa}{Qb} \times 100 \quad (10)$$

to change—resources commonly earmarked for business-as- usual activities make it difficult to find fiscal room for transfor- mational efforts. Legacy Systems and Processes: Transforming existing legacy systems that process the majority of claims is problematic because they are not designed for change. Thus, they require either ferocious re-engineering effort or replacement with robust, resilient components implemented with a DevOps mindset.

A. Cultural Resistance

Insurance companies first need to embrace cultural change and adopt DevOps principles. These principles emphasize communication and collaboration between development, op- erations, and other stakeholders involved in the delivery of a service or product. The transition from slow, waterfall develop- ment methodologies, in which software is delivered months or even years after completion, to Web-scale methodologies, with a real DevOps approach, embodies a culture that promotes rapid innovation and seamlessly integrates with a Continuous Integration and Continuous Delivery (CICD) toolchain.

B. Legacy Systems

Some industries are burdened with legacy systems that inevitably cause more harm than good. While these systems

Meaning: percent defect reduction.
Re-arrangements:

$$Qa = Qb(1 - 100QIR) \quad (11)$$

$$Qb = 1 - QIR/100Qa \quad (12)$$

V. Case Studies of Successful DevOps Implementation

Why is digital innovation key for claims? The claims process is often viewed as a key pain point for customers. Legacy claims systems and processes result in high opera- tional costs and poor customer experience. It's no wonder claims journeys lack digital innovation — companies have focused on automating other, more customer-facing operations, such as quotes and policy issuance. However, digital claims innovation can play a key role in improving the overall customer experience significantly. Cognizant's DevOps team successfully automated the carrier's critical claims process, driving significant business outcomes and solving key chal- lenges along the way. What makes DevOps crucial? With the car insurance carrier faced with growing market demand and new customer expectations, Cognizant's DevOps team assumed responsibility for an application that supports the claim process. The key objective was to support expanded deployment coverage while improving the solution's quality and business performance. The team developed processes and standardized frameworks to enable continuous integration and delivery, and introduced automation at every stage of delivery, including release, performance testing and monitoring. The solution now is deployed more than 12 times per day, with defects reduced by 40

Fig. 9. Successful DevOps Implementation

A. Case Study 1: Transforming Claims Processing

The first case study focuses on a European Direct Insurer and the challenges the company faced: very low loan-to-value ratios and tough competition, making new business low margin and expensive on a per-unit basis. To cope with this, there were several initiatives in the Business area and in the IT Infrastruc- ture area. In Business, they focused on Protecting Bottom Line Profit, launching campaigns to new and existing customers in a bid to Reverse New Business Migration and Protect against Attrition. The infrastructure focus was on protecting Bottom Line Profit by launching Efficiency Initiatives such as Data Warehouse Consolidation, Infrastructure Software Consolidation, and Server Virtualization. The study examined how claims processing could be reshaped into a fully digital procedure that drastically reduces cycle time and ensures minimum delay. Automation played a big part in reducing the operational costs. In the first phase, this was achieved with a set of tools. The second phase introduced integrated systems in place of the tools. The third phase incorporated new team management rules and introduced sensor devices for car, body, and wheels.

B. Case Study 2: Enhancing Customer Experience

Keys to winning market share via digital products are improving customer experience through rapid delivery of new features and ensuring application stability and availability. A multinational insurance organisation needed to provide a seamless first notice of loss experience and a simple rollout plan that met the business requirements for claims portal availability, backup and failover. Continuous integration allowed for frequent deployments to production, reducing speed-to-market while continuous delivery ensured high- quality production releases. A solid foundation for migration was developed by setting up automated code check-in and build, automated unit tests and functional acceptance testing. To support the business requirements, a phased deployment approach was used that enabled on-demand portal opening and automatic backup for policyholders in different countries. Pingdom monitors ensured high production availability by proactively tracking the quality and availability of the production environment. Quality gates were implemented in the release pipeline that allowed production deployments only if all the preceding phases completed successfully. Additionally, Gatling-based performance testing was integrated into the pipeline to execute tests and gather results whenever a build was triggered. Providing visibility of execution and commendations to successful developers maintained harmony and competency during the delivery process.

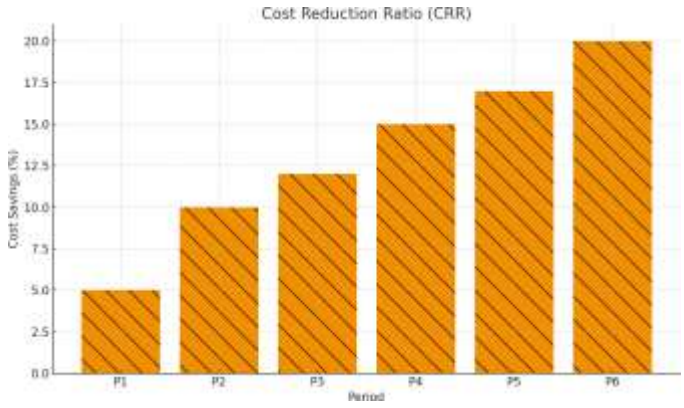

Fig. 10. Cost Reduction Ratio (CRR)

Eq-5: Cost Reduction Ratio (CRR)

$$CRR = CbCb - Ca \quad (13)$$

Meaning: fraction of cost saved (multiply by 100 for **Re- arrangements:**

$$Ca = Cb(1 - CRR) \quad (14)$$

$$Cb = 1 - CRRCa \quad (15)$$

VI. Tools and Technologies for DevOps in Insurance

Transforming insurance operations demands more than al- tering the way people collaborate. It requires different ways of working across the entire software development lifecy- cle—including development, testing, releases, deployments, and support and monitoring. Digital insurers disrupt their industry by delivering new features and products faster, re- sponding rapidly to changing market conditions, anticipating customer needs, tuning reliability, delivering improved plat- form stability, and reducing risk. This level of responsive- ness requires IT automation, including continuous integration and continuous delivery (CI/CD). Key CI/CD transformation areas include build automation, test automation, deployment automation, and monitoring and feedback automation. For building and testing, Jenkins (an open source pipeline or- chestrator) automates build and test jobs. GitLab manages repositories, provides merge request tracking, and hosts an in- ternal container registry. Snyk scans for known vulnerabilities within container images and includes a DevSecOps automated approval gate.

A. CI/CD Tools

CI/CD Tools Continuous Integration and Delivery are es- sential components of a DevOps practice, allowing teams to create builds that can be deployed into production quickly and with fewer errors. GitLab, CircleCI, Jenkins, TravisCI, and Azure DevOps are examples of tools that provide a way for teams to build pipelines that carry on automated delivery of code to every environment, feedback information on whether a build is moving forward or failed, and allow for automated testing in every environment in order to detect regressions and maintain quality. Implementing a CI/CD pipeline requires developers to automate each step in the software delivery process. Continuous Integration means that the source code repository should not contain breaking changes at any moment in the software delivery pipeline, not only because they may make the whole team stop and waste time fixing broken builds, but also because it may prevent the code from moving forward if the pipeline is stopped due to a failure or error. As part of Continuous Integration, every check-in into the production branch should trigger an automated process that builds the software and performs morphological checks such as compilation, and performs unit tests running the code using a variety of use cases that is easy to set and maintain. Continuous Delivery means that every time an application or software passes through all automated tests it should be ready to be deployed into production, but a human should decide when to do so. Continuous Deployment goes one step further and requires deploying to production every change that passes through the pipeline without human intervention.

B. Monitoring and Logging Solutions

With the aid of Continuous Integration/Continuous Delivery (CI/CD) tools, fast software development and continuous deployments for delivery, a way is paved for engineers to learn quickly and keep on improving tests and applications. It is impossible to underestimate the importance of monitoring and logging at all points of delivery. Monitoring and logging provide insights that are critical to delivering high-quality digital products at a high tempo—both in terms of speed, and in terms of quality. Monitoring and logging also support the teams with the ability to see, understand, debug and timely discover issues. Structural monitoring and logging dashboards can be developed which can display information to the teams enabling them to be alerted to specific conditions which the team wants to get notified for. Another advantage is its built-in or third-party tools to track the status of, and display error and exceptional conditions with quick resolution, such as the self-service portal. Self-service portals deliver a higher quality of services to end customers and policyholders with improved digital experience. This means that the operations teams can support policyholders and third parties quickly through the effective monitoring and logging capabilities, with an enhanced view of the infrastructure configuration. The configuration of the infrastructure visibility also allows the team to make the right decisions, manage costs effectively, and provide a faster resolution to problems.

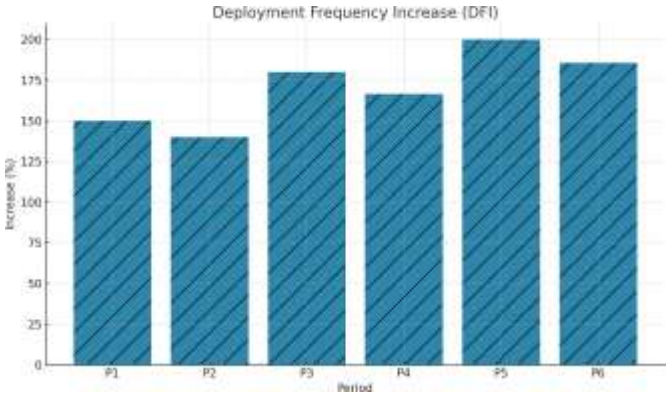

Fig. 11. Deployment Frequency Increase (DFI)

Eq-6: Deployment Frequency Increase (DFI)

$$DFI = D1 - D0 \times 100 \quad (16)$$

Meaning: percent increase in deployment count vs. pre- DevOps.
Re-arrangements:

$$D1 = D0(1 + DFI100) \quad (17)$$

$$D0 = 1 + DFI/100D1 \quad (18)$$

VII. Conclusion

The drive to automate and digitize business processes across the insurance industry demands faster delivery of services tai- lored to customer requirements. Meeting this demand requires collaboration among all stakeholders and integration of the numerous tools involved. DevOps provides an excellent ap- proach for achieving these goals. By uniting teams, embedding security practices, and continuously integrating and delivering business applications, DevOps creates a digital ecosystem capable of adapting to rapid and dynamic change. Common challenges in implementing DevOps often stem more from resistance to cultural change than from technical obstacles. Successful examples of DevOps implementation demonstrate that with the right guidance, it is possible to surpass these challenges. The continuous movement of information enabled by DevOps allows all stakeholder collaboration and supports the automation of complex business processes. DevOps rep- resents a significant step forward in business innovation by facilitating the automation and digitization necessary to meet the evolving needs of insurance organizations. Several trends are beginning to influence the direction of DevOps moving forward, including the use of Application Programming In- terfaces (APIs) within the DevOps framework, the formation of DevOps-as-a-Service offerings, the integration of Artificial Intelligence and Machine Learning (AI/ML) into Autonomic Engineering, and the adoption of DataOps methodologies.

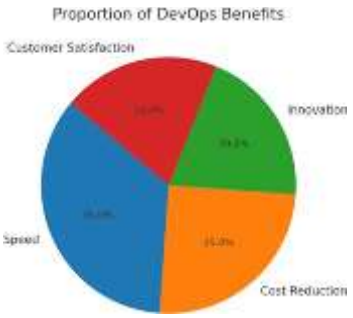

Fig. 12. Proportion of DevOps Benefits

A. Emerging Trends

Digital transformation touches every industry, but insurance more than most. Most of daily life requires digital processes, from booking movies to driving a rented car, grocery shopping, and especially buying insurance. Expect transparent insurance processes that allow you to participate in event-driven experi- ences with significant financial implications. For example, you might want to share the costs of a wedding through insurance and for your friends and family to participate in the risk and reward. It should be easy for both the insured and insurer to finalize claims for development activities, which reduce the risks to the community. The customer can choose the level of risk to assume and be able to expect and manage the outcome. The insurance industry is colored by the complex process at the backend, which is driven by the required controls and risks involved. Insurers know that innovation is the key to being able to deliver experiences that address the needs of specific customer segments during moments-driven moments. Continuous innovation, which delivers value frequently, as opposed to retrospective innovation, which leads to occasional value delivery, can further increase the value of the entire insurance experience. The cultural foundation for continuous innovation also speeds the launch of a greenfield insurance carrier. However, several technology and business challenges inhibit the insurance industry from realizing the full potential of a digital transformation. DevOps is driving change in the insurance industry by promoting collaboration symmetries. The introduction of continuous integration, continuous deliv- ery, and continuous deployment has introduced cultural and technical change; consequently, organizations still struggle to realize the benefits of DevOps and continuous delivery.

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