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Mestrado em Gestão de Informação
Master Program in Information Management

Existing technology and the one that is being used by insurance companies in the Iberian Peninsula

A Gap Analysis

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Dissertation presented as partial requirement for obtaining the Master's degree in Information Management

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Instituto Superior de Estatística e Gestão de Informação
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by

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Dissertation presented as partial requirement for obtaining the Master's degree in Information Management, with a specialization in Information System and Technologies Management

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February 2022

ACKNOWLEDGEMENTS

I would like to begin by thanking my family, in particular to my wife, for their patience and support throughout this journey and to my little girl for the sleepless hours that warned me that I had to complete the thesis as quickly as possible.

To my supervisor, Professor Doutor Vítor Manuel Pereira Duarte dos Santos, for his motivation, guidance and help in the most difficult moments of my master's thesis.

To all the interviewees, for their kindness and availability to participate in this study, depending on personal time with me to share information or professional opinions.

To the professors at Nova Information Management School for all the knowledge they provided me during the classes that came to be very useful in the realization of this master's degree

Last but not least, to all my friends who helped me throughout my school journey.

ABSTRACT

This Master's Thesis dissertation focuses on the insurance sector, more precisely on the insurance companies present in the Iberian Peninsula and how new technologies are being used. New technology trends, digital transformation, and technology disruption are widely used terms nowadays; however, while it is quite common to use these terms, their practices and theories are not always applied by businesses.

Several factors can be the cause of the failure to implement technological trends in insurance companies, either due to lack of expertise, high costs, or simply because the technologies are not mature enough and there is some fear of creating a bad reputation with customers.

In order to investigate this gap between the existing technology and the technology that is being used by the insurance companies, a case study analysis was performed. Based on the technologies identified in the literature review, in-depth interviews were conducted with CIO's, CTO's, IT Directors, and Heads of IT of some insurance companies (from small insurance companies to market-leading insurance companies) and the results were analyzed in order to reach a valid conclusion about this gap and why it exists.

After carrying out the case analysis and analyzing the answers given by the respondents, it is possible to identify that the technological gap exists and what the main reasons are for the lack of usage of the new technological trends in most insurance companies.

Keywords

Technology gap; Insurance companies; Insurtech; Technological trends; Case Study

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LIST OF ABBREVIATIONS AND ACRONYMS

AI
Artificial Intelligence
CIO
Chief Information Officer
CTO
Chief Technology Officer
Gps
Global Positioning System
GPUs
Graphics Processing Unit
IaaS
Infrastructure as a Service
IoT
Internet of Things
IT
Information Technology
NLP
Natural Language Processing
P2P
peer-to-peer
PaaS
Platform as a service
RFID
Radio-Frequency Identification
SaaS
Software as a service
U.S.
United States

1 Introduction

1.1 Background and problem identification

The insurance industry is an economic growth factor of great importance as it provides the ability to mutualize risk and promote employment (Barbara et al., 2017).

According to the *Insurance information institute*, in 2017, the insurance sector in the U.S. was responsible for 2.7 million jobs and generated $1,377,114 million in direct premiums (Insurance Information Institute, 2019).

In Portugal, the insurance industry is divided into life and no life branches and in 2019 the value of direct premiums was around 12 million euros (Associação Portuguesa de Seguros, 2019).

In Spain, in terms of branches, the division is the same as in Portugal, but in terms of direct premiums in 2019, the result was around 64,248 million euros (Dirección general de seguros y fondos de Pensiones, 2020).

In a big sector like this the digital transformation and new technology trends like cloud computing, Artificial Intelligence, blockchain, and others, are changing how business is done (Cappiello, 2020b).

Technology is changing the way products and services are delivered and those responsible for that are the so called Insurtech, the name given to the technological innovations that appear in the insurance market (Cappiello, 2020b; OECD, 2017; Stoeckli et al., 2018).

This digitalization creates value and reformulates the insurance sector allowing a cost reduction and at the same time a greater focus on clients (Cappiello, 2020b; The Geneva Association, 2018).

The digital platforms create a new world of possibilities for the insurers. Customer interaction, risk mitigation, new products, and distribution models are just some of the insurance areas that can be boosted and used to create an advantage against the competition.

According to a study by the Global Center for Digital Business Transformation, the Financial Services industry is one of the industries most at risk for a major digital disruption (Cisco, 2017).

Product Development	• The use of Big Data facilitates new behavioral, granular data collection and enables service personalization. • Telematics may reduce associated risks but create new ones, such as cyber risk • Product/service innovation and diversification
Sales and Distribution	• Comparison platforms present customers with a comprehensive choice of all kinds of insurance covers and in some cases allow to buy insurance online. • Offering innovation and diversification. • Insurtech startups entry in the insurance market from adjacent markets.
Underwriting	• Instantaneous information and Big Data allow more predictive and evaluative analytics. • Finer segmentations driven by greater processing capabilities
Claims	• Telematics provides instantaneous information which can help insurers with more accurate claims assessment and reduce fraud. • Technology decreases processing time.

Table 1 - Activities that form insurance value chain and some technological solutions (Cappiello, 2020b)

Although we have all this technology, investment in insurtech is not done by all companies.

In 2019, KPMG assessed China's insurance market by surveying 200 insurance industry professionals. It showed that 64 percent of the interviewees have the opinion that investments in *insurtech* are less than what the industry needs, and 89 percent believe that *insurtech* investment should be increased (Zhong An & KPMG China, 2019).

The importance of proper IT management has a decisive role in this implementation because many companies fail in the implementation of IT projects (Neirotti & Paolucci, 2007) and for that reason the CIO role is fundamental; it has to be a business-driven person who simultaneously has good knowledge of IT (Peppard et al., 2011).

Planning the digital strategy must be done aligning the IT with the business strategy and will benefit most the companies that can react fast and be more proactive (Cisco, 2017). In the insurance world there is also a major concern about the technology giants like Google, Amazon,

or Facebook and their reaction or possible investment in the insurance sector since they have the ability of fast technology implementation and access to millions of people's personal data (The Geneva Association, 2018).
We are then faced with a situation where there is a difference between the existing technology and the technology that is being used by insurance companies.

1.2 Study Objectives

The goal of this study is to identify the main reason behind the existing gap between the currently available technologies and the ones that are being used by insurance companies in Portugal and Spain.

This objective can be split into the following intermediate objectives:

1. Provide a comprehensive review of the insurance sector, it's importance and characteristics.
2. Provide a review of the new technological trends that exist on the market.
3. Identify examples where those technologies can be applied by the insurance companies.
4. Identify the current insurance practices in term of technologies and identify the gaps between the technological trends and the technology that is currently being used by the insurance companies.
5. Find the reason why a gap exists between them.

1.3 Study relevance and importance

The insurance sector is a resilient sector that makes the economy grow and provides jobs to millions of people worldwide (Barbara et al., 2017; Deloitte, 2020; Insurance Information Institute, 2018). It is an industry that can take advantage of new technologies to expand and offer better services and be more competitive in the market in terms of prices and consumer experience (Cappiello, 2020b, 2020a; Stoeckli et al., 2018).

We are at a time where innovation and technology are increasingly important for competitiveness in companies, creating an advantage over the competition by the introduction of new offerings and services to customers (Cappiello, 2018; Sathe, 2020; Tidd et al., 2005),

meaning it is important to know the pace and conditioning of the incorporation of this technology in the insurance sector.

There are already countless implementations or suggestions on where to apply this kind of technology. Insurtech startups are being disruptive in the market and generating value (Cappiello, 2020b) and it is up to top management to implement these kind of solutions (Neirotti & Paolucci, 2007).

One of the sectors where there seems to be no recent studies is the insurance sector and it seems important to understand the reasons why there is a gap between the commercial availability of technologies and their application in insurance companies.
This analysis could allow the insurance companies to take advantage of these technologies and take a more proactive stance concerning the adoption of new technologies.

2 Literature Review

In this chapter, the literature review is presented with the main theoretical concepts of this Master's thesis. It starts by explaining the insurance sector, that is the sector of analysis in this thesis, followed by an explanation of technological trends and insurtech.

2.1 Insurance Sector

The principle of the insurance business is based on risk transfer, where for the exchange of a premium payment the risk is transferred from the policyholder to the insurer (APS, 2012; Tasca, 2019) .

In the U.S., the insurance can be divided into two main branches P/C (property/casualty) and L/H (life/health); while in the rest of the world it is divided into life and nonlife. It is a very profitable sector that generated $4,892 billion in the year of 2017 for life and nonlife direct premiums (Insurance Information Institute, 2019).

Regarding the Iberian Peninsula in 2017, around 76 million euros were generated in direct premiums (Associação Portuguesa de Seguros, 2019; Dirección general de seguros y fondos de Pensiones, 2020).

In the face of market demand, the insurance sector is adapting to digitalization and trying to leave behind so-called legacy systems, it's been a difficult adaptation since it is one of the sectors (alongside with the banking sector) with greater resistance to change (Cappiello, 2020a).

2.2 Technological trends and insurtech

2.2.1 Big Data

Big data is the concept that describes the treatment of enormous amounts of datasets. Normally, when we talk about Big Data, we are talking about the analysis of a large volume of structured, unstructured, and semi-structured data (Gandomi & Haider, 2015; Ghasemaghaei & Calic, 2019).

Big Data can be described by the Three V's (Volume, Variety, and Velocity).

Volume: Large amount of data is generated from all kinds of devices and applications (social networks, mobile phones, smart devices, etc.).

Variety: It is the variety of data that is generated, including the structured, semi-structured, and unstructured data that can be obtained in all kinds of format like text, documents, images, audio, videos, etc.

Velocity: The velocity is one of the biggest challenges of big data. The data is generated very quickly, and all the processing must be agile to extract useful information from it.

(Gandomi & Haider, 2015; Oussous et al., 2018).

There is currently an extension to the 3V model in which it describes the model as 5V, adding value and veracity.

Value: The value refers to the cost and profit of data. The data that have been collected, generated, analyzed, and stored have costs associated, and we are currently in an era where more than ever data is highly valued and has a high demand and that is why it is also possible to profit from the collected data by selling it to third parties.

Veracity: Not all the data is good data. With the great volume of data that is generated nowadays, it is mandatory to ensure the quality of data to ensure that the decisions made with the collected data are made with trustworthy data.

(Rodríguez-Mazahua et al., 2016)

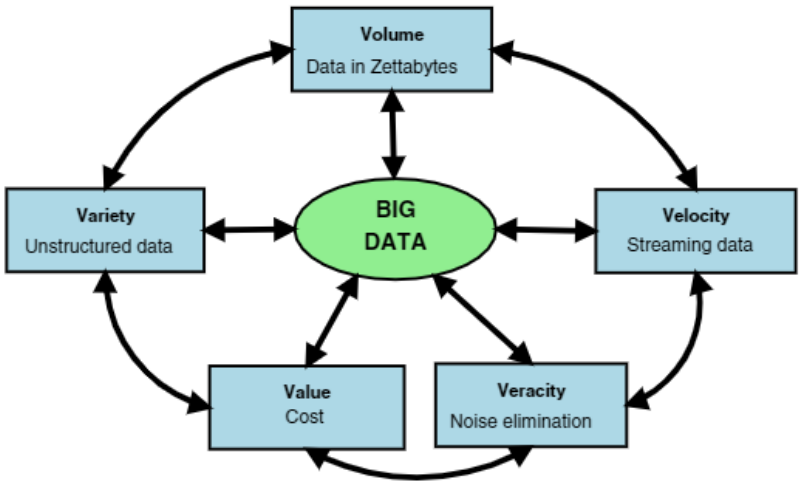

Figure 1 - Big Data 5V model (Rodríguez-Mazahua et al., 2016)

Nowadays, we live in a world in which the volume and speed with which data is generated is astronomical.

Companies can capture and create data with great ease and those data are changing the way of doing business. With this data, companies can understand the habits and consumption patterns of their costumers and adjust the business according to the information collected (Raguseo, 2018).

One of the biggest challenges for companies is related to the difficulty of capturing, storing, and analyzing the data because it has very high costs associated with it (Philip Chen & Zhang, 2014).

Its applicability brings advantages to several sectors and there are some trends where big data can be applied, such as internet of things (IoT), smart cities, and E-health.

The IoT represents one of the areas where big data is used most, largely due to technological advances in hardware like sensors, GPS, and wireless adapters. Nowadays, Big Data is giving great support in the logistics and transport area with route optimization applications (Oussous et al., 2018).

In Smart Cities, it will be a reality in the future. The possibility that all devices communicate with each other will generate millions of data that will have to be handled efficiently to get some benefit from them (Rodríguez-Mazahua et al., 2016).

E-health applications are already enjoying the capabilities of big data with the generation of data to personalize health services or to adapt public health plans (Oussous et al., 2018).

One of the concerns regarding big data is data privacy because we are talking about managing a large-scale of data which sometimes contains sensitive and private data. Data anonymization techniques are used to try to preserve privacy (Rodríguez-Mazahua et al., 2016).

2.2.2 Artificial Intelligence

In recent years, there has been a rapid development of AI, that is becoming a part of everyone´s daily life (Haenlein & Kaplan, 2019). Over the years, AI has been defined in many ways, but in general it refers to machine intelligence that can be used in various situations to obtain certain goals (Prentice et al., 2020).

Many of the advances that are felt in the field of AI are due to the speed with which information flows nowadays and the combination of current hardware capacity with algorithmic optimization. Several open-source platforms and libraries have contributed so that researchers and developers can easily create their ideas and test their models quickly and efficiently (Dosilovic et al., 2018).

There exists a broad understanding that AI can, among other tasks, understand human language, drive cars, increase productivity (on personal and corporate levels), and mimic the cognitive processes of humans, like learning, reasoning, and perception (Haenlein & Kaplan, 2019; Prentice et al., 2020).

Big multinational companies have acquired and worked together with start-ups and have been announcing at the launch of their products features that include AI (Agrawal et al., 2017). It is a world still in great development that can help several business sectors, there are use cases where this technology is already being used to solve problems such as managing IT infrastructures, collecting and treating customer trends data, or even helping in medical decisions (Ammanath et al., 2020).

In the world of AI, there are some technologies that stand out and create a greater interest by the companies. I do not mean that in the future there will be no other areas of AI that would have greater interest, but for the moment we can highlight the following.

Machine learning

Machine learning is the branch of AI that uses algorithms to process data, recognize patterns, and learn from the information collected. Its applicability is quite diverse and can be used for statistical analysis, identification of patterns, and future predictions (Schuld et al., 2015).

A study conducted by Deloitte at the end of 2019 on 2737 IT line-of-business executives from companies that adopted AI technologies found that 67 percent of candidates responded that they use machine learning today and 97 percent use or think about using machine learning technology in the next year.

Deep learning

This is the area of machine learning that uses artificial neural networks that is based on the model of the human brain (Hu & Zhang, 2019). Deep learning models and algorithms are

composed of multi-layer systems that have raw data as input and will return an output with a higher level of representation (Lecun et al., 2015).

Natural Language Processing (NLP)

NLP is the area dedicated to the understanding and study of natural language to perform certain tasks. The goal is to make the systems interpret and understand natural language to perform tasks with some utility, such as translations, text recognition, and even simulate human speech (Chowdhury, 2003).

Computer vision

The computer vision area is dedicated to performing image and video classification tasks. It has been in the spotlight lately, largely due to deep learning and the large processing capacity of current GPUs. Nowadays, using current technology, computers are able to classify images better than humans (Grosz et al., 2016).

All this technology also brings responsibility, as we are talking about systems that can sometimes take decisions without human interaction and that can raise moral and ethical issues.

One of the greatest challenges of AI in the coming years is the regulation of AI systems as they evolve over time and it is mandatory to have standardization (Haenlein & Kaplan, 2019). In this long road ahead, governments will have a decisive role in the regulation of AI (Turner, 2018).

2.2.3 Blockchain

Blockchain is a technology that is normally associated with crypto-currencies but its potential goes far beyond that. Blockchain is considered by many the most secure way of making transactions (Carlozo, 2017; Nofer et al., 2017).

Explaining its operation in a very minimalist way, we get blocks of transaction data, and every block is protected by a hash and linked to the previous block. In this way it is impossible to corrupt because each block on the network will validate the information (Nofer et al., 2017).

The main characteristics of blockchain are as follows:

Decentralization: A transaction in the blockchain network does not work in the same way as a traditional centralized system, each transaction is conducted by two peers (P2P) without the validation of a central trusted agency.

Persistency: Each transaction is recorded in blocks and is distributed throughout the entire network, preventing the blocks from being corrupted as any change to a block would be detected.

Anonymity: There is no entity to register user's private information, each interaction with blockchain is made with a generated address, and a user can have as many distinct addresses as interactions with the network.

Auditability: The users can easily verify and trace the records in the blockchain network.

(Xie et al., 2018)

At the application level, although blockchain is often linked to the financial sector, there are other sectors where it is also possible to apply blockchain, such as public services, IoT, the music sector, or in the areas of security and privacy (Nofer et al., 2017)

In table 2, it is possible to see some of the applications where we can use blockchain technology.

Type	Application	Description	Examples
Financial applications	Crypto-currencies	Networks and mediums of exchange using cryptography to secure transactions	Bitcoin Litecoin Ripple Monero
	Securities issuance, trading and settlement	Companies going public issue shares directly and without a bank syndicate. Private, less liquid shares can be traded in a blockchain-based secondary market. First projects try to tackle securities settlement	NASDAQ private equity Medici Blockstream Coinsetter
	Insurance	Properties (e.g., real estate, automobiles, etc.) might be registered using the blockchain technology. Insurers can check the transaction history	Everledger
Non-financial applications	Notary public	Central authorization by notary is not necessary anymore	Stampery Viacoin Ascribe
	Music industry	Determining music royalties and managing music rights ownership	Imogen heap
	Decentralized proof of existence of documents	Storing and validating the signature and timestamp of a document using blockchain	www.proofofexistence. com
	Decentralized storage	Sharing documents without the need of a third party by using a peer-to- peer distributed cloud storage platform	Storj
	Decentralized internet of things	The blockchain reliably stores the communication of smart devices within the internet of things	Filament ADEPT (developed by IBM and Samsung)
	Anti-counterfeit solutions	Authenticity of products is verified by the blockchain network consisting of all market participants in electronic commerce (producers, merchants, marketplaces)	Blockverify
	Internet applications	Instead of governments and corporations, Domain Name Servers (DNS) are controlled by every user in a decentralized way	Namecoin

Table 2- Some possible applications of blockchain (Nofer et al., 2017)

Despite being an extremely secure technology, it also has its challenges, the most prominent of which are the *scalability*, because all transactions need to be validated and with a very large network this can become a heavy process; the *privacy leakage*, because although the identity of the person that makes the transaction is not revealed, there is always some information that is accessible in the network such as the IP address; and *selfish mining*, because one node that controls 51% of the computer power of a network can reverse a transaction (Xie et al., 2018).

2.2.4 IoT

The Internet of Things (IoT) is a recent communication paradigm, in which the objects of everyday life are equipped with microcontrollers, transceivers for digital communication, and protocol stacks that will make them able to communicate with one another and with the users,

becoming an integral part of the Internet. The basic idea of this concept is the constant presence around us of a variety of things or objects – such as RFID tags, sensors, actuators, mobile phones, etc. – which can interact with each other and cooperate to reach common purposes. The smart devices are smart because all are connected, not because they have capabilities by themselves. Although there is a connection between them it is also necessary that they communicate in order to create a full IoT environment (Atzori et al., 2010; Ladd & Groth, 2015; Wortmann & Flüchter, 2015; Zanella et al., 2014).

The IoT has a bright future and there are high expectations, but significant challenges remain to be solved, both from a technological and business perspective. It has the potential to add a new perspective by enabling communications with and among smart objects, leading to 'anytime, anywhere, any media, anything' communications.
The Internet has dramatically changed the way that we live, changing interactions between people to a virtual level (Atzori et al., 2010; Wortmann & Flüchter, 2015).

Its applicability is quite large, reaching various areas of our society, sometimes changing, without realizing it, our style and quality of life. Most of the situations that we experience on a daily basis, whether on a trip to the gym, on a walk, on a business trip, or even being at home, we come across objects that communicate with each other and with the environment where we find ourselves, communicating later with certain applications (Atzori et al., 2010).

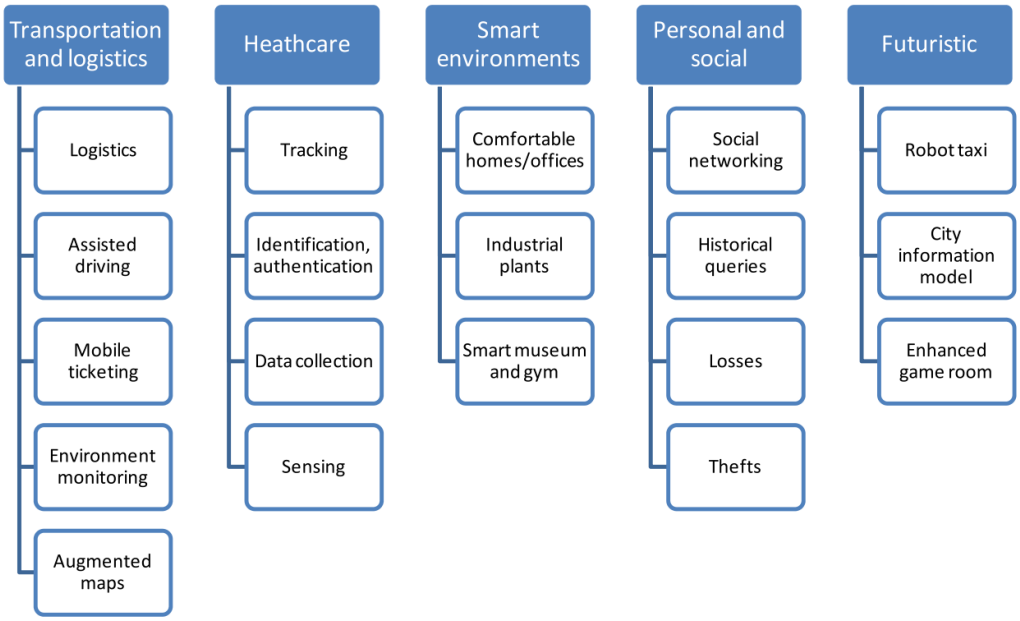

Figure 2-Some application domains of IOT (Atzori et al., 2010)

Certainly, the future will pass through the implementation of IoT but there are still some challenges to be completed, challenges both at the technological and strategic level, like how to adapt products and business models to the IoT. For those implementations, digital transformation and the change of IT processes and governance principles will be key (Wortmann & Flüchter, 2015).

2.2.5 Cloud Computing

Cloud computing is a relatively recent concept that makes available to the user a pool of configurable computing resources quickly and effortlessly without the user having to worry about physical servers and configurations of resources because the resources are in data centers managed by the cloud provider (Jadeja & Modi, 2012).

Some of the main characteristics of cloud computing are:

- Easy access to services (data, applications, servers, etc.), as all you need is a browser and an internet connection (Jadeja & Modi, 2012).
- The implementation of services is easier as there is no need for great technological expertise (Jadeja & Modi, 2012).
- Elasticity and scalability, the ease with which resources can be increased or reduced in the cloud (Miller, 2017).
- It is possible to have total control of the use and costs of all resources, creating a pay-per-use model (Miller, 2017).

In the cloud computing architecture there are 3 architectural layers with distinct characteristics, Software as a service (SaaS), Platform as a service (PaaS), and Infrastructure as a Service (IaaS) (Patidar et al., 2012).

At IaaS, the cloud provider offers customers access to the use of infrastructure as computational or storage resources. The customer uses their applications and platforms within the cloud infrastructure (Jadeja & Modi, 2012).

At PaaS, the cloud provider offers its customers the possibility to deploy in the cloud infrastructure allowing the customer to create and develop applications in the cloud (Miller, 2017).

At SaaS, the cloud provider offers its customers the possibility to run specific software in the cloud, normally used in a pay-per-use model (Patidar et al., 2012).

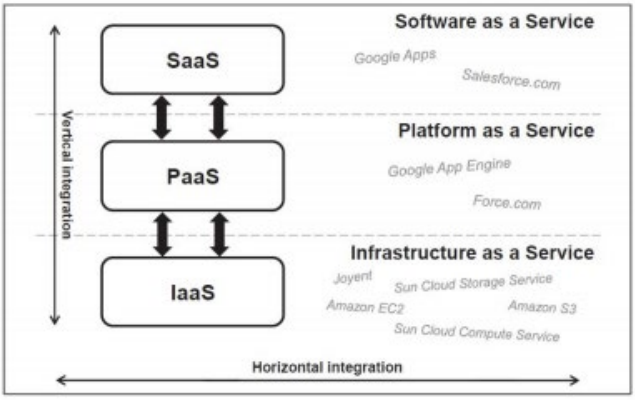

Figure 3 - Three layers of cloud computing (Patidar et al., 2012)

There are also four distinct types of clouds:

- Private cloud in which the customer has total control over the infrastructure, who uses it, and which applications are running in the cloud. In this model, the customer is the owner of the entire infrastructure and is a cloud used only by a single organization/customer (Patidar et al., 2012).
- Public cloud where services are made available to all customers and resources are managed by the cloud provider (Jadeja & Modi, 2012).
- Hybrid clouds in which they are a mix between private clouds and public clouds, allow the user to have some applications to be run in the private cloud and others in the public cloud (Patidar et al., 2012).
- Community cloud where cloud resources are shared between specific groups/organizations with resources controlled by one or more members of the community cloud (Miller, 2017).

Although cloud computing has quite significant advantages, one of the biggest concerns is information security because an organization entrusts all its data and its customers to a third party and is dependent on the security that is applied by the cloud provider (Zissis & Lekkas, 2012).

2.3 Insurtech and insurance technological trends

The utilization of new technology trends in the insurance market resulted in the appearance of the name Insurtech that derives from the concept of the well-known Fintech (Tasca, 2019).

The insurance sector is a sector that is considered slow in the implementation of new technologies and this point has been changing over the years with the appearance of insurtech. These new technologies change the way of interacting with customers and create new sales and distribution channels (Cappiello, 2020a; Tasca, 2019).

One adaption of Porter value chain to the insurance sector, made by Antonella Cappiello, shows us in Table 3 the new kind of technological solutions that can improve and disrupt the insurance sector.

Value chain activities	Tools	Impact on insurance value chain
Product design and development	• Big data • IoT • Blockchain	• Better behavioral, granular data collection and service personalization • Product/service innovation • Product/service diversification • Telematics may reduce associated risks but create new ones, such as cyberrisk
Underwriting pricing	• Big data • Artificial intelligence • IoT • Blockchain • Cloud computing	• More predictive and evaluative analytics • Reduction of information asymmetries • Finer risk assessment • More possibility of risk prevention • Finer segmentation driven by greater processing capabilities • More risk appropriate pricing • Contract information stored digitally
Sales and Distribution	• Big data • Cloud computing • Chatbot • artificial Intelligence • social networks • mobile devices • web site and apps	• More spread of information to the market • Contract information stored digitally • Increase in the number of policies purchasable online • Increased involvement of the customer in the sales process • Innovation and diversification of sales channels • Insurtech start-ups new entry in the insurance market from adjacentmarkets • Less face-to face engagement
Policy/Claims Management	• Big data • Artificial Intelligence • Blockchain	• More accurate claims assessment • Fraud reduction • Automated calculation and pay-out of claims • Possibility to claim damages and follow the procedures digitally • Decrease of processing time

Table 3- The digitalization of the insurance value chain (Cappiello, 2020a)

These technological trends create several opportunities in various activities in the insurance sector, adding value to them.

Applicability of Big Data in the Insurance Sector

The possible application of Big Data technology in the insurance sector can be done in several ways and can impact several key points in the insurance industry.

Big data can help insurance companies to identify targets and to make a proper analysis of consumer behaviors. Predictive models and data analytics give insurers the ability to predict the behavior of their insured and based on that data make decisions that generate value for the company (OECD, 2020).

Big data can also promote the sale of new products like the telematic insurance, an insurance where the insurance premium is calculated based on the data collected or increase the sales and improve the distribution channels with the presentation of better quotes to prospects based on data collected on their social networks (OECD, 2020).

The fraud detection and prevention capabilities are also improved with Big Data. The use of this technology to analyze large volumes of data allows for the detection of patterns and warns of possible fraud or fraudulent schemes (Cavanillas et al., 2016).

Applicability of IoT in the Insurance Sector

IoT is one of the technologies that, along with other technologies such as AI or Big Data, may have great applicability in the insurance sector.

There are three types of IoT devices that insurers give more prominence because it assumes a greater impact on the insurance sector; they are sensors in vehicles and machines, environmental sensors, and biometric sensors (Pai et al., 2020).

Telematics insurance is one of the great innovations that is only possible thanks to IoT technology. One example of telematic insurance is telematic car insurance. Telematic car insurance is an insurance where data are collected regarding the insured's driving habits, such as speed, braking, acceleration, and daily driving time. With these data collected, the insurer can predict the risk of an accident and vary the value of the insurance premium according to that risk (OECD, 2020).

The applicability of environmental sensors is also immense, giving the user the possibility to control and monitor their homes through a smart device. The possibility of controlling alarm sensors, smoke sensors, door locks, among others has led some insurers to choose to sell

integrated packages or to apply discounts on insurance for users who equip their homes with these technologies (Pai et al., 2020).

Insurers have the potential in IoT technology to be differentiating in the market to the point of being able to present their customers with innovative, creative, and customizable solutions that will certainly add value.

Applicability of Artificial Intelligence in the Insurance Sector

As previously mentioned, in recent years AI has started to be part of our daily lives and its applicability in the insurance sector is no exception.

According to table 3, we can see that AI has the potential to boost various areas of the insurance sector, such as underwriting, sales and distribution, or the management of policies and claims.

Being the insurance sector, a sector in which the interaction between the client and the insurance company is very low, one of the developments that is being invested in is virtual assistants. These chatbots use NLP to interact with customers, answering their questions and freeing up human assistants for the most complicated questions which the chatbot is unable to answer (Hall, 2017).

There is also a wide applicability of AI technology in policies and claims, both to reduce fraud and to speed up the payment of claims. With the help of IoT sensors and other data capture tools, it is possible with the use of AI to handle claims automatically without human intervention. We can take as an example a car accident in which the customer makes a video or sends images of the damaged car. Based on this video/images, the repair costs are automatically calculated, and the customer is forwarded to the repair shops. Another example is the use of the data collected by IoT equipment that can assist in risk detection and anticipate a claim with the help of AI technology (Balasubramanian et al., 2018).

The applicability of AI in the insurance sector has potential to be disruptive. AI combined with other technologies like Big Data or IoT has the ability to completely change the insurance industry as we know it nowadays.

Applicability of Blockchain in the Insurance Sector

Blockchain technology can have several types of use in the insurance sector. One of the possible applications is in the realization of smart contracts. Smart contracts are contracts that use Blockchain technology to improve the performance and reliability of the contract itself, transforming it into a self-executing contract. Claims information is identified and shared so that the execution of a contract clause is automatically enforceable. A practical example is a payment for a claim that with the use of smart contracts would be made in real time automatically (Maguire et al., 2017).

Another of the possible innovations that Blockchain can bring to the insurance industry is in fraud prevention and risk assessment. With Blockchain, it would be possible to collect information before making a smart contract and with that information present a price to the customer based on a previous analysis of their claims records or even based on information previously collected by IoT devices, all of which is registered in the Blockchain automatically. For this type of architecture to work, each client would have to have a unique address in Blockchain and everything would depend on the quality of the data that existed about this person inside Blockchain (Gatteschi et al., 2018).

All of this technology and its applicability in the insurance sector is relatively recent, could have a relevant impact, and become a disruptive technology.

Applicability of Cloud Computing in the Insurance Sector

According to IBM, cloud computing in the insurance industry has two priorities: reducing costs and increasing agility (IBM Global Business Services, 2010).

Cost reduction has a lot to do with the concept of cloud computing technology in which services are available in the form of pay-per-use where the insurer only pays for what it uses, thereby reducing the costs associated with the acquisition of new applications (IBM Global Business Services, 2010).

Cloud development turns out to be more agile, meaning the implementation of new applications and the resolution of problems with current applications could be resolved more quickly, thereby reducing costs and improving customer satisfaction (Soni, 2016).

There is also the advantage of working on a scalable system of resources that can be used to support various applications such as the analysis and forecast of customer habits and consumption or even risk analysis. It also turns out that it is possible to have the resources to place a product on the market quickly and efficiently, thus improving customer satisfaction (Soni, 2016).

3 Methodology

The objective of this study is to identify the gap between the existing technology and the technology that is being used by insurance companies. As we are trying to find the "why" for the existence of this gap, a qualitative approach was used, more precisely the realization of a case study.

This chapter will explain the details about this research and all the steps that have been made in this study.

3.1 Case Study methodology

For the research methodology, a qualitative approach was chosen because it is the method that allows open answers in which the participant can express themselves and tell their experience with more detail (Jackson et al., 2007).

One of the most common methods of qualitative analysis is the case study, although it generates some controversy in the scientific community because it does not follow a defined research guideline (Rashid et al., 2019).

There are different interpretations of how to conduct case study research. There are researchers who defend that the important part in the case study is the case itself, relegating the investigation methods to second place, as is the case of Robert Stake, while others like Robert Yin defend the opposite, the methodology has more importance in a case study (Johansson, 2007).

Case studies can be based on multiple or single cases and can include qualitative or quantitative data, being a research method widely used when trying to understand the "why" or "how" of events, events in which the focus is on trying to understand the complexity of real-world and real-life situations (Baškarada, 2014).

According to (Crowe et al., 2011) the crucial stages for conducting a case study are:

1. Defining the case – The existing literature and a prior appreciation of the theoretical issues are an essential support to formulate the research questions and consequently to define the case concisely.

2. Selecting the case(s) – The case must have genuine interest to the researchers, should be unique, and have importance and relevance.
3. Collecting and analyzing the data – The data can be collected from multiple sources, in a quantitative or qualitative approach (although the qualitative approach is more commonly used), and should be analyzed in detail.
4. Interpreting data – A consistent understanding of the data should be made, paying attention to details.
5. Reporting the findings – The findings can have implications in theory development and testing, and the report of these findings should be clear for the readers to allow them to understand how the conclusions were reached.

3.2 Case Study design

In this research, the case study methodology was applied as is presented in Figure 4.

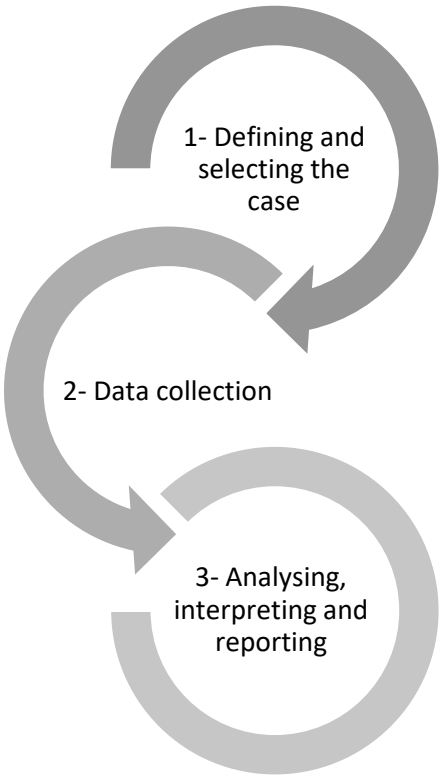

Figure 4- Case Study methodology

1. A review of the insurance sector was performed, focusing on its importance and characteristics. A review of new technological trends that exist on the market nowadays was also conducted, highlighting the following technologies: Big Data, IoT, AI, Blockchain, and Cloud Computing.

   The term insurtech was approached, and examples of use cases in the insurance sector for all this technological stack were identified and explained in the literature review. This demonstrates that it is possible to apply technological trends in the insurance sector in an innovative and disruptive way.

   Having identified the emerging technology and its applicability to the insurance sector, we can focus on defining the case and understanding why this technological gap exists.

2. In order to identify the existence of this technological gap, the approach that has been made was the realization of in-depth interviews to insurance companies CIO's, CTO's, IT Directors, or heads of IT departments. The expectation was to collect different opinions and different realities and gather relevant data for this case study.

   The literature review identified the importance of Big Data, IoT, AI, Blockchain, Cloud Computing, and Insurtech. Based on these technological trends, the interview preparation and interview guide were created.

   Questions were made about each one of the technological trends in order to identify if the insurance companies were using that specific technology and to provide some examples of it. This allows to identify whether the technologies that were addressed in the literature review are actually being used or not.

   The interview guide has 13 questions and has an expected duration of between 15 to 25 minutes. The interview guide is longer than the questions analyzed in the case study analysis because some previous questions were made, questions that were not so relevant, but which make the respondents more comfortable to express some personal opinions about clients and the insurance sector.

   The relevant questions that have been made are about the usage of Big Data, IoT, AI, Blockchain, Cloud Computing, insurtech, and the existence of the technological gap.

   This co-relationship between the technological trends of the literature review and the questions in the interview script is a very important factor in this case study because

depending on the interviewee's willingness to expose the technological situation of their company, it is possible to extract relevant information regarding the use/non-use of a certain technology and why.

Apart from that, two very relevant questions were also included in the interview guide. The first one was to find out the interviewee's opinion about the technological gap in their insurance company (if it exists and its motives), and the second was to know their opinion about the reasons for the existence of this gap in the insurance sector.

The interview type that was conducted in this study was a semi-structured interview. This is a type of interview where the answers given by the interviewee dictate the direction and the way the interview is conducted because instead of providing questions likely to provide a “yes or no” answer, open questions will be provided which may cause the answers to differ from the interview guide (Stuckey, 2013).

This kind of interview has its disadvantages, like their time-consuming nature and the fact that the interviewer must be well prepared and be knowledgeable of all the themes spoken about in the interview. However, it also has its advantages, like the fact that we can know the independent opinion of each interviewee (Adams, 2015).

All interviews conducted were recorded and have been transcribed for further analysis of the data and to draw assumptions about this study.

3. Analyze and interpret the answers given in the interviews and extract the key points regarding the current use of new technological trends by the insurance companies and find the reason why there is a gap between the existing technology and the technology that is being used by the insurance companies.

4 Case Study

4.1 Defining and selecting the cases

The insurance sector has always been a very conservative and highly regulated sector, where the technology implemented in insurance companies does not always follow the technological trends existing in the market and in other sectors.

The definition of the case was the identification of why a gap exists between the technology that was identified in the literature review and the technology that is really used by the insurance companies. So, the focus was on the insurance sector, more precisely on the insurance companies, where the priorities of data collection were at a steering level to try to collect the most accurate data.

For the selection of cases, various types of insurance companies were considered, the small, medium, and large ones, and the objective was to reach the entire insurance sector and not just a part of it.

4.2 Data Collection

Based on the literature review, an interview guide was carried out to try to identify a series of factors relevant to this study.

The interviews were realized to companies CIO's, CTO's, IT Directors, or heads of IT departments because of their expertise and real knowledge about what is really happening at a technological level within insurance companies.

The main objective in the interview preparation was to try to understand how insurance companies are at a technological level, based on the technologies that have been identified as technological trends and then try to understand if there really exists a technological gap within these insurance companies and in the insurance sector.

A series of factors were decisive in the preparation of the interviews, knowing from the beginning that using a qualitative method (in depth interviews) not all the answers would be the same and the interview script could undergo small changes according to the answers given by the participants.

4.3 Case Analysis, Interpretation, and Reporting

In this chapter, the focus is on the technological trends addressed in the literature review, namely Big Data, IoT, AI, Blockchain, Cloud Computing, and insurtech.

Based on the answers given by the participants, a division was made between small, medium, and large companies, and a table was made for each technological trend in which the opinions and answers of each one appears.

In table 4, we can see how the new technological trends are being implemented in the insurance companies.

	Small		**Medium**			**Large**		
	company 2	company 8	company 1	company 3	Company 7	company 4	company 5	company 6
Big Data	No	Yes	Yes	Yes	Pilot	Yes	Yes	Yes
IoT	No	No	No	No	No	Yes	Yes	No
A.I	No	No	Yes	Yes	No	Yes	Yes	Yes
BlockChain	No	No	No	No	No	Pilot	No	No
Cloud Computing	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Insurtech	No	No	No	Yes	Yes	Yes	No	Pilot
Technological Gap exists?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4- technological implementation in insurance companies

4.3.1 Big Data in the insurance sector

Big data was the first technological trend to be approached in the interview. The use of big data technology and its potential in the insurance sector exceeded my expectations as only one of the insurance companies has not yet implemented Big Data, but all of them see the potential of this technology and its applicability in the sector.

Consulting table 2 we can confirm that whether at an early stage or at a more advanced stage, Big Data is already a reality in the insurance sector and insurance companies are already starting to take advantage of the potential of Big Data, whether to assess the risk of new clients or even to get to know current customers and try to be proactive in approaching the customer.

Those that are at an early stage are already laying the foundations, creating data lakes, and storing data to be processed later. Other companies, more dynamic in terms of technology, which we can see from the response of the participants that they are two large companies, already use Big Data in a more structured way to analyze the behavior of their policyholders, for customer acquisition, or even to carry out medical expense management.

Exists several possible applications of Big Data in insurance sector for example do identify possible targets and make a proper analysis of consumer behaviors or to promote sales of new products like telematic insurances. Are you using/planned to use Big Data in the near future?	
Small Company	**Speaker2:** " In near future it's not in our roadmap, but in my opinion, it is something that we should take into account" **Speaker8:** "We are using it already but in a very small way. We have a project that already started, and we have started to put the data in a data lake and now our goal is to use that date to make an analysis of our clients, but like I said, were still on the beginning of it and were not making use of the data, I expect that in the next few months we could jump to that part."
Medium Company	**Speaker1:** "We are using it in a very early stage in the first as a way to predict the eventual customer churn. Ok, so it is a very early stage. We are doing baby steps in this regarding. So, it means that there is a lot of things we have to do in the future." **Speaker3:** "Yeah, I think that the big data at insurance sector is critical, well, it's not in my opinion, the statistic says that the management of the huge amount of data is the base of the insurance, is the way that you create or make a good risk assessment of your new customer, it's this type of statistic. Then big data is from my point of view, one of the critical things in the future for the insurance company and yes, currently we are using big data. It's true that we are in this transformation process, we are changing the technologies that we use to do big data, but currently we have, for example, a huge data lake where we are introducing all the information of the company and all the information that we want to use." **Speaker7:** "Yes, we have a project in course. It's not yet finished but we already started one big project in this area".
Large Company	**Speaker4:** "Were already using Big Data and Machine learning Solutions for all these use cases" **Speaker5:** "Yeah, we do. We use it now. We've used it now for several purposes, some of them related to customer acquisition, some of them relating to medical expense management, some of them related to customer experience, so yes, we have all kinds of approach with this technology. "

	Speaker6: "Well, we are using it. I mean, we're starting to use in it. We have a data lake in which we are loading all data of the company in order to use, you know, data analytics to explore that information and not only we have internal information, but also information from the market and to understand behavior, to understand how we should segment the clients and also to be proactive…"

Table 5- Answers of participants about the usage of Big Data in their insurance companies

4.3.2 IoT in the insurance sector

The purpose of the following question was to realize the usability and applicability of IoT by the insurance companies.

Nowadays, between Portugal and Spain, the use of IoT does not have great expression, and this technology is only used by two large companies in this study. The main reasons are divided between the type of company (small, medium, large), and some of the reasons that can be highlighted are for example the priorities in terms of company growth or even not seeing applicability for IoT in the current insurance business model.

Of the three large companies that were interviewed, two already use IoT in health insurance, integrating with wearables and in pilot projects in car insurance. Although company 6 does not use it, it sees the added value that IoT technology brings to the insurance sector and considers the possibility of using it in the future.

In medium-sized companies, two of them do not see the applicability in IoT technology, and one of them even mentions that IoT in health insurance turns out to be complicated because customers do not like to disclose their health data to third parties.

The remaining companies see value in IoT technology and two of them plan to implement this solution in the future.

Exists several possible applications of IoT in insurance sector for example use data from sensors to present costumers with customizable solutions. Are you using of plan to use IoT in the near future? Why ?	
Small Company	**Speaker2:** " Yes, that's true. We are planning to use this kind of applications in the future, and this is more in the near future. “ **Speaker8:** " Were not yet using IoT and to be honest, at the moment are not on our roadmap… We see opportunity for it, it’s a technology that will add value for sure but in my opinion because of our youth, we have other priorities."
Medium Company	**Speaker1:** “Not yet using it, but we plan to use it in the future. For example, device in the cars, device in the wearables as a way to best understand customer behavior. But not now.” **Speaker3:** “Not at this moment, we don't have any real proof of concept. It is true that we have made some approach to some startup related to these types of technologies, but in the sector that we work, we work life, accidents, health and

	household, and in this sector currently, there aren't a lot of use of these technologies… …I think it's more marketing that other thing because at the end you need to have for example a watch, you know… to take information, and I think that at this moment in general, the customer doesn't like so much to offer personal health data to nobody. I think it's a bit difficult that you get this type of information from your customers." **Speaker7:** "It doesn't have much applicability because IoT is the Internet of Things and our things here are insurance, isn't it... So... We still don't have anything, we've already analyzed some possibilities in this and it doesn't mean that we won't use them through wearables in the future, but for now we don't have anything in that sense. ".
Large Company	**Speaker4:** "Were already using IoT in some project or in some pilot product, specifically in the automobile industry and some pilot tests also in the world of health, but not for the calculation of claims, but for the personalization of the service" **Speaker5:** "We do have a very established platform for IoT and specifically wearables. So, we do have health products connected with our customers, which are based on the data produced by wearables. So yes, it's a reality now. " **Speaker6:** "I mean, in the insurance business per se, I mean, as an insurer, the answer is no, we're not using it, and probably we should start using it. If you have information about your health and whether you do exercise, you know you walk 'x' amount of kilometers per day, your eating habits, and drinking habits, and we may not only advise you whether you need to improve those behaviors, but also they may have a potential impact on the premium that you pay for your health insurance because you know, if you have health in life, most probably you will use less the coverage of the insurance and in some other insurance business, to be precise, in the car insurance business, there are some companies that are already using that type of information from IoT in the way that you know the car velocity, how you drive your car, how you brake, how you accelerate, how you take the tolerance, etcetera, etcetera. They are taking those behaviors and scoring the way that you drive and based on those scorings, your premium may go up or down. So, I believe there is a room for that, but we are not using it yet"

Table 6-Answers of participants about the usage of IoT in their insurance companies

4.3.3 Artificial intelligence in the insurance sector

AI nowadays has already a great use in the insurance sector, whereas the answers given by the Interviewees on this study reveals that it is just not being used by the small companies and one medium company.

For the small companies, the main reason is the maturity of the company, we could assume that as they are still in the growth phase, they are not investing in this technology, not because they do not see the value in it, but because there are other priorities. Regarding the medium-sized company that does not use AI, it recognizes that it is of interest to use it but that at the moment they have only carried out studies but without any practical effect.

A common point in the other insurance companies that are using AI is that it is mostly used in chatbots and in the automation of customer service solutions to try to give a better service to the clients.

Artificial intelligence is a reality nowadays, in insurance business AI have the potential to boost various areas like underwriting, sale and distribution and policies and claims. Are you using Ai technology in your company? Why?	
Small Company	**Speaker2:** " We are using AI, but not for insurance purposes. We are using A.I for assistance purposes, so that is the point. We are using that to improve our product productivity, we're not using that to get more customers because what I told you before, were not one end to end insurance company and we are more limited in this area, and we are exploring that. I think it's important to think about all these things that we are talking about, but to be honest, we are not at that point right now. " **Speaker8:** " No, were not using A.I, it's true that this year we had one approach with a major company that produce chatbots but for the same reason that IoT, we got other developments that we believe that could bring us more value. Maybe in the future we would start using it. "
Medium Company	**Speaker1:** "Yes, starting to be using AI, but in a very early stage once again, specifically as a way to do predictive analytics to detect the eventual journey in the customer side." **Speaker3:** "We are using with some startup companies, doing things related to chat bot. We are using these for different applications. We started in a simple thing to help our customer's and now we are using for all our internal use. I think that artificial intelligence is a reality in the future, but my opinion is that will be not as we see in the films or in the newspaper. I think it's going to be more, uh, more based on a statistic or in probabilistic analysis than other thing. Well, I don't believe… I think

	that the use of system that make self-learning… I think it's possible, well, I guess I am a bit old, but I started to work in the university with neural networks and things like this, many, many years ago when these technologies started. I was in the university working on these type of things and from my point of view, it's a technology not easy to use when you have a customer in front of you, I will try to explain, if I have a perfect neural network that analyze the data and decide that you are going to pay 50 percent more of your health insurance next year, what is going to be your opinion as a customer? You go to a helpdesk and ask why you are going to raise the price of my insurance… And the answer to say is: was the robot. This is not the correct answer. I think that we are going to use it, I think it's a technology that in the future It's going to be a reality, but not all the things that we heard from the sales people." **Speaker7:** "Not yet, we have some studies done in this area, but we have not yet made a practical application of any artificial intelligence project. This can be of interest even in customer support, in the automatic answering of questions that can improve in our response to the customer. We have some studies in this area but we have not yet applied."
Large Company	**Speaker4:** "Yes, specifically a use case is customer service, where there is an artificial intelligence bot that is capable of classifying information that customers are demanding to present them with different answers without the need of human intervention. That's a use case, for example." **Speaker5:** "Yeah. We are using AI for several things, we are using some… some digital health solutions which are based on AI on one hand, then chatbots are quite massive over here also, so I would link that with the customer experience, but we do have a large number of chatbots and also, we are using artificial intelligence in terms of efficiency in some internal projects, to improve some processes. So, AI It's also being used, not as widespread as I would like to, but it's getting there." **Speaker6:** "I mean, we are using it in the process to authorize the treatments, I mean, the way that we work is, you go to the doctor, a doctor will prescribe certain treatment, and depending on the type of treatment that you have, it will require the company to authorize that treatment or not. That process of authorization, we validate whether you know it is covered within your policy, whether it wasn't excluded when we sold the product, whether you have done that treatment or that analysis or whatever in the past 'x' amount of weeks or months, whether you are up to date in your payments to insurance, etc. All of that was a very manual process. Now we are using artificial intelligence to understand how did human being was behaving for the past three years doing that type of authorizations, and we managed to replicate with 99.97 percent precision that the machine will take exactly the same decision as the people will do….

	Other thing that we will start using it is once we put the CRM in place that we are looking to put a well-known CRM of the market. We will use Artificial intelligence to understand more the behavior of our people, by the way that they interact. Once we have all the information coming from different channels in a unique platform, every data would be in the CRM, then that will give us enough information to understand how people are relating with us and we are, you know, covering their needs, and by exploring that information, we can improve the way that we communicate with our clients in the channel that they prefer to, as a way of communication.”

Table 7- Answers of participants about the usage of Artificial intelligence in their insurance companies

4.3.4 Blockchain in the insurance sector

Blockchain technology, despite being a trend nowadays when we talk about decentralization, is the only technology that is not being used by these insurance companies in a productive environment.

Practically all study participants have the same opinion and are unanimous about blockchain technology, it still does not exist as a useful technology in the insurance sector. In their opinion, there is not any real proof of concept, it has potential but still needs someone to come up with an idea of how it can be applied.

Blockchain technology can transform the insurance business and have also several types of use in the insurance sector. Your company is already using BlockChain?	
Small Company	**Speaker2:** " Ok. Well, to be honest, we don't have any plan to implement these technologies. The only thing that we talk about that, to talk about implement, it's about the business intelligence thing. All of these blockchains, and big data, and all these technologies, I think, are necessary, especially for big companies and I think it's something that we should take into account … …Yeah, I think all the technology that we're talking about, all of them are complementary. I don't think that you are saying, things like you use that instead of this or use that, rather that one“ **Speaker8:** " Like I said before, blockchain it’s not in our roadmap for the next 3 or 4 years, have potential, but from having potential to see something tangible there is a big difference. Maybe I'm wrong and a startup appears with some brilliant idea and with a correct applicability of the blockchain in the insurance industry, who knows… “
Medium Company	**Speaker1:** “Yeah, for sure we will be using in the future, specifically, when we start to do the micropayments, but not now, and it is not yet in the roadmap for the near future, but for the medium large it will, for sure.” **Speaker3:** “We are not using at this moment, we have tried to do something, but we don't find something useful for it.” **Speaker7:** “Not yet, I believe that Blockchain could be useful in the future, but at the moment we don't have any application in this sense. “

Large Company	**Speaker4:** "Were thinking on using it. We have some kind of pilot between several companies, but we are not yet in the production phase with that technology." **Speaker5:** "No, No... We have done a number of pilots, approximations, I would call proof of concepts with blockchain. For the time being, we have not had a clear vision on what the technology could add to our experience, so for the time being we never felt the need to use." **Speaker6:** "About blockchain…Hum, I think we may start using it if we have some European agreement sort of… …But internally in Spain, even though we were looking for some use cases, we didn't find any for blockchain. That might be some of them related to, you know… use blockchain to certify certain part of the process, you know… your I.D, or your bank account. Have a blockchain, uh… system, related to your bank or to the police to say, yes, I can guarantee that this person is whoever he says he is or she is, and the same with the current account, that bank certified that account number belongs to you. And we may get rid of SEPA if we have a blockchain technology to validate that, but apart from that, we don't see right now any use of blockchain in our sector, in the health insurance."

Table 8 - Answers of participants about the usage of Blockchain in their insurance companies

4.3.5 Cloud Computing in the insurance sector

On the other hand, contradicting the Blockchain technology, Cloud computing is used by all the insurance companies that participated in this study.

It is the only technological trend that we can assume, according to this study, is present in all the insurance companies. Although there are few that work 100% in the cloud, the vast majority already develop in the cloud.

The main advantages that have been identified focus on the flexibility and cost control that the cloud provides to the insurance companies.

Is Cloud computing already a reality in your company?	
Small Company	**Speaker2:** " Yeah, that is a reality…Everything is on the cloud.“ **Speaker8:** “Yes, we got something like 80 percent of our technology in the cloud, and around 20 percent out of the cloud because are older systems that were inherited, but for example, for all new projects that we have, we put all on the cloud due to is agility and scalability. “
Medium Company	**Speaker1:** “: Oh yeah. When I arrived to the company cloud computing, it had a very low usage, but now have a very high usage, specifically every project that I start, a TCO always must be done as a way to understand what will be the best for the company, inside or cloud, so it depends, sometimes it will be in the cloud, other times it is, for example, the last one the TCO clearly point to on premise project.” **Speaker3:** “Yeah, we are changing our core system and it's deployed in Amazon. We are creating a new data lake and it's deployed and created using Amazon tools. We are doing a new frontend for our agents and customers, and we are using serverless and API management technologies and everything new that we do it's all in the cloud, everything, Azure or Amazon, but it's in cloud. I think it's the infrastructure cost is so high if you try to have everything on premise, it's so high. And the flexibility... Is through that the cost, in my opinion, is not the first, uh, the first reason to cloud because the cost is more or less the same. You don't achieve a huge advantage. The advantage comes from the flexibility, high cost control, control better your infrastructure, control better your costs and all these type of things, for example, the data recovery plans of all these type of things.”

	Speaker7: "We have some services that are provided by cloud computing. In parallel with most systems that are local, on premise, we already have some services, some things that are in the cloud, some services and some features.
Large Company	**Speaker4:** "In the digital health area, in the Digital Health division, we are a cloud-only company. This means that all our systems are in the cloud, and we also work in a multi-cloud model, which means that our level of maturity in this cloudification process is very high. The parent company in this case, because their level of maturity is lower, they are also already working with certain systems, mainly the customer relationship layers, with multi-cloud environments." **Speaker5:** "Yeah, yeah, it is. Yeah, yeah, we haven't quite a big number of applications which are already based basically on most of our new developments are cloud ready designed. Some of them might actually be deployed in the cloud and some others are still deployed on premise but with a cloud ready design. So, I would say that, yes, this has been deployed here massively, I would say." **Speaker6:** "Oh, yeah, yeah. I mean, cloud computing is a reality since 2017 or so. So, we're using cloud computing, and I will go to, I mean, all the things that we said about, you know, the data lake, artificial intelligence, all that is based on the cloud in different models' path, and that is our go to way of working. We currently we have a main cloud provider that is Microsoft, but we also have a secondary, uh, cloud provider that is AWS and to a lesser extent, IBM Cloud."

Table 9 - Answers of participants about the usage of Cloud Computing in their insurance companies

4.3.6 Insurtech

Insurtech and the improvements that they could bring to the sector was the last question regarding the technological trends in the insurance sector.

Despite the value that all the participants see in insurtech, not all the insurance companies benefit from their technological support. The ones that benefit from their support point out very valid arguments like their mentality, or their fresh ideas for the insurance market.

In the opinion of most of the people interviewed, the lack of legacy system and the fact that they are not as regulated as a traditional insurance company makes them a powerful ally to have in the implementation of new technological trends.

Insurtechs, a new reality in the insurance business. What your opinion about it? What improvements you think that could bring to the sector? Are you working already with insurtechs?	
Small Company	**Speaker2:** For the answer the assumption is that this company is not using it but was not a clear answer to the question. **Speaker8:** "In my personal opinion insurtech's have the possibility to disrupt the insurance sector, like many fintech's in the bank sector. Why? Because this kind of startups don't have the legacy, have few maintenance cost's and in general brings new ideas and new ways of thinking to an old fashioned and conservative sector like the insurance sector. In my opinion the biggest problem could be the regulation problems because insurance sector is a very regulated sector… The answer is no, were not working, but probably we will work in the next year or so, like I said, one of the projects that we evaluated in the A.I field was the chatbot and that chatbot was not to be developed inhouse but instead use a solution presented to us by an insurtech company, so yeah, probably we will work together in a near future."
Medium Company	**Speaker1:** "Oh, an insurtech it's a good way to let the companies that are using old processes and old technology to speed up because if we are not able to speed up, it means that we are not able to provide the best solutions at the best price for the customer. So, the insurtech's are very welcome because they change our status quo, they change our way to perceive what customers really need, and we should adapt to the customer need. Unfortunately, these vertical, it is very traditional, so

	it is very block size like we say, and the insurtech's just changed this way of doing and this way of thinking. That's why bigger companies are acquiring Insurtech's. Ok. Planning to work in the future? Yes, because what we are doing right now, it's not needed the Insurtech's power let we say, because we know what we are doing. For now, it's creating the foundations as a way to do the needed business in the future for acquiring or doing business with Insurtech's.". **Speaker3:** "I think they are necessarily. Two reasons mainly, one is because there are people very smart outside with good ideas and then create things really good, and the other is that we comment before, we are a market completely regulated for all the sides, internally, externally, all the sides. Then, the speed that we have in our IT department, it's impossible to be similar to a startup. You work in an insurance company, and you know the internal procedures, ask for a server, to start a project... But at the end, all these things are internal control that we have as a regulated company. It's easier to take others to develop the product and you buy, because in this in these things, you don't need all these type of controls. Yes, we have for health insurance. We are using Insurtechs for different things, for tele-assistance, to have the doctor at the other side of the computer, things like this. We are also using for the chatbot, we are using small companies that help us in this type of things. Yes, we're having different things, we don't have, how they call…we don't have a place where we create new insurtech. We look to the market and take the best things for us." **Speaker7:** "I think they can bring about a lot of improvements because these types of companies explore technologies and tools related to the insurance market that can then be acquired in partnership or in any other way by insurers and integrate as technological added value to our offers is not. Yes, we have a case or another, were already working with insurtech's."
Large Company	**Speaker4:** "Well look, I think there are several advantages that they offer. The first of these is that they are companies that focus on doing one thing and doing it well, that is a very relevant weight, because large companies have multiple lines of business that need their attention and that in the end, the maintenance of the core ends your capacity for innovation a bit, that, on the one hand, then on the other hand there is agility, these types of companies are very fast, trying, testing and adapting to the client and if you have them as allies because the capacity for innovation that they can offer you is very relevant, and the last thing is that precisely this is the point at which you have to understand, an insurtech is not a threat to a business, but that you have to see it more as an ally…

	Yes, were already working with insurtech's, specifically with healttech companies, digital health." **Speaker5:** "Well, I think that they are very big and significant part of the change in the sector. I mean, there have been changing the market broadly. We have not really done anything with the insurtech yet. We keep an eye on that, of course, but I wouldn't say that we are doing things with insurtech yet, but it will probably come in the next few months." **Speaker6:** "Well, I mean, even though they didn't have the same strength as they had in the banking sector, that is a sector I know quite well… I mean, that type of technology, what will do is will shake the industry because they have a fresh approach, they don't have any legacy of history, they start from a blank canvas, OK? And so, it is easier to draw a picture when you have a blank canvas than when you have 40, 50 or 60 years of history of growing up company. Whether you like it or not, you get dependencies that will inhibit you from moving as fast as a new company. I mean, we are working with them in some proof of concepts for certain things that we believe could be good for the industry but if as I said, is this proof of concept, not in a real production environment."

Table 10 - Answers of participants about the usage of Insurtech's in their insurance companies

4.3.7 The technological Gap

The technological gap present in insurance companies is the main topic of this Master's thesis, and as such, two questions were asked to the people interviewed regarding the technological gap to try to understand their opinions.

The first one:

"**Do you feel there is a gap between the current technology that were been talking in this interview and the one that is used in your company? Do you think other insurance companies share the same scenario?**"

This question aims to know their opinion regarding the technological gap between the technologies that have been approached in this study and their reality.

The second one:

"**The insurance sector is a very conservative sector, much like what happens with the banking sector. Do you think this is a relevant factor for the existence of this technological gap? Are technologies only implemented when they are sufficiently mature and tested in other sectors? Or it is a question of costs/ priorities of insurance companies?**"

This question aims to find a motive for this gap, such as technological maturity, or even the legacy of being in a conservative sector for several years.

The two questions turned out to be complementary because the participants of this study started to give reasons for the gap in response to the first question, and the first question ends up revealing that the technological gap exists and is real.

In table 11, it is possible to see the participants answers to the first question regarding this gap analysis.

Do you feel there is a gap between the current technology that were been talking in this interview and the one that is used in your company? **Your opinion about this gap is the main reason of this study, do you think other insurance companies share the same scenario?**	
Small Company	**Speaker2:** "Yes, but from my point of view it's a general thing, this is happening to the whole sector. Obviously, maybe it's not always 100 percent or zero, but I think it's something that is affecting the sector, and not only this sector, it's affecting sectors like banking.

	I think insurance and banking they are parallel businesses and I think it's happening that they are very resistant to change, they are trying to resist to change. and then it's always the same, that they are forgetting the customer. This is the main thing, now it's very modern to think about this, think like the customer, and then you create the idea around the customer because it's not you're not creating a product you are creating a relationship with a customer. I think this is what the modern companies do, or the modern successful companies do, and I think these sectors, banking and insurance, don't do." **Speaker8:** "Yes, for sure, in my company we have clearly a gap between the technology that you talked and the one that were using, but that is not only because of the maturity of our company, I think that other companies share the same scenario because at the speed that the new technologies appear is almost impossible to have all the technologies implemented. And don't forget that most of the insurance companies are very old and change or implement some of this kind of technologies is complicated, first because it's not cheap and second because you need to change the mindset of the users, and for example for old users have a technology that could replace their work it's not an easy approach, I think you know what I mean to say."
Medium Company	**Speaker1:** "As far as I can understand yes, even in the big companies, because, once again, the insurance vertical is a vertical very traditional let we say. So, there is a lot of old technology that it is hard to fix as a way to speed up for the new trends. That's why some companies are doing some kind of, how can we say, lab areas as a way to try and also invest in the fintech areas as the way to start a side-by-side company and with these, speed up the usage of the new technologies. But the problem is that the mainstream, let me say, it's hard to do it because there are a lot of process based on old methods that are very hard to change, very hard to change…" **Speaker3:** "Well, if you see, we are using many of these new technologies that we have talked. We are in a transformation program, and we started five years ago, and our decision was a bit risky, but I think it's the correct one. If we are going to create something for the next 10, 15, 20 years, we have to start in the current top or more modern technology, because in other way you burn all in this sense, then we are using really new technologies. Everything new is in the cloud, we are using, uh… we are not using servers in the cloud, we are using the Dockers and this type of technologies. Everything that we do, it's using APIs, then our gap is between our legacy and the things that we are doing new and all this type of thing, and this travel is really complex. We are suffering a lot because it's not easy to move the company, it's not easy to move your colleagues or your user's to these new technologies. The second thing is that all these new technologies are really nice, but they are immature, they are green at this moment… they are not mature technologies. The level of confidence that you need in the financial sector, he's not 100 percent achieved in these new technologies. Sometimes you find things that say, well it is not logical, in the legacies in your own premise many years ago this as already been surpassed, and

	in these new technologies, in the cloud or in the artificial intelligence, there are things that need some time." **Speaker7:** "I have the idea that we, in terms of exploring new technologies, are a little bit or have been a little bit at the forefront of our peers. It doesn't mean that our counterparts are stopped, but maybe we've been a little at the forefront. It is evident that this does not mean that we are in constant evolution and that we still have a lot to do in the coming years … Therefore, between what is intended and what we really are, there is always a gap. Although positioning ourselves in relation to our national counterparts, I think we were doing quite well in terms of applicability of new technologies."
Large Company	**Speaker4:** "Well, it is a bit what I told you at the beginning, there is an important technological gap. I believe that any large corporation should aspire to find value in new technologies and that this value is reflected in the face of its customers and its business, that is, it is an aspiration of all large companies to be on the crest of the technological wave but the problem is in the legacy, in the legacy systems. In the end, large companies have a very powerful business that needs a level of stability that you only get in a long-term roadmap and the speed at which technology advances in contrast to the need for stability that those roadmaps need, it leads to a scenario where roadmap rarely fulfilled. That's kind of the situation that I think happens in all companies and that certainly happens in ours." **Speaker5:** "What if we talk about Spain? Probably. I think that, that we are ahead of our competitors in terms of technology usage I would say. Not, but not by much. It's not like we are technology driven and they are not, but yes, I think we are in a good advance. Then I think that the sector is divided now. There are a number of players which are making very clever use of technology nowadays and I think they are positioning themselves very, very well in the game, but there is also a big chunk of a sector that because of, you know, legacy and this kind of things are struggling a little bit to manage the technology change." **Speaker6:** "Well, there are gaps, yes. Yeah, I think in general, yes. And I mean, let's face it, the market will push us to move faster and to have more open technology more... When I say open technology, I mean in the sense of being able to integrate among some other companies and allow some of the companies to use our microservices or APIs to obtain certain information that we may give them. Give them, when I say, give them is not necessarily for free, I mean, one thing that the insurance industry didn't realize yet is that there is a potential new business model based on the data and the technology that you can provide to the industry and some other industries that they can take advantage and charge a fee for the use of that information. I know it may sounds weird, but…"

Table 11-Answers of participants about the gap between the current technology and the one that is used in their company

As we can see from the analysis of the answers given, there is a set of reasons for the existence of this gap that are represented in Figure 5.

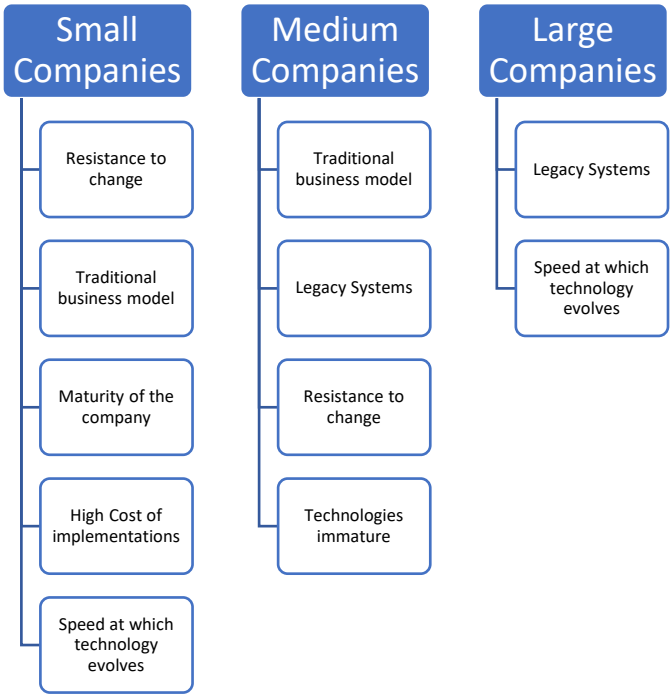

Figure 5-Reasons for the technological gap

Depending on the type of company we can see different reasons for this technological gap. The small companies do not suffer from the legacy systems, but on the other hand there are other factors such as high implementation costs or the maturity of the company that has a decisive factor when implementing a new technology.

In the development of this study, the insurance companies were also asked if they thought that this technological gap in the insurance sector is due to one of three reasons: the fact that the insurance sector is conservative, the technology is not yet mature enough and they are waiting for its applicability in other sectors, or whether it was a reason of cost versus priorities.

The insurance sector is a very conservative sector, much like what happens with the banking sector. Do you think this is a relevant factor for the existence of this technological gap? Are technologies only implemented when they are sufficiently mature and tested in other sectors? Or it is a question of costs/ priorities of insurance companies? what is your opinion?

Small Company	**Speaker2:** "I think the problem with the insurance companies is that the bulk of the benefits or the profit that they get are from the normal insurance. And this product is always the same and you need that product because it's, sometimes it's compulsory. So I think this is the bulk, and then I think with that, sometimes it's like the lack of imagination to create a new ones because you are more stable and you have this market, you have your market share and you have something that you can control, something that you can compare, and all of the insurance companies are offering more or less the same in terms of the main product. I think that means that exists a lack of imagination to create a new market because they are very stable and they don't want to lose that, you know what I mean? It's like this is pushing them to be conservative" **Speaker8:** "In my opinion is a mix of the two of them, fist because in a big insurance company where you got legacy's system and all the things working, the same product of the last 5 or 10 years, etc… it's difficult to insert a new disruptive technology without some prove of concept, without see that this technology have worked in other insurance company or inclusive in other sector of activity. By other side at least that's is what happened with us since were a new company and don't have much legacy, we have other priorities for the business, we prefer for example to develop and to improve our Erp instead of a chatbot, and I'm not saying that the chatbot or a big blockchain project or a IoT project don't have value… Of course, that have value but at this point of maturity we must start by the basics and to prepare the foundations to start this kind of projects in some years. No one start the home by the roof."
Medium Company	**Speaker1:** "It's the second, the cost priority in an insurance company, because we do know that we need to change, but unfortunately, the pace of change it is not as strong as it should be because we need to perform while transforming, Ok, that's why only those that can embrace this change quickly it will be the ones that will have more success because if we are not able to speed up, we will die." **Speaker3:** "Well, I think there was a gap and a lack of investment in the last years and now try to recover this gap, in my opinion, is fault of the competence. The insurance sector it's a business with good margins, by the moment with good margin. Then you don't need the pressure, you don't feel the pressure to be in the top of the technology like we talked before about the Telco, in the Telco the competencies is cruel, it's very hard and they need to invest and to be all the time in the in the first line of the technology. In the insurance sector in general, the margins are good, you don't feel this pressure for your competence. It's my opinion, but it's true this is changing, I think that with the digitalization of the society, of the country, makes these changes necessary. And I think that all the insurance companies know that if they don't change in the next ten years, they go, they will be out of the market in five more years. " **Speaker7:** "I think they are different markets, while a bank customer requires daily use of access to digital platforms, nowadays practically the customer demands it,

	in the insurance company the customer does not need to go to the insurance company every day to see how are your contracts and your policies… I think this is a gradual change, isn't it? There are insurers that are more agile and tend to make this change faster, and there are insurers that are not so agile and will take longer. In our case, we have an internal team, at the same time there are also works that we do outside... We have an internal team that also helps in the innovation and implementation of new solutions and at the same time, as I say, we also have partnerships with Insurtech's and with software houses to make technological evolutions. But there are other insurers that are perhaps further behind and have more difficulties."
Large Company	**Speaker4:** "If you go to other sectors that are much more threatened by it, by new digital technologies, for example, that pushes the level of technological adoption to be much higher in sectors such as banking or insurance, where, as well as regulatory issues or due to capitalization issues, it is necessary to have large investments, which makes it difficult for these new technologies to enter, since it is much more conservative from the point of view of technological strategy than in other sectors, where it is not viable do it." **Speaker5:** "I don't even like the term legacy because most of what we call legacies is basically what feeds our mouths, so, I don't like to call it legacy. But yes, I think that when I say and when I talk about legacy preservation is legacy mindset rather than…than…you know, the legacy systems themselves. It's like, you know, we have always been doing things this way and we don't feel like we need to change. I mean, that's a very legitimate opinion. I don't agree with that, but I think it's legitimate. But I think that in the end will make you struggle when… I mean, there are many amazing things that technology is offering nowadays and if you are missing that, you're missing a big part of what is going to be happening next." **Speaker6:** "Well, I think it's a combination of both. It's a less risk taker approach in the insurance industry in general and the technology is seen as a cost and not as an investment to have better opportunities and you can see the difference in the companies that are more technology driven. They create a bigger gap in insurance company, they create a bigger gap with their competitors because they can take more advantage of the data that they are processing, the data analytics, artificial intelligence, robotics and what have you to explore that they tend to create more value to the shareholders and the company."

Table 12 - Answers of participants about posibles reasons for the technological

Addressing the issue of the technological gap, a series of key factors were obtained that identify the reason for the existence of this gap in this sector.

Small insurance companies identify the insurance sector as a conservative sector that always presents the same products, not betting on innovation and pointing to their lack of originality and creativity when creating new products, as commented by speaker 2: “product is always the same and you need that product because it's, sometimes it's compulsory”. Another of the points identified was the cost versus priorities of insurance companies and the fact that legacy systems are already part of the sector and have all the features required by users, compared to new technologies and the lack of maturity.

Medium-sized insurance companies also identified the cost versus priority as it is not possible to implement everything at the desired speed. They also identified the fact that the insurance sector is conservative and that nowadays there is no pressure from the competence to make a significant change. The aspect of the current insurance sector was also discussed, in which the current models in which insurance companies operate do not require constant contact with the customer, as in other sectors such as banking.

In large companies, the reasons identified were practically the same, returning again to the sector being quite conservative and the large investments that would be necessary to implement the new technological trends, which are still seen as a cost and not as an investment. References have also been made to the fact that they do not feel the pressure of change that is felt in other sectors, and the legacy mindset that is present in the insurance companies.

One aspect still mentioned by some participants of this study is that insurance companies that are more competitive in terms of technology and those who can keep up with new technological trends will create a greater gap with their competitors.

5 Conclusions

In this study, an analysis was performed of the existing technology and the technology that is being used by the insurance companies in the Iberian Peninsula.

After an analysis of current technologies that were emerging in the market, the focus was centered on five technological trends, which were Big Data, IoT, AI, Blockchain, and Cloud Computing and on start-ups in the insurance sector, the so-called insurtech.

After that, several hypotheses were considered to try to identify the best way to reach the insurance companies and try to understand their true technological reality.

There is nothing better for this purpose than talking to those who have decision-making power within the insurance companies and that is why the approach was to carry out interviews with CIO's, CTO's, IT Directors, and Heads of IT departments in eight insurance companies at the Iberian level.

As the reality of each insurance company is distinct and there are insurers of different sizes, a subdivision was made between small, medium, and large insurance companies.

The questions asked focused on understanding which of these technologies were used and, finally, on knowing the opinion regarding the existence of a technological gap, both in their company and in the insurance sector itself.

Through this study, it was possible to conclude that there exists a technological gap between the technological trends and the ones that are really used by the insurance companies. In the Case Analysis, interpretation, and reporting it is possible to see by the interviewee responses that not all the technology is being used and the main reasons for the existence of this technological gap.

This study is important to enhance the visibility and to have a perception at a directive hierarchical level of insurance companies in terms of technology, which helps us to understand what is being applied versus what exists and why this technological applicability has no higher percentages.

5.1 Research Limitations

There are two major limitations in this study. The first is due to the fact that interviews were carried out with a small sample, mainly because there is little availability and opening of senior management positions of insurance companies to speak openly about the current technology in their companies. Even so, we opted for the in-depth interview to have more open questions and to have different opinions and points of view.

The second major limitation is the fact that the insurance sector is a very broad sector, and we have insurance companies that only operate in the life sector, others that its target is the non-life sector, others that at their core, for example, is the automobile or health insurance and this means that sometimes some of this technology does not fit well into the business model of the company. The analysis would be less complex if the market were all homogeneous and all the insurance companies commercialize the same products.

5.2 Future Work

In terms of future work, the suggestion would be to be able to count on a larger number of participants for the interviews and to extend the study not only to the Iberian Peninsula, but also to the global insurance market, which was not done due to the lack of time associated with this Master's thesis degree and the difficulty in getting senior management positions of insurance companies to participate in this study.

It would also be interesting to try to understand if, with the technological advance that is felt nowadays, if a few years from now this gap will still be present based on the same technologies addressed in this study. With this, it would be possible to understand the speed with which the technology is implemented, if there were great advances in the sector and even if there were technologies that ended up failing in the insurance sector.

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Appendix I

Interview guide

- The interviews are planned to take 20 to 35 minutes
- GDPR consents will be read at the beginning of the interview in order to authorize the recording and the use of the data collected during the interview.
- Anonymity of the interviewer will be protected
- There are no right or wrong questions in this study, I'm looking for professional experiences and opinions.

Interview questions

1. In what range do you include your insurance company? Small, medium, or large insurance company?

Small (1 to 100 employees)	Medium (101 to 999 employees)	Large (+1000 employees)

2. How do you consider your company in terms of technology, an innovative or more conservative company? What's the main reason?
3. How do you see the insurance sector nowadays? In your opinion, did the insurance industry have to reinvent itself to keep up with customer demands (new type of costumers, with more open mind and technology driven)?

4. What you think about the technological advance that has been felt in the last decade? How technological advance made itself felt your company?

5. What your opinion about the new technological trends that exist nowadays in the market (Big Data, AI, Blockchain, IoT and Cloud computing)? Are you using or plan to implement some of this technology in the future?

6. Exists several possible applications of Big Data in insurance sector for example do identify possible targets and make a proper analysis of consumer behaviors or to promote sales of new products like telematic insurances. Are you using/planned to use Big Data in the near future?

7. Exists several possible applications of IoT in insurance sector for example use data from sensors to present costumers with customizable solutions. Are you using of plan to use IoT in the near future? Why?

8. Artificial intelligence is a reality nowadays, in insurance business AI have the potential to boost various areas like underwriting, sale and distribution and policies and claims. Are you using Ai technology in your company? Why?

9. Blockchain technology can transform the insurance business and have also several types of use in the insurance sector. Your company is already using Blockchain?

10. Is Cloud computing already a reality in your company?

11. Insurtechs, a new reality in the insurance business. What your opinion about it? What improvements you think that could bring to the sector? Are you working already with insurtechs?

12. Do you feel there is a gap between the current technology that were been talking in this interview and the one that is used in your company? Your opinion about this gap is the main reason of this study, do you think other insurance companies share the same scenario?

13. The insurance sector is a very conservative sector, much like what happens with the banking sector. Do you think this is a relevant factor for the existence of this technological gap? Are

technologies only implemented when they are sufficiently mature and tested in other sectors? Or it is a question of costs/ priorities of insurance companies? what is your opinion?

a. How do you do in your company? You implement the latest trends on the marked or wait a little bit for see some application results and possible errors as well?

Appendix II

Interviews

Company 1

Interviewee: Speaker1, CIO of a Portuguese Insurance Company

Interviewer: Tiago Costa

Location of Interview: Microsoft Teams, 06/10/2021

Interviewer: Ok, [Speaker1], I will make the interview in English. The interview is planned to take about 20 to 25 minutes. The anonymity interviewer will be protected. The name, the company will not appear on this study. There are no right or wrong questions. I'm looking just for professional experience and opinions. I will start the first interview about the insurance company and sector in what range do you include your insurance company? Small, medium, or large insurance company? Small insurance company is about 1 to 100 employees, a medium 101 to 999 employees and the large more than 1000 employees.

Speaker1: It will be in the middle because we are about roughly 550 employees.

Interviewer: Ok, a medium company. How do you consider your company in the terms of technology and innovative, a more innovative company or a more conservative company?

Speaker1: Unfortunately, more conservative company.

Interviewer: Ok, and what's the main reason for that?

Speaker1: The main reason is the technical depth because it is a company about 35 years old and we have a legacy that is a huge, extremely huge, and very difficult to manage. Specifically, when we need to transform, so perform while transform is harder. If the legacy is pretty old.

Interviewer: Ok. How do you see the insurance sector nowadays, in your opinion, did insurance industry have to reinvent itself to keep up the customer demands, new type of customers, with more open mind, technology driven?

Speaker1: Yes, huge. The insurance vertical is a financial vertical that need to take advantage of new technology like predictive analytics, like, how can we say, IoT like areas like the artificial intelligence, because more and more we need be more close to the customers and more close to the costumers means to have a better solution for a customer. It means by these that a solution that should not be equal to everyone should be mapped for the customer needs and

customer needs only should be taken into consideration because doing the same thing to everybody it's not the best idea and we need to do differently, we need to use the technology that we have at our disposal to create this openness or not openness with proximity to the customer as a way that they may understand that, OK, I am unique to the customer, sorry to the to the insurance company. That's why I believe that we need to change our processes, our way of doing, reinvent our technology, our core as a way to guarantee that we do everything that we can using the state of the art technologies that we have that we have at our disposal because we have that kind of technology, but unfortunately, being able to access this kind of technology, it is not enough because if we are not able to transform ourselves by the use, the best use of this technology, it's nothing.

Interviewer: Ok. I will now make questions more about the technology in the insurance companies. What do you think about technological advance that has been felt in the last decade, how technological advance made itself felt in your company?

Speaker1: The last decade, OK, I am at [company name] less than five years, so it's how can I say, I initiate a journey to transform the company. And once again, because the legacy, it's very heavy, the depth, the technological depth, it is huge, that's why I cannot speed up as far as we would like. Sometimes I can give that example to change the wheel of a car while is in movement. It's very difficult. It is physical, but it is extremely difficult.

Interviewer: Ok. And what's your opinion about the new technological trends that exist nowadays in the market, for example, big data, AI, blockchain, IoT, cloud computing? Are you using or plan to implement some of this technology in the future? Don’t need to be a very long answer, because I will make questions about this technology in the next few questions.

Speaker1: Okay. By the way, I am already taking care of some of those technologies, like, for example, the artificial intelligence and predictive analytics. The rest not yet is in the roadmap.

Interviewer: According to these last questions, I will ask some individual questions about these technologies to know your opinion about it and to see the reality of your company. Ok. These technologies that I will talk now are the ones that are being focused on this study. Exists several possible applications for big data in insurance sector, for example, identify possible targets, make a proper analysis of consumer behaviors or to promote sales of new products like telematics insurance, for example. Are you using or planning to use big data in the near future?

Speaker1: We are using it in a very early stage in the first as a way to predict the eventual customer churn. Ok, so it is a very early stage. We are doing baby steps in this regarding. So, it means that there is a lot of things we have to do in the future.

Interviewer: Ok and exists, several possible applications of IoT in the insurance sector, for example, use data from sensors to present customers with customizable solutions. How are you using or plan to use IoT in the future?

Speaker1: Not yet using it, but we plan to use it in the future. For example, device in the cars, device in the wearables as a way to best understand customer behavior. But not now.

Interviewer: Not at the moment. Ok, and about artificial intelligence. Artificial intelligence is a reality nowadays. In the insurance business AI have the potential to boost various areas like underwriting, sales and distribution policy and claims. Are you using AI on your company? Why?

Speaker1: Yes, starting to be using AI, but in a very early stage once again, specifically as a way to do predictive analytics to detect the eventual journey in the customer side.

Interviewer: Ok. And about blockchain technology, for example, blockchain can transform the insurance business and have also several types of use in the insurance sector. Your company is already using Blockchain?

Speaker1: Yeah, for sure we will be using in the future, specifically, when we start to do the micropayments, but not now, and it is not yet in the roadmap for the near future, but for the medium large it will, for sure.

Interviewer: And smart contracts, for example, have a lot of potential for the insurance companies. What do you think that is the biggest impediments to not using or not have implemented this solution already?

Speaker1: Because it's impossible to do everything. When we start from a company that does have a legacy system based in the previous century, it’s impossible to accelerate everything at the same time. So, let's transform by having sure that the basic is there by creating a what regarding this good big data platform because without a big data platform, it is impossible to give those kinds of steps.

Interviewer: Ok, and is cloud computing already a reality in your company?

Speaker1: Oh yeah. When I arrived to the company cloud computing, it had a very low usage, but now have a very high usage, specifically every project that I start, a TCO always must be done as a way to understand what will be the best for the company, inside or cloud, so it depends, sometimes it will be in the cloud, other times it is, for example, the last one the TCO clearly point to on premise project.

Interviewer: Ok.

Speaker1: So, it depends on the TCO.

Interviewer: And about insurtech's, they are a new reality in the insurance business. What's your opinion about it? What improvement you think they could bring to the sector?

Speaker1: Oh, an insurtech it's a good way to let the companies that are using old processes and old technology to speed up because if we are not able to speed up, it means that we are not able to provide the best solutions at the best price for the customer. So, the insurtech's are very welcome because they change our status quo, they change our way to perceive what customers really need, and we should adapt to the customer need. Unfortunately, these vertical, it is very traditional, so it is very block size like we say, and the insurtech's just changed this way of doing and this way of thinking. That's why bigger companies are acquiring Insurtech's.

Interviewer: And you are already working with some Insurtech's? Or planning to work on the future?

Speaker1: Ok. Planning to work in the future? Yes, because what we are doing right now, it's not needed the Insurtech's power let we say, because we know what we are doing. For now, it's creating the foundations as a way to do the needed business in the future for acquiring or doing business with Insurtech's.

Interviewer: And do you feel there is a gap between the current technology that we've been talking about in this interview and the one that is been using in your company? Your opinion about this gap is the main reason of this study. Do you think other insurance companies share the same scenario?

Speaker1: As far as I can understand yes, even in the big companies, because, once again, the insurance vertical is a vertical very traditional let we say. So, there is a lot of old technology that it is hard to fix as a way to speed up for the new trends. That's why some companies are doing some kind of, how can we say, lab areas as a way to try and also invest in the fintech areas as the way to start a side-by-side company and with these, speed up the usage of the new technologies. But the problem is that the mainstream, let me say, it's hard to do it because there are a lot of process based on old methods that are very hard to change, very hard to change

Interviewer: Ok, and like we said before, the insurance sector is a very conservative sector, much like what happened with the banking sector. Do you think this is a relevant factor for the existence of this technological gap? Are technologies only implemented when they are sufficiently mature and tested in the sector, or it's a question of costs and priorities of the insurance companies?

Speaker1: It's the second, the cost priority in an insurance company, because we do know that we need to change, but unfortunately, the pace of change it is not as strong as it should be because we need to perform while transforming, Ok, that's why only those that can embrace this change quickly it will be the ones that will have more success because if we are not able to speed up, we will die.

Interviewer: This last one you already answered me during the interview, how do you do in your company? You implement the latest trends on the market, or you wait a little bit to see the results and the applicability of this technology in other companies?

Speaker1: No, No, Ok. Unfortunately, we are not speeding up as fast as we like, it is not by that motive, ok, because we know that we have to be bold, to try new ways of doing technology, ok? As I said, we are not speeding up this as fast as we could is because our legacy. We are not a company that say, OK, let's wait until no, no, no, no, no. We are very bold, OK? We are very bold. Let's try new approaches, but unfortunately, to try those new approaches, it's based on how fast we can go based on what we have, not based on… Ok, let's see what the others are doing. No, no. We are not afraid of what others are doing.

Interviewer: It's your own pace because you have history behind?

Speaker1: Yes, exactly. [Company name] holds a brand called it [Company Name], it's a direct insurance company, says it's a direct insured company it means that we are more flexibly to speed up whatever we need because as you know, a direct does not have the business partners in the middle. That's why we can speed up the change here. With business partners, it will be a little bit harder because we shall never forget that the business partners should always be considered specifically for a company that more than 80 percent is through partners.

Interviewer: Ok, And the interview, it's over. Thank you very much for your availability to participate in this study.

Company 2

Interviewee: Speaker2, CTO of a Portuguese Insurance Company

Interviewer: Tiago Costa

Location of Interview: Microsoft Teams, 23/12/2021.

Interviewer: The interviews are planning to take around 20 minutes, not more, sometimes less. The anonymity of the interviewer will be protected and there is no right or wrong questions in this study, I'm looking just for professional experience and opinions. Hum, now I will do questions about insurance company and sector. In what range do you include your insurance company, a small, medium or a large insurance company? A small insurance company have 1 to 100 employees, a medium has 101 to 999 employees and a large more than 1000 employees.

Speaker2: A Small one.

Interviewer: Ok. And how do you consider your company in terms of technology, an innovative or a more conservative company? And what's the main reason?

Speaker2: I think our is innovative.

Interviewer: How do you see the insurance sector nowadays, in your opinion, did the insurance industry have to reinvent itself to keep up the customer demands, for example, the new type of customers, the millennial ones with more open minds?

Speaker2: Yes, I think that the problem of the sector is very old fashioned, and all the products are always the same, and I think nowadays the people think differently. One thing like for example, you don't want to pay the whole insurance if you only going to use just a piece of that insurance, you want to do something more customized. I think in the future, the sector should adapt to the new customers.

Interviewer: Ok, I will do more questions now about the technology in the insurance companies. What do you think about the technological advance that was being felt in the last decade, how the technological advance made itself felt on your company?

Speaker2: I think from my point of view, the sector is low, there isn't a lot of the development of interest in this area, so I think that the sector is a little bit behind and I think more sectors related to that like assistance and everything is getting better because we have an amount of work that we try to automate and try to do it more productive and everything, but I think the insurance in general have low technological advance. In our case, the insurance part, I think, is low too, and in terms of assistance, I think is better because of that, because we are trying to automatize, and we are trying to use more technologies in our company to be better in terms of assistance.

Interviewer: Ok. What's your opinion about the new technological trends that exist nowadays in the market, for example, Big Data, A.I, blockchain, IoT, cloud computing? Are you using or plan to implement some of this technology in the future? You don't need to detail much the technology, because I will ask more detailed questions about this in the next few questions.

Speaker2: Ok. Well, to be honest, we don't have any plan to implement these technologies. The only thing that we talk about that, to talk about implement, it's about the business intelligence thing. All of these blockchains, and big data, and all these technologies, I think, are necessary, especially for big companies and I think it's something that we should take into account.

Interviewer: Ok. According to these last questions, now I will ask you individual questions about these technologies to know your opinion. Exists several possible applications of Big Data in the insurance companies, for example, identify possible targets, make analysis of customer behaviors or to promote the sales of new products like, for example, the telematics insurances. Are you using or plan to use big data in the near future?

Speaker2: In near future it's not in our roadmap, but in my opinion, it is something that we should take into account.

Interviewer: Ok, and why not? Why are not in your roadmap?

Speaker2: The point is like, this is the problem with us, but the point is like our insurance company is like an instrumental, so we use that because it's a support for our assistance company and we can't sell a wide range of products. We can only sell limited products because our customers are, uh, insurance companies as well. So, because of that, we think of investing money in that area, but it's very limited and we would have a super wide range of products and we don't have a lot of experience in that, so I think it's something that we have to build step by step.

Interviewer: Hum… and about IoT, exist several possible applications for IoT in the insurance sector, for example, use data from sensors to present customers some customizable solutions, like you said before, some tailor-made insurance. Are you using or plan to use IoT in the near future?

Speaker2: Yes, that's true. We are planning to use this kind of applications in the future, and this is more in the near future.

Interviewer: And about artificial intelligence. Artificial intelligence is a reality nowadays in the insurance business. AI have the potential to boost various areas like, for example, the underwriting, sales and distribution, the policy and claims. Are you using AI in your company at the moment? Why?

Speaker2: We are using AI, but not for insurance purposes. We are using A.I for assistance purposes, so that is the point. We are using that to improve our product productivity, we're not using that to get more customers because what I told you before, were not one end to end insurance company and we are more limited in this area, and we are exploring that. I think it's important to think about all these things that we are talking about, but to be honest, we are not at that point right now.

Interviewer: Ok. Uh, like you said before we talked about the blockchain technology that you are not using, but blockchain technology can transform the insurance business and have also several types of use in the insurance sector. Are you planning to use blockchain in the near future? Do you see any kind of use for it on the insurance sector?

Speaker2: Yeah, I think all the technology that we're talking about, all of them are complementary. I don't think that you are saying, things like you use that instead of this or use that, instead of that one. So, I think all of them complement each other and I think it's something that I agree with 100 percent that we should use things like that, especially to understand more the customer, because nowadays all the companies are oriented to the customers and not oriented to all other things, so if we plan to be modern, we have to be oriented to the customer. If we are oriented to the customer, we need to understand the customer and I think sometimes it's a problem with the gap, with the technology gap that we're talking about. The insurance companies, they are not oriented to the customer, they are with a standard and all of them are the same. I think they use this gap that we have now, that we need insurance for everything, and we are not evolving and that means that we are not oriented to the people, to the customers. I think all the things that you are talking about is to do what the companies do right now, or the successful company do right now, that is tied to understand more the customer. That is something that sometimes you think, OK, but this is a product that is a company, so the company is oriented to the customer, but it's not true, be oriented to the customer is to understand the customer, to try to offer better products to the customer and try to keep the customer. That is something that we think the insurance companies are not good at that.

So, we are not the part of create a membership with the customer and we have that relationship that is good and strong and then you are happy with your company and then you feel that they are fulfilling all the things that you need and things like that... I think nowadays is not like this at the insurance companies. It is my point of view, but even more is the point of view of the sector, that are trying to be orientated to the customer.

Other successful sectors are different and are more close to the customer and have more ways to connect to persons, they are better in social media, better in all these kind of things and I think all these things together, if we unite all of this, if you put together the information that you're talking about, the Big Data, the Blockchain, all these kind of things, it's about to understand more of the customer and I think that's real and that the insurance sector are not understanding 100 percent the customer.

Interviewer: Ok, so you think the insurance companies at the moment, are not so driven for the customers? It's like you do an insurance and OK, you have won the customers and you don't connect the customers anymore.

Speaker2: You don't understand the customers and the customer have changed and the products are still the same, so I think is something that we are not doing OK. This is my idealistic point of view.

Interviewer: Hum, and about Cloud Computing. Are you already using, it's a reality in your company?

Speaker2: Yeah, that is a reality.

Interviewer: Ok. It's all on the cloud now....

Speaker2: Everything is on the cloud, exactly...

Interviewer: And about Insurtech's, they are a new reality in the insurance business. What's your opinion about it? What improvements you think that could bring to the sector?

Speaker2: Can you be more specific? Give an example.

Interviewer: Ok. For example, very similar to the fintech's, uh, the new startups and products that are appearing on the market, for example, I don't know a name of an Insurtech, but I have seen in some Congress that, for example, use the artificial or artificial intelligence for scanning in the auto insurance. I have seen one of them that create an algorithm where the client take

photos of the damage car and you send to the insurance company instead waiting from the automotive expert to evaluate the damage. Normally these Insurtech's are working with insurance companies and sometimes are bought by insurance companies when they like the technology.

Speaker2: I think when we talk about insurance, we talk about to rely on something, so you want to be… you want to trust, you want to say: OK, I'm safe.

So, I think the balance is big but on the other hand we are talking about the gap. The customers are different, the initiatives are different, the way of communicating with people is completely different... So, I think the balance of those things I think that it will be the future, because from my point of view is like we have to connect to the customer, that we talk about before, like we have to connect to them and we have to understand them more than we do nowadays, but at the same time, we have to give them safety.

They must know that the product is safe, that they are safe. Insurance company it's not like every company on the internet, that you can join whatever because it's not about money or not always about money. It depends on the product and it's about to be safe. And I think that the perfect balance will be understand how to connect with the new customers and at the same time, give them safety.

Interviewer: And do you feel there is a gap between the current technology that we have been talking about in this interview and the one that is using it in your company?

Speaker2: In terms of what he have been talking about, the artificial intelligence, Big Data, Blockchain, all of these kind of things, yes. In terms of trying to understand the customer, I think that's the good part for us, we are closer to the customer because we are attending the customer, we are managing all the customer cases and I think with that, we are more closer to the costumer.

In terms of technology to understand and to create new products we are also limited, as I told you before, we cannot sell whatever we want, we have to sell a specific type of insurance because if not, we will have problems with our current customers, but I think in terms of being close to the the customer, we are OK, and in terms of having all these technologies to understand the best product for the customer, we are not that OK.

Interviewer: Ok. Your opinion about this gap is the main reason of this study. Do you think other insurance companies share the same scenario?

Speaker2: Yes, but from my point of view it's a general thing, this is happening to the whole sector. Obviously, maybe it's not always 100 percent or zero, but I think it's something that is affecting the sector, and not only this sector, it's affecting sectors like banking.

I think insurance and banking they are parallel businesses and I think it's happening that they are very resistant to change, they are trying to resist to change. and then it's always the same, that they are forgetting the customer. This is the main thing, now it's very modern to think about this, think like the customer, and then you create the idea around the customer because it's not you're not creating a product you are creating a relationship with a customer. I think this is what the modern companies do, or the modern successful companies do, and I think these sectors, banking, and insurance, don't do.

Interviewer: And the insurance sector, like we're talking, it's a very conservative sector, much like the banking sector. Do you think this is a relevant factor for the existence of this technological gap? Or are technologies implemented when they are sufficiently mature and tested in other sectors? Or, for example, it's a question of cost priorities of the insurance company? What's your opinion?

Speaker2: I think the problem with the insurance companies is that the bulk of the benefits or the profit that they get are from the normal insurance. And this product is always the same and you need that product because it's, sometimes it's compulsory. So I think this is the bulk, and then I think with that, sometimes it's like the lack of imagination to create a new ones because you are more stable and you have this market, you have your market share and you have something that you can control, something that you can compare, and all of the insurance companies are offering more or less the same in terms of the main product. I think that means that exists a lack of imagination to create a new market because they are very stable and they don't want to lose that, you know what I mean? It's like this is pushing them to be conservative.

Interviewer: And how do you do in your company? You implement the latest trends on the market or wait a little bit to see if the technology is mature enough

Speaker2: We are constantly checking. This is actually a part of our success here in [company name]. We are always checking, but we are not always implementing the latest technologies. We are always with the radar on, and we detect these technologies, I think quickly, but sometimes we cannot implement it straight away, so we need to think about it and understand the moment, but I think in that case, we are always open and aware about new technologies, and I think this is a strong point of our company.

Interviewer: Ok, perfect. The interviewee is ended, thank you very much for your help and participation in this study.

Company 3

Interviewee: Speaker3, CIO of a Spanish Insurance Company

Interviewer: Tiago Costa

Location of Interview: Microsoft Teams, 20/10/2021.

Interviewer: It started already. Hum, thank you one more time, [Speaker3]. This will be a short interview. The interviews are planned to take about 20 to 25 minutes. The anonymity of the interviewer will be protected. Company name and your name will not appear on the study. There is no right or wrong questions in this study, I'm just looking for professional opinions. I will start with the first questions, questions about the insurance company and the insurance sector.

Interviewer: In what range do you include your insurance company? A small, medium or large insurance company, a small one has 1 to 100 employees, a medium have 101 to 999 employees and a large more than 1000 employees.

Speaker3: We are median insurance company here in Spain. We have currently, uh, I don't remember, but around 500 employees in [company name] in Spain without the agents because agents are a big number, but the number of employees is around 500 people.

Interviewer: Ok. And how do you consider your company in terms of technology? An innovative or a more conservative company? And what's the main reason?

Speaker3: Ok. I think that we are an innovative company. The main reason I think it's one side we are involved in a huge transformation program where we are changing practically all the system that we have in our insurance company and the second reason to think that we are an

innovative company is that we have a small but important project or services where we are using well, let me say new technology.

Interviewer: Ok. And how do you see the insurance sector nowadays? In your opinion, did the insurance industry have to reinvent itself to keep up the customer demands?

Speaker3: Well, in general, I think it's in the DNA of our insurance business. Insurance business is more conservative, it's in the nature of our business, OK, to control all of the risk. In this sense we are conservative, but currently, I think that there is a huge tendency that all the companies are trying to renew the technology in their own companies.

The big companies are doing projects for 10 or more years ago, they invest a lot and now they are taking the profit of this investment, by other side I think at this moment, all the companies, big, medium, and small, all of them are doing a transformation. Well, I have a good relationship with many of the CIOs of insurance companies here in Spain, and I think that practically everybody, practically all of the companies are involved in a transformation program, bigger or small, but all of them are at this moment in a transformation situation.

Interviewer: And that's the generality.

Speaker3: Yeah, in Spain it's completely general, I think. I don't know nobody that are waiting.

Interviewer: They are not waiting for the others.

Speaker3: Yeah, it's true that in the insurance sector in Spain, at least for many years, there aren't any investment, any important investment and now many companies have to recover the lost time.

Interviewer: Here happened the same in Portugal. And what do you think about the technological advance that was being felt in the last decade, how technological advance made itself felt in your company?

Speaker3: The technological advance?

Interviewer: Yes, for example, how in the last 10 years your company evolved in terms of technology?

Speaker3: Ok. Well, the situation of [company name] here in Spain was, for one side, completely stop it, no investment in new technology. For example, our current core system, the policy management and policy and a claims management system, have more than 30 years old, it's

really old, and all our systems are in the same situation, and it was a no investment policy in general. Later, they decided to implement, in my opinion a not correct alignment or with a good strategy change, and five years ago, we started again and then we are changing practically all of our system, but not only, uh… the pure technological one's, is the approach to the system. We are doing things in order to give more power to the user, with more parameterizable tools, things like this.

Interviewer: Ok. And what's your opinion about the new technological trends that exist nowadays in the market like for example Big Data, IoT, A.I, blockchain? Are you using or plan to implement some of this technology in the future?

Speaker3: Well, I think in…I don't know if you know, the Gartner curve for new technologies, but you know, well, Gartner, for all the different type of technologies, he draw a curve where he says this is the expectation of a new technology, the go back to the reality and then the maturity of the technology.

I like this approach because it's true that at the beginning of many of the technologies there are, let me say, a lot of marketing, a lot of smoke around the technologies. One thing is what the consultants tell to the CEOs and to a lot of people that well… other thing is the reality. In that sense, I think that there are currently technologies that have a right to stay as for example cloud computing, I think the cloud is something that in 10 years nobody will be out of a cloud system. It's possible that a multicloud or something like this, but I'm sure that is going to be used by everybody, but there are new technologies like blockchain or things like these, that in my personal opinion is that it's not so clear the benefit of it.

Interviewer: Ok, they are not mature enough.

Speaker3: Yeah, because, in this market there are a lot of startups. If you have relationship with the startups, you talk with them, you say, wow, this is a good idea, I like it, but to pass from the idea to create the money is a huge and difficult step, and I think that this type of technology is something similar.

You hear about blockchain and said, wow, it's interesting and then you say, well, how I can make money with this or save money or improve my business, and then everybody gives you the two same examples and said, well, these don't give me an important advantage to put in front of my competence. This is my personal opinion related to blockchain, but for example, I said to you,

cloud, all the things related to serverless, all the things related to APIs, I think this is the future. Artificial intelligence is the future. There are a lot of marketing there, It's my opinion.

Interviewer: Now I will do some question about the news technologies. I will start now for the first one that is big data. There are several possible applications of big data in the insurance sector, for example, to identify possible targets and make a proper analysis of consumer behaviors or to promote sales of new products like telematic insurances. Are you using or planning to use the big data in the near future?

Speaker3: Yeah, I think that the big data at insurance sector is critical, well, it's not in my opinion, the statistic says that the management of the huge amount of data is the base of the insurance, is the way that you create or make a good risk assessment of your new customer, it's this type of statistic.

Then big data is from my point of view, one of the critical things in the future for the insurance company and yes, currently we are using big data. It's true that we are in this transformation process, we are changing the technologies that we use to do big data, but currently we have, for example, a huge data lake where we are introducing all the information of the company and all the information that we want to use.

Interviewer: Ok, and about IoT, exists several possible applications of IoT in insurance sector, for example, to extract data from sensors and use it to present customers with customizable solutions. Are you using or planning to use IoT in the near future?

Speaker3: Not at this moment, we don't have any real proof of concept. It is true that we have made some approach to some startup related to these types of technologies, but in the sector that we work, we work life, accidents, health, and household, and in this sector currently, there aren't a lot of use of these technologies.

My view is that at this moment is more a marketing thing that a real thing because the information that you take from it, well… yes, there are people that say: no, with your alarm I take all the information around your house… Yeah, but what is the difference or what is the gap that provide this technology to you? Very few things.

Other thing would be if you have for example, car insurance. I think in the car's insurance, it's other history.

I had worked in [Company name] and I participated in the IT strategic group at the world level and for example, in this sector, there are important things to use big data in combination with IoT in order to identify what is the correct price for the driver.

Interviewer: Ok. In health insurance, you don't see a market for it at the moment?

Speaker3: I think it's more marketing that other thing because at the end you need to have for example a watch, you know… to take information, and I think that at this moment in general, the customer doesn't like so much to offer personal health data to nobody. I think it's a bit difficult that you get this type of information from your customers.

Interviewer: More a problem of data protection.

Speaker3: Yeah, exactly. And I think that in the future, well… in the future no, at the present, GDPR in the European Union have a strong protected position to all things related to personal data.

Interviewer: Yeah, that's true, and the insurance market is a very regulated market.

Speaker3: Yes, it is. We have a personal data and at the same time, we are a financial institution with a strong control from all the regulators.

Interviewer: That's true. And about artificial intelligence, like we talk before, it's a reality nowadays. AI have the potential to boost various areas. For example, the underwriting, sale and distribution and policy and claims. Are you using AI at the moment on your company or planning to use? Why?

Speaker3: We are using with some startup companies, doing things related to chat bot. We are using these for different applications. We started in a simple thing to help our customer's and now we are using for all our internal use. I think that artificial intelligence is a reality in the future, but my opinion is that will be not as we see in the films or in the newspaper. I think it's going to be more, uh, more based on a statistic or in probabilistic analysis than other thing. Well, I don't believe… I think that the use of system that make self-learning… I think it's possible, well, I guess I am a bit old, but I started to work in the university with neural networks and things like this, many, many years ago when these technologies started.

I was in the university working on these type of things and from my point of view, it's a technology not easy to use when you have a customer in front of you, I will try to explain, if I have a perfect neural network that analyze the data and decide that you are going to pay 50

percent more of your health insurance next year, what is going to be your opinion as a customer? You go to a helpdesk and ask why you are going to raise the price of my insurance… And the answer to say is: was the robot. This is not the correct answer. I think that we are going to use it, I think it's a technology that in the future It's going to be a reality, but not all the things that we heard from the sales people.

Interviewer: Not to replace a person, more like a complement, like for example, the chat bot.

Speaker3: Exactly, exactly. And there are other point, I think that an insurance company is not like a bank, Ok, in a bank the interaction between the customer and the insurance, occurs many times in the year, but in insurance, your relationship with the insurance company is when you have a problem, a claim or when you have the renew of your contract, is the only two times.

There are sectors like health where you have many interaction but others like life or household or I don't know… or car insurance, your relationship with your customer is in a few moments, and in these few moments if you don't have a personal interaction with your customers and you don't take care of them and you put a machine in order to save money, I think it's a mistake. It's my personal opinion.

Interviewer: It's not like a traditional market, for example, like the telco market, when you need to call customers with promotions or something like this. The insurance, it's a sector that almost don't communicate with the customer, there is not a relationship.

Speaker3: Yeah, I agree with you, and I think that there are other points in telco. Sorry, it's possible if someone from telco listen to me will kill me. What is the difference between Telefonica or Orange or Vodafone? The price.

It's the only the only difference. Then they have to take the last cent of euro in every interaction, but it's not the situation of insurance, in insurance you can provide more service to your customer, give a differentiation in your service to the customer. The customer will pay for other things. But it is my opinion, Ok… it possible, I don't know, probably in [insurance company name] for example. In Spain, they don't try to be the cheaper, they try to be the best service, and they have the size to fight in the area of the price. Companies like us, like [Company name], we don't have the size to compete in price with other companies. Okay... Well, this is not technology...

Interviewer: Yes, this is more a little bit about the market and how the market works.

Speaker3: Because my opinion is that the technology exists to provide service to insurance. I said many times, I am not a technological person, I am an insurance technological person because my knowledge is insurance and technology, not technology.

Interviewer: And about blockchain, we talk about blockchain before. Blockchain technology can transform the insurance business and have also several types of use in the insurance sector. There are any applications in blockchain or is your company using it? I think not because of your previous answer.

Speaker3: We are not using at this moment, we have tried to do something, but we don't find something useful for it.

Interviewer: And For example, the smart contracts? You don't see blockchain entering in the insurance market, for example, in the smart contract?

Speaker3: Well, it's so difficult. I don't know in the Portuguese market. I think that in the Spanish market is so difficult to make your customer to understand clearly what is a smart contract. They have contract with a personal interaction, if you make everything by digital interaction, it's possible, but I think that will be necessary one more generation. Currently I think it's so difficult, the people are not prepared for this type of technologies.

Interviewer: Probably will be more common on the millenniums.

Speaker3: Yeah, my son, my daughter, yeah… They only use the computer, they don't want to talk with people. This is possible for them? Yes, in 10, 15 years, but I think at this moment, it's a bit early.

Interviewer: Ok, the next technology is one that you talk it already, and it's one that I notice that is used by a lot of companies, that is the cloud computing. Cloud computing is already a reality on your company. Are you using it?

Speaker3: Yeah, we are changing our core system and it's deployed in Amazon. We are creating a new data lake and it's deployed and created using Amazon tools. We are doing a new frontend for our agents and customers, and we are using serverless and API management technologies and everything new that we do it's all in the cloud, everything, Azure or Amazon, but it's in cloud. I think it's the infrastructure cost is so high if you try to have everything on premise, it's so high. And the flexibility... Is through that the cost, in my opinion, is not the first, uh, the first reason to cloud because the cost is more or less the same. You don't achieve a huge advantage. The

advantage comes from the flexibility, high-cost control, control better your infrastructure, control better your costs and all these type of things, for example, the data recovery plans of all these type of things.

Interviewer: Yes, and you can raise the machine if the number of customers, uh, increase, you can raise the machine like this [snap of fingers].

Speaker3: Exactly, you grow in the horizontal, you have a minimum machine and there is growing in parallel. And yeah, for example, for IT, the flexibility is one of the huge advantage. We have the typical discussion between development and infrastructure people. No is your program is not well done or, no is your machine that it's so small and it's not good, and in Amazon, you don't have this discussion because to put a machine the double or third times, or ten times, it's done only with three clicks in the mouse. It's so easy to create a huge machine for several hours and eliminate this type of discussion. This flexibility that provides you the cloud, it's for IT department, a huge advantage.

Interviewer: And about Insurtechs? Insurtechs are a new reality in the insurance business. What your opinion about it? What improvements you think that could bring to the sector?

Speaker3: I think they are necessarily. Two reasons mainly, one is because there are people very smart outside with good ideas and then create things really good, and the other is that we comment before, we are a market completely regulated for all the sides, internally, externally, all the sides.

Then, the speed that we have in our IT department, it's impossible to be similar to a startup. You work in an insurance company, and you know the internal procedures, ask for a server, to start a project... But at the end, all these things are internal control that we have as a regulated company. It's easier to take others to develop the product and you buy, because in this in these things, you don't need all these types of controls.

Interviewer: You are already working with some Insurtech's?

Speaker3: Yes, we have for health insurance. We are using Insurtechs for different things, for tele-assistance, to have the doctor at the other side of the computer, things like this.

We are also using for the chatbot, we are using small companies that help us in this type of things. Yes, we're having different things, we don't have, how they call…we don't have a place where we create new insurtech. We look to the market and take the best things for us.

Interviewer: I know what you're trying to say, you don't have for example a campus where you develop, instead you contract Insurtech's to work with your company.

Speaker3: Exactly.

Interviewer: Sometimes, at least here in Portugal, big companies buy the insurtech and the insurtech became a part of the insurance company.

Speaker3: Yeah. If you see that they have a good idea and this can be great business, why not?

Interviewer: Now I let the technology aside, the part of individual questions about each one, and I have only a few more questions. Do you feel there is a gap between the current technology that we are been talking in this interview and the one that he is using in your company? Your opinion about this gap is the main reason of this study. Do you think the other insurance companies share the same scenario?

Speaker3: I don't know if I understand correctly the question, sorry, your question is about the gap between these technologies that we are talking about and our current situation, isn't it?

Interviewer: If you feel that there is a gap between the technology that we talking about in this study and the one that you are really using in your company?

Speaker3: Well, if you see, we are using many of these new technologies that we have talked. We are in a transformation program, and we started five years ago, and our decision was a bit risky, but I think it's the correct one.

If we are going to create something for the next 10, 15, 20 years, we have to start in the current top or more modern technology, because in other way you burn all in this sense, then we are using really new technologies.

Everything new is in the cloud, we are using, uh… we are not using servers in the cloud, we are using the Dockers and this type of technologies. Everything that we do, it's using APIs, then our gap is between our legacy and the things that we are doing new and all this type of thing, and this travel is really complex.

We are suffering a lot because it's not easy to move the company, it's not easy to move your colleagues or your users to these new technologies. The second thing is that all these new technologies are really nice, but they are immature, they are green at this moment… they are not mature technologies. The level of confidence that you need in the financial sector, he's not

100 percent achieved in these new technologies. Sometimes you find things that say, well it is not logical, in the legacies in your own premise many years ago this as already been surpassed, and in these new technologies, in the cloud or in the artificial intelligence, there are things that need some time.

Interviewer: And the insurance sector is a very conservative sector, very much like happens with the banking sector. Do you think that is a relevant factor for the existence of this technological gap? Are technologies only implemented when they are sufficiently mature and tested in other sectors? Or it is a question of costs and priorities of insurance companies? what is your opinion?

Speaker3: Well, I think there was a gap and a lack of investment in the last years and now try to recover this gap, in my opinion, is fault of the competence. The insurance sector it's a business with good margins, by the moment with good margin. Then you don't need the pressure, you don't feel the pressure to be in the top of the technology like we talked before about the Telco, in the Telco the competencies is cruel, it's very hard and they need to invest and to be all the time in the in the first line of the technology.

In the insurance sector in general, the margins are good, you don't feel this pressure for your competence. It's my opinion, but it's true this is changing, I think that with the digitalization of the society, of the country, makes these changes necessary. And I think that all the insurance companies know that if they don't change in the next ten years, they go, they will be out of the market in five more years

Interviewer: You were talking about the legacy system. Do you think the legacy are a big impediment to the new technologies? Or is more like the cost of the or the technology or is the technology itself that is not mature enough?

Speaker3: From my point of view, I think that is the biggest stopper to make a good transformation because user's, they don't think about… the users are not worried about if is a new technology or not. They are not worried about if with this technology it will be cheaper in 10 years or will be more flexible or will be... They don’t not care about this, they only want that have the same functionality that they have currently, and usually the legacy is come from 20 years ago, something like this. In 20 years, you have created a huge amount of functionality and then there is not easy to move your user from this situation to a new one.

Interviewer: Change people's minds this more difficult.

Speaker3: Oh, yeah, completely agree. I think the legacy is the bigger stopper, not related with technology but for the user. And I understand if you have a tool and this tool work correctly...

Interviewer: Why you want to change...

Speaker3: Exactly why you are going to change the software if now it's running correctly.

Interviewer: It's cost trade benefits...

Speaker3: Yeah, but the benefit will come in five years, or who knows, five years is eternity.

Interviewer: It's true. It's true. [Speaker3], thank you very much. I ended the questions. I will now stop the recording.

Company 4

Interviewee: Speaker4, Information Technology Director of a Spanish Insurance Company

Interviewer: Tiago Costa

Location of Interview: Microsoft Teams, 11/10/2021.

Interviewer: Ya está grabando, vale. ¿En que rango consideras tu empresa aseguradora, una empresa pequeña, media o grande, siendo que una pequeña va entre 1 a 100 empleados, una media de 101 a 999 y una grande más de 1000 empleados?

Speaker4: Grande.

Interviewer: Vale. ¿Cómo consideras tu compañía en términos de tecnología? ¿Una compañía más innovadora o una más más conservadora?

Speaker4: Pues a medias. Hay muchos temas en los que se innova y bueno, pues el core del negocio es más conservador.

Interviewer: ¿Cuál crees que es la principal razón, o el principal motivo?

Speaker4: Sobre todo la gestión del legacy. Hay muchos sistemas que son producto del crecimiento inorgánico de la empresa y al final esos sistemas, esa situación de legacy, se vincula mucho la capacidad de innovación de la compañía. Se innova, pero no al nivel que lo haría, por

ejemplo, una empresa que tiene todos sus cores en modelos o en tecnologías de última generación.

Interviewer: ¿Como ves, el sector asegurador en los días de hoy? ¿En tu opinión, la industria aseguradora tuve que se reinventar para acompañar los clientes? El nuevo tipo de clientes, más tecnológicos...

Speaker4: Desde el punto de vista de negocio, el sector asegurador cada vez tiene más... El producto, el seguro cada vez es más una comodidad, con lo cual el sector asegurador tiene que reinventarse como bien has dicho tú, para ofrecer servicios y soluciones diferentes a los clientes y adaptarse a cada tipología de cliente. Y eso tiene que ver con la personalización del servicio y con el acompañamiento, con las dos cosas.

Interviewer: Vale, voy a hacer ahora unas preguntas más acerca de la tecnología en los seguros vale. ¿Cuál es tu opinión al respecto de los avances tecnológicos que se hicieran sentir en la última década? ¿Cómo se hizo sentir en tu compañía?

Speaker4: Bueno, pues a ver, todo lo que tiene que ver con la explotación del dato de cliente es muy relevante porque afecta a muchos puntos de lo que es la propuesta de valor del seguro, desde el propio cálculo de rentabilidad de clientes hasta esta parte de personalización del servicio, pues la inteligencia artificial, el machine learning, todas estas tecnologías están ayudando y empujando la relación con los clientes hacia un mayor nivel de personalización.

Hay otras tecnologías más punteras como el mundo de IoT de donde se hacen, por así llamarlo, pilotos o experimentos asociados al recoger información del comportamiento de los usuarios o de los vehículos que conducen, que también están ayudando a mejorar el cálculo de siniestralidad, por ejemplo, de los clientes y así adaptar mejor el precio y el tipo de servicio a cada uno de ellos, pero son todavía muy incipientes. Es algo que todavía está pendiente de ver si finalmente se implanta como un modelo, también por la reticencia de los propios clientes a vincular la cobertura de un seguro a su comportamiento, y luego hay otras tecnologías, como el tema de blockchain que has comentado antes... Bueno, pues todavía no hay suficiente, por así decirlo, a nivel de madurez dentro de las compañías aseguradoras como para encontrar modelos de explotación viable de este tipo de tecnologías, pero es un poco, tenemos como diferentes grados de adopción.

Estamos muy vinculados a la curva de adopción tecnológica de Gartner en cada una de las tecnologías, pero bueno, el sector asegurador no es un sector puntero, pero es un sector que

poco a poco va adoptando estas nuevas tecnologías cuando alcanzan el nivel de madurez suficiente como para ser explotadas en un entorno de producción.

Interviewer: Y con respecto a estas tecnologías que estabas hablando, por ejemplo, manejar la data, el machine learning, la parte de blockchain... ¿Cuál es tu opinión acerca de la tecnología de punta que existe en los días de hoy? ¿Ya están utilizando o planean utilizar en el futuro alguna de estas tecnologías?

Speaker4: Por ejemplo, toda la parte de explotación del dato ya se está utilizando desde el punto de vista del modelo de Advanced Analytics, toda la parte de ayudar a los negocios a entender mejor a los clientes y desde el punto de vista de la optimización del dado, con algoritmos que calculan la mejor oferta disponible o la propensión a compra de los clientes, etcétera. Son modelos que ya están implantados y se están utilizando, otras tecnologías, como por ejemplo el caso de blockchain, que requiere de un de un compromiso, de más de una compañía para la explotación de este tipo de soluciones tecnológicas, pues están más en fase de piloto que en fase de productividad.

Interviewer: Vale, yo ahora voy a hacer un poquito cuestiones más acerca de cada una de ellas.

Interviewer: Existen varias aplicaciones posibles para Big Data en el sector asegurador, por ejemplo, identificar posibles targets de mercado o hacer un análisis a los comportamientos de los clientes, o incluso para promover las ventas y luego los productos como el del seguro telemático. ¿Ya están utilizando Big Data o prevén utilizar en el futuro?

Speaker4: Nosotros ya estamos utilizando soluciones de Big Data y de machine learning para todos esos casos de uso.

Interviewer: Vale, y existe también, como hablamos hace un rato, la parte de IoT, de los sensores y todo más. Existen muchas posibles aplicaciones también en el sector asegurador, por ejemplo, como bien habías hablado, utilizar los sensores para ofrecer a los clientes soluciones customizables. ¿Ya están utilizando IoT o prevén utilizar en el futuro?

Speaker4: Nosotros estamos utilizando IoT en algún proyecto o en algún producto piloto, específicamente en el ramo de automóviles y alguna prueba piloto también en el mundo de la salud, pero no para el cálculo de siniestralidad, sino para la personalización del servicio.

Interviewer: Y con respecto a la inteligencia artificial en el sector asegurador. La inteligencia artificial tiene un potencial enorme para mejorar muchas áreas como el área de siniestros, el

área de operaciones de ventas y distribución e de pólizas y reclamaciones. ¿Ya están utilizando esa tecnología en vuestra compañía?

Speaker4: Si, específicamente un caso de uso es el de atención al cliente, donde hay un bot de inteligencia artificial que es capaz de clasificar información que están demandando los clientes para presentarles diferentes respuestas sin necesidad de intervención humana. Ese es un caso de uso, por ejemplo.

Interviewer: Vale, y esto ya me habéis contestado. Pero al respecto de blockchain que habíamos hablado ahora mismo, hay también muchas posibilidades en el sector asegurador. ¿Al día de hoy ya están utilizando o están pensando utilizarlo?

Speaker4: Estamos pensando utilizarlo. Tenemos un pues una especie de piloto entre varias compañías, pero todavía no estamos en fase de producción con ese con esa tecnología.

Interviewer: Vale. ¿Y por qué crees que esta tecnología está tardando mucho en imponerse en el mercado a nivel de algo productivo?

Speaker4: Yo creo que hay una sobreestimación de las capacidades de esa tecnología, es decir, el número de casos de uso donde una tecnología de blockchain es útil es muy limitado ahora mismo, tal y como está diseñado y cuesta encontrar el caso de uso, y el caso de uso pasa por poner en común a varias compañías, porque no tiene sentido... No hemos encontrado un caso de uso en el que tenga sentido implantar una solución de blockchain, donde hay una empresa que centraliza las comunicaciones y el almacenamiento, etcétera, porque para eso no usas blockchain.

La ventaja de blockchain es el almacenamiento descentralizado, el tercero de confianza, etc. Y ahí para encontrar un caso de uso necesitas un acuerdo de varias compañías y ese tipo de acuerdos cuestan y luego a parte del nivel de madurez tecnológico de las soluciones de blockchain con tiempos todavía elevados, de acceso a la información y de actualización entre nodos, etcétera, hace que siempre sea preferible una solución más tradicional por temas de rendimiento. Pues ahí están esas dos variables, una se va a resolver con los avances tecnológicos, pues la llegada del 5G, que nos va a dar más velocidad y otra vendrá de la mano del mercado cuando esa necesidad sea patente y está encima de la mesa, en un sector tan comoditizado y tan concentrado, por así decirlo en cuanto a los grandes actores, pues esta tecnología acabará teniendo sentido más pronto que tarde.

Interviewer: Vale, y acerca de cloud computing, ¿cloud computing ya es una realidad en vuestra compañía?

Speaker4: Nosotros en la parte de salud digital, en la división de Salud Digital, somos una empresa cloud only. Esto quiere decir que todos nuestros sistemas están en la nube, y además trabajamos en un modelo multi cloud, con lo cual, pues nuestro nivel de madurez en ese proceso de cloudificacion es muy alto. La empresa matriz en este caso, pues su nivel de madurez es más bajo, pero también están trabajando ya con ciertos sistemas, principalmente las capas de relación con el cliente, con entornos multinube.

Interviewer: Vale, perfecto. Y con respecto a las Insurtech's, son una realidad nueva en el mercado asegurador. ¿Cuál es tu opinión acerca de las Insurtech's y que mejoramientos puede traer a este sector?

Speaker4: Pues mira, yo creo que son varias ventajas las que ofrecen. La primera de ellas es que son empresas que se centran en hacer una cosa y en hacerla bien, eso es un peso muy relevante, porque las empresas grandes, las empresas de grandes dimensiones, tienen múltiples líneas de negocio que necesitan de su atención y eso al final, el mantenimiento del core te termina un poco la capacidad de innovación, eso, por un lado, luego por otro lado está la agilidad, este tipo de empresas son muy rápidas, probando, testando y adaptándose al cliente y si las tienes como aliadas pues es muy relevante la capacidad de innovación que te pueden ofrecer, y el último es que precisamente ese es el punto en el que tienes que entender de una insurtech es que no es una amenaza para un negocio, sino que tienes que verla más como una aliada.

En general, todas las empresas, todas las startup, tienen el mismo problema a la hora de crecer y son las grandes inversiones en marketing a la hora de acceder al nuevo cliente. Eso es un problema que no está vinculado al sector, sino que requiere una gran inversión y las startups pues o no tienen el capital o no tienen los acuerdos.

Pues ahí la gran compañía tiene la ventaja de poder ofrecer ese porfolio de clientes en base a una relación donde los dos son partner, para que ese producto de insurtech esté colocado en el mercado de una forma eficiente y a un mercado target. Nosotros, por ejemplo, en Salud Digital, que trabajamos en un modelo de ecosistema, lo que hacemos es integrar, en este caso son healtech no son insurtech, dentro de la propuesta de valor, siempre conservando la propiedad del cliente y con una experiencia unificada de forma que tanto las empresas, las healthtech, son

capaces de acceder a un mercado al que no podrían acceder de otra forma y nosotros nos enriquecemos con las ventajas de su producto para hacer una propuesta de valor más completa.

Interviewer: ¿Y ya están trabajando con insurtech's al día de hoy?

Speaker4: Si nosotros trabajamos con insurtech's y específicamente con empresas de healtech, de salud digital.

Interviewer: Y estamos llegando al final, solo nos queda más dos preguntitas. ¿Tú crees que existe un gap tecnológico entre la tecnología que estuvimos hablando en esta entrevista y la tecnología de tu compañía? ¿Crees que las otras aseguradoras comparten el mismo escenario?

Speaker4: Pues es un poco lo que te comentaba al principio, existe un gap tecnológico importante. Creo que cualquier gran corporación debe aspirar a encontrar el valor en las nuevas tecnologías y que ese valor se refleje de cara a sus clientes y a su negocio, o sea que es una aspiración de toda la gran compañía el estar en la cresta de la ola tecnológica pero el problema está en los legacys, en los sistemas legacy.

Qué bueno, pues al final las grandes compañías tienen un negocio muy potente que necesita de un nivel de estabilidad que sólo consigues en un roadmap a largo plazo y la velocidad a la que avanza la tecnología en contraste con la necesidad de estabilidad que necesitan esos roadmap pues te lleva a que sea rara vez se cumple, rara vez se cubre, perdón, o sea, esa es un poco la situación que creo que se da en todas las compañías y que desde luego se da en la nuestra.

Interviewer: Y el sector asegurador es un sector muy conservador, similar lo que ocurre con el sector de la banca. ¿Tú crees que ese también puede ser un factor de relevancia para la existencia de este Gap tecnológico? ¿Crees que la tecnología solo es implementada cuando esta suficiente probada en otros sectores?

Speaker4: Si te vas a otros sectores que están mucho más amenazados por él, por los nuevos entrantes digitales, por ejemplo, eso empuja a que el nivel de adopción tecnológico sea mucho más alto en sectores como la banca o el seguro, donde, como bien por temas regulatorios o bien por temas de capitalización, es necesario el tener grandes inversiones, que dificulta la entrada de estos nuevos entrantes, pues es mucho más conservador desde el punto de vista de la estrategia tecnológica que en otros sectores, donde es que no es viable hacerlo

Interviewer: Si aquí no se si consideras también la parte de costes versus prioridades, que también es algo que pueda influir.

Speaker4: Pues fíjate que no creo que la banca o el sector asegurador tenga un problema de costes. Creo que es un tema más de conservar el negocio, de dar estabilidad a tu core que de no tener capacidad para para hacer esa inversión en modernización del stack tecnológico.

Interviewer: Es más de madurez del propio software y de la tecnología.

Speaker4: Eso es.

Interviewer: Solo se aplica ya cuando está suficientemente estable. Vosotros en vuestra compañía, ¿cómo lo hacen? ¿Implementan cuando sale en el mercado o cuando la tecnología está más estable?

Speaker4: Si, tenemos que esperar a que la solución este estable. Efectivamente.

Interviewer: Vale. La entrevista está hecha, te agradezco mucho la disponibilidad para participar en esta master thesis.

Company 5

Interviewee: Speaker5, Digital Transformation Director of a Spanish Insurance Company

Interviewer: Tiago Costa

Location of Interview: Microsoft Teams, 25/11/2021.

Interviewer: Ok, like I say, the interviews are planning to take about 20, 25 minutes. I sent you a consent form is the same one that I sent before, it has all the information of the master thesis but with the online firm provider because of the GDPR consent's.

Speaker5: Ok, you send that this morning. Ok, so I'm supposed to sign this and send it back, I guess, right?

Interviewer: Yes, no need to be now, you can sign after the interview. The anonymity of the interviewer will be protected. The names of the persons and the companies will not be shared and there is no right or wrong questions in this study, I'm looking just for professional experience and opinions.

Speaker5: Ok.

Interviewer: Ok, let's start the questions about insurance company and sector. In what range do you include your insurance company, a small medium or a large insurance company? A small It's around 1 to 100 employees, a medium 101 to 999 employees and a large more than 1000 employees.

Speaker5: A Large Insurance Company.

Interviewer: How do you consider your company in terms of technology. And innovative or more conservative company?

Speaker5: Innovative, I guess. Yeah, innovative.

Interviewer: And what's the main reason for that?

Speaker5: Technology has always been a part of the equation, with many innovations using technology, so the use of technology is not new for us. It's something we've been doing for many years now.

Interviewer: Ok, perfect. And how do you see the insurance sector nowadays, in your opinion, did the insurance industry have to reinvent itself to keep up with the customer demands, for example, the new type of customer, the millennium's, with more open mind?

Speaker5: You have to take into account that I normally talk about health insurance, and I am supposed to talking about the whole insurance sector. Ok, so that's important for me and talking about health insurance specifically. Yes, I do think that we have to reinvent ourselves not only because of millennials, centennial and whatever comes next, but also because I think that people are looking for different things in our product that they used to be looking for. So nowadays it's much different. So, we have to move from being a payer to be a carrier.

Interviewer: OK, I will now go to questions more about technology in the insurance companies.

Speaker5: Ok.

Interviewer: What do you think about the technological advance that was being felt in the last decade, how technological advance maybe made itself felt in your company?

Speaker5: The question specifically is asking what happened here, so in terms of technology?

Interviewer: It's more about the technological advance that we have in the last decades and how this advance make itself felt on your company.

Speaker5: Ok.

Interviewer: Who are you using the news technologies? Technological advance is making a part of your company, or you are advancing slow.

Speaker5: Oh, we have repeatedly used many of the technological advances of the last 10 years, namely we have gone mobile. No question about that. We have mobile, we're using the cloud, we are using artificial intelligence, machine learning and broadly those are the three that come to my mind immediately when I think about this, but probably there might be more. But at least these three we are using.

Interviewer: And I have questions about the specific technology. So probably we'll come more in mind when we talk about it.

Speaker5: Ok.

Interviewer: And what's your opinion about the new technological trends on the market, for example, big data, AI, IoT, cloud computing. Are you planning to implement some of this technology on the future?

Speaker5: Most of them are already implemented over here. So yes, definitely. And I plan to use them in the future because basically I'm using them in the present. So yes.

Interviewer: Perfect. Now, according to this last question, I will ask you some individual questions about this technology and the reality of these technologies in your company.

Speaker5: Ok.

Interviewer: Exist Several possible applications of big data in the insurance sector, for example, identify possible targets, make analysis of consumer behavior, promote sales and new products like, for example, the telematic insurances. Are you using or planning to use big data in the near future?

Speaker5: Yeah, we do. We use it now. We've used it now for several purposes, some of them related to customer acquisition, some of them relating to medical expense management, some of them related to customer experience, so yes, we have all kinds of approach with this technology.

Interviewer: So, you were using already.

Speaker5: Yeah.

Interviewer: And about IoT, exist many possible applications, like for example, retrieve data from sensors to make customizable solutions for the clients. Are you using or planning to use IoT in the future?

Speaker5: We do have a very established platform for IoT and specifically wearables. So, we do have health products connected with our customers, which are based on the data produced by wearables. So yes, it's a reality now.

Interviewer: It's already a reality nowadays in your company. And about artificial intelligence? AI have the potential to boost various areas in the insurance company, for example, underwriting, sales and distribution, policies and claims. Are you using AI nowadays? Why?

Speaker5: Yeah. We are using AI for several things, we are using some… some digital health solutions which are based on AI on one hand, then chatbots are quite massive over here also, so I would link that with the customer experience, but we do have a large number of chatbots and also, we are using artificial intelligence in terms of efficiency in some internal projects, to improve some processes. So, AI It's also being used, not as widespread as I would like to, but it's getting there.

Interviewer: Now I have another technology that is very talked nowadays, that is blockchain. Blockchain can transform insurance business. You have, for example, smart contracts and other applications where you can use it, you are using blockchain already in your company?

Speaker5: No, no.

Interviewer: And what's the main reason?

We have done a number of pilots, approximations, I would call proof of concepts with blockchain. For the time being, we have not had a clear vision on what the technology could add to our experience, so for the time being we never felt the need to use.

Interviewer: It's not a question of it's not mature enough, but you don't see any use case for this technology.

Speaker5: Not really. Not the time being, I'm not saying that we won't. But for the time being, we haven't seen any that have really… that has really… you know, excited our imaginations. So, it's not something that we're doing

Interviewer: You don’t see any applicability that increased any value to your company. And cloud computing. Cloud computing is already a reality in your company?

Speaker5: Yeah, yeah, it is. Yeah, yeah, we haven't quite a big number of applications which are already based basically on most of our new developments are cloud ready designed. Some of them might actually be deployed in the cloud and some others are still deployed on premise but with a cloud ready design. So I would say that, yes, this has been deployed here massively, I would say.

Interviewer: Ok, the other question I have, it's about insurtech's. Insurtech's are a new reality in the insurance business. What your opinion about it? What improvements you think that could bring to the sector?

Speaker5: Well, I think that they are very big and significant part of the change in the sector. I mean, there have been changing the market broadly. We have not really done anything with the insurtech yet. We keep an eye on that, of course, but I wouldn't say that we are doing things with insurtech yet, but it will probably come in the next few months.

Interviewer: It probably come in the future. And do you feel there is a gap between the current technology that that were talking about in this interview and the one that we that is being used in your company? This gap is the main the main reason of this study. Do you think other insurance companies share the same scenarios that your company? I saw in the interview that your company is a more technology driven company.

Speaker5: What if we talk about Spain? Probably. I think that, that we are ahead of our competitors in terms of technology usage I would say. Not, but not by much. It's not like we are technology driven and they are not, but yes, I think we are in a good advance. Then I think that the sector is divided now. There are a number of players which are making very clever use of technology nowadays and I think they are positioning themselves very, very well in the game, but there is also a big chunk of a sector that because of, you know, legacy and this kind of things are struggling a little bit to manage the technology change.

Interviewer: You think the legacy is the main reason why these companies don't evolve so much?

Speaker5: I don't even like the term legacy because most of what we call legacies is basically what feeds our mouths, so, I don't like to call it legacy.

But yes, I think that when I say and when I talk about legacy preservation is legacy mindset rather than…than…you know, the legacy systems themselves. It's like, you know, we have always been doing things this way and we don't feel like we need to change. I mean, that's a very legitimate opinion. I don't agree with that, but I think it's legitimate.

But I think that in the end will make you struggle when… I mean, there are many amazing things that technology is offering nowadays and if you are missing that, you're missing a big part of what is going to be happening next.

Interviewer: The difficulty is to change the people minds.

Speaker5: Yeah, and probably when I say and when I talk about legacy, I should say legacy mindset, that's probably the biggest issue.

Interviewer: Ok, I go to the last question. We are almost finishing. The insurance sector it's a very conservative sector.

Speaker5: Yes.

Much like, what happens with the banking sector, for example. Do you think this is a relevant factor for the existence of this technological gap? Are technology implemented when they are sufficiently mature and tested in other sectors. Or is the question of cost priorities of the insurance companies?

Speaker5: I think… I think that might be part of the reason, but probably to me, not the main reason. The main reason to me is that this is a sector which, as you say, is very conservative, but it's also very protected. I mean, regulation, protect. So, it's a sector in which it is very, very difficult to disrupt.

There are some other sectors which are not as heavily regulated as insurance. So, you know… I mean, I'm talking broadly about entertainment, so anybody can, you know, found a startup and then Netflix happens, and all entertain is done. Spotify happens and the whole entertainment sector is disrupted.

Insurance is not that easy because you need to have a lot of money in the beginning, because you need to have provisions and so on. So, there are many access barriers to the sector. In my opinion, this is like an endless cycle because it is so difficult to access the sector because you must have a lot of financial resources. The sector is like laying low and resting well assure that nobody is going to disrupt the sector, and so it's like… probably that's the reason for which

technology adoption within the sector happens slower that in some other sectors, because this is, you know, very fortified.

I don't know what this is in English, but it is a very close sector, very difficult to access. I think the sector might…might and probably will be disrupted, but not because a little startup scaling up, probably that's very, very unlikely.

Interviewer: Ok. More about the regulators, if there are something new, probably they will block it and will try to.

Speaker5: The sector is conservative for many reasons, one of them because the regulators are more conservative than the sector. So that takes you to that place fairly.

Interviewer: Yeah. Ok, thank you [Name], we have finished the interview.

Company 6

Interviewee: Speaker6, CTO of a Spanish Insurance Company

Interviewer: Tiago Costa

Location of Interview: Microsoft Teams, 16/09/2021.

Interviewer: This interview is planet to take around twenty to twenty-five minutes.

Speaker6: Ok.

Interviewer: The anonymity of the interviewer will be protected.

Speaker6: That's fine.

Interviewer: And there are no right or wrong questions. I'm looking just for professional experience and opinions.

Speaker6: Ok, that's fine.

Interviewer: Ok, I'm going to start first questions about the insurance company and the insurance sector. In what range do you include your insurance company, small, medium, or large insurance company? Small is about 1 to 100 employees, a medium company is 101 to 999 employees and large more than 1000 employees.

Speaker6: It's a large, it's a large company.

Interviewer: Ok. How do you consider your company in terms of technology? An innovative company or a more conservative company? And what are the main reason?

Speaker6: Yeah, ok, I would say it's a more conservative company, even though we're trying to change the approach to be a more innovative company. If you allow me, in the insurance business, at least here in Spain, the companies are very conservative, and they don't apply the latest technology to the degree that some other industries do and, in that sense, I think we need to Proof that the technology works before we can apply to our customers.

Interviewer: Ok, that's a fair reason, and I a lot of the questions will have the focus on that reason. How do you see the insurance sector nowadays, in your opinion, did insurance industry have to reinvent itself to keep up with customer demands, for example, the new type of customers the millennial ones with more open mind and technology driven?

Speaker6: Yeah, I would say so. I mean, the insurance sector in general, not only my company. We need to give to our customers and especially our young customers the means that they are looking for and therefore, even though it is a very regulated industry, I think this industry will change in the near future, given the fact that external competition may come into place and there will be more fintech companies with a lower cost of ownership in technology and therefore they will have less barriers to enter to compete against well-established companies like my company.

And the short answer will be yes, we need to change because younger people, the way that they interact with all the companies in different sectors and industry is through mobile, WhatsApp, you know… Facebook and more social media than traditional systems.

Interviewer: I agree with your opinion for sure, and I think the future will be about that, about the millennium people and how we can improve technology at the insurance's companies. I will focus now more this interview on questions about the technology in the insurance companies. What do you think about the technological advance that was being felt in the last decade? How technological advance can make itself felt in your company?

Speaker6: I, to be honest, I don't know where I got your question right or not, when you're saying technological advances, you refer to?

Interviewer: I refer to several types of technology, for example, big data, AI, blockchain, IoT.

Speaker6: So, what is the impact of the.

Interviewer: I think you are on mute.

Speaker6: I mute myself without knowing that. Yeah, ok, I think I got your question.

Well, I believe one of the drivers that the insurance company and especially at least in my company we are doing, is to use the data as the driving force in order to do the transformation of the company. What I mean is that in order to apply artificial intelligence, robotics you need to have a good governance of the data, good quality of data because all the decisions are going to be driven by the data.

I think in the past, it was more a process driven, company and technology, and now is more data driven technology, having the customer at the center of the universe. And not only you need to explore the data of within your own company, but also use the data that is available in the web, in the social media, and all that to understand better your client and to be able to offer a more competitive and more ad hoc service to what that customer is looking for.

Interviewer: And about the other technologies? when I talk the other technologies, I'm talking about AI, for example, blockchain, IoT, are you using or planning to implement some of this technology in the future?

Speaker6: Well, we are using artificial intelligence and machine learning for things like authorizations or all to validate all the, the expenses and receipts that we get from our hospitals and customers. As you know, probably 80 percent of the cost of the insurance company in the health sector is due to, you know…medical treatments, and things that we give to our customers. And therefore, we receive a huge amount of invoices that by using artificial intelligence, we can see whether those invoices are invoiced correctly, whether they are duplicates, whether they they're trying to build a service that is, uh… is with a fixed price agreement and uh… and things like that. So, in those areas, we're using artificial intelligence. About blockchain…Hum, I think we may start using it if we have some European agreement sort of.

Interviewer: Legislation, probably.

Speaker6: Yeah, legislation, exactly. That will allow you to use a private health insurance in any other European country and that will be invoiced directly to the insurance company, I mean, right now, even though you may have a health insurance, if you have to go to a hospital in France and you have an insurance in Spain, that insurance won't be recognized. So blockchain could be

a very good use to certify if that legislation is in place, that person can have a private insurance, health insurance, and that can be used, and that treatment is covered within his or her health insurance policy.

But internally in Spain, even though we were looking for some use cases, we didn't find any for blockchain. That might be some of them related to, you know… use blockchain to certify certain part of the process, you know… your I.D, or your bank account. Have a blockchain, uh… system, related to your bank or to the police to say, yes, I can guarantee that this person is whoever he says he is or she is, and the same with the current account, that bank certified that account number belongs to you. And we may get rid of SEPA if we have a blockchain technology to validate that, but apart from that, we don't see right now any use of blockchain in our sector, in the health insurance.

Interviewer: Ok, according to these last questions, I will ask some individual questions about this technology. Some of them, you just explained to me if you're using or not using by your previous answer. In those ones, you can give a short answer because I got the content from these previous answers.

Speaker6: Ok.

Interviewer: Exists several possible applications of big data in the insurance sector, for example, identify possible targets, make a proper analysis of consumer behavior or to promote sales of new products like telematics insurance. Are you using or planning to use big data in near future?

Speaker6: Well, we are using it. I mean, we're starting to use in it. We have a data lake in which we are loading all data of the company in order to use, you know, data analytics to explore that information and not only we have internal information, but also information from the market and to understand behavior, to understand how we should segment the clients and also to be proactive in the sense that you may have a customer that is swapping a premium Telecommunication company for cheaper one.

You would say, well, why is that related to the insurance company? Well, you know, if that person is moving from a premium company to a cheaper company, maybe it's because he's having some financial difficulties and probably you can do something in the insurance business to say… we may lower your premium for the next six months because of the pandemic or any other reason that we think that you may be having some financial troubles and therefore you can be more proactive. So yes, we're using data analytics to segment customers to understand

their behavior, to understand which way they want to communicate with us, whether they are more digital customer or paper-based customer or a… you know, a call center customer, whatever. We have a long way to go. Ok.

Interviewer: But already starting to use.

Speaker6: Yes.

Interviewer: Hum, now about IoT. Exist several possible applications for IoT in the insurance sector, for example, use data from big data and from sensors and apply to customer customizable solutions. Since your company is more a health insurance company probably don't use it, but I will ask you if you are planning to use IoT in the future if you see any applicability? If you are not already using it of course, and why?

Speaker6: I mean, in the insurance business per se, I mean, as an insurer, the answer is no, we're not using it, and probably we should start using it.

If you have information about your health and whether you do exercise, you know you walk 'x' amount of kilometers per day, your eating habits, and drinking habits, and we may not only advise you whether you need to improve those behaviors, but also they may have a potential impact on the premium that you pay for your health insurance because you know, if you have health in life, most probably you will use less the coverage of the insurance and in some other insurance business, to be precise, in the car insurance business, there are some companies that are already using that type of information from IoT in the way that you know the car velocity, how you drive your car, how you brake, how you accelerate, how you take the tolerance, etcetera, etcetera.

They are taking those behaviors and scoring the way that you drive and based on those scorings, your premium may go up or down. So, I believe there is a room for that, but we are not using it yet.

Interviewer: Ok. About artificial intelligence, you answer me before, but I will ask you the same. It's a reality nowadays? Is a more mature technology than probably the IoT. AI have the potential to boost various areas like, for example, underwriting, sales and distributions, policy and claims. Are you using AI in your company already?

Speaker6: Yes. Yes.

Interviewer: Why and where do you use it?

Speaker6: I mean, we are using it in the process to authorize the treatments, I mean, the way that we work is, you go to the doctor, a doctor will prescribe certain treatment, and depending on the type of treatment that you have, it will require the company to authorize that treatment or not.

That process of authorization, we validate whether you know it is covered within your policy, whether it wasn't excluded when we sold the product, whether you have done that treatment or that analysis or whatever in the past 'x' amount of weeks or months, whether you are up to date in your payments to insurance, etc.

All of that was a very manual process. Now we are using artificial intelligence to understand how did human being was behaving for the past three years doing that type of authorizations, and we managed to replicate with 99.97 percent precision that the machine will take exactly the same decision as the people will do.

Obviously, the mistake of taking, you know, 24 or 48 hours to answer it is an immediate answer, so we call the system, the system will apply the artificial intelligence and the neural read on whatever, and it will say, OK, it is a yes or no, and every three or four months… I mean, what we kept was an isolated group of certain associations and people that keep doing the same process manually so we can retrain the machine every three months to see and to adjust the behavior of the machine versus the human being and that not only speed up the process, but also managed to save a few thousand euros.

Other thing that we will start using it is once we put the CRM in place that we are looking to put a well-known CRM of the market. We will use Artificial intelligence to understand more the behavior of our people, by the way that they interact. Once we have all the information coming from different channels in a unique platform, every data would be in the CRM, then that will give us enough information to understand how people are relating with us and we are, you know, covering their needs, and by exploring that information, we can improve the way that we communicate with our clients in the channel that they prefer to, as a way of communication.

Interviewer: The CRM are at integration phase at the moment?

Speaker6: Yeah.

Interviewer: Hum, the next question is about blockchain. I already know the answer because you answer me that you are not using it.

Speaker6: We are not.

Interviewer: I got the answer why you are not using, because of the legislation, so we will skip this one and the other question that I have to you is about cloud computing. Cloud computing is already a reality in your company?

Speaker6: Say it again, which technology?

Interviewer: Cloud computing.

Speaker6: Oh, yeah, yeah. I mean, cloud computing is a reality since 2017 or so.

So, we're using cloud computing, and I will go to, I mean, all the things that we said about, you know, the data lake, artificial intelligence, all that is based on the cloud in different models' path, and that is our go to way of working.

We currently we have a main cloud provider that is Microsoft, but we also have a secondary, uh, cloud provider that is AWS and to a lesser extent, IBM Cloud.

Interviewer: Ok, and is cloud computing, hum… It's better to reformulate the question, do you still have physical computers or it's all on cloud at the moment?

Speaker6: I mean, we have. I would say about 40 percent will be a legacy CPD host-based systems that is managed by IBM and 60 percent will be cloud. Everything will be cloud in the future.

Obviously, all the Office 365, the Micro Computing is all cloud based, you know, with shared drivers like OneDrive and the use of Microsoft teams, I mean, that is all cloud based. Regarding to the basic operational systems, I would say 60 percent is cloud 40 percent still legacy.

Interviewer: And what about insurtech's, Insurtech's are a new reality in the insurance business. What's your opinion about it? What improvements you think that could bring to the sector?

Speaker6: Well, I mean, even though they didn't have the same strength as they had in the banking sector, that is a sector I know quite well… I mean, that type of technology, what will do is will shake the industry because they have a fresh approach, they don't have any legacy of history, they start from a blank canvas, OK? And so, it is easier to draw a picture when you have a blank canvas than when you have 40, 50 or 60 years of history of growing up company. Whether you like it or not, you get dependencies that will inhibit you from moving as fast as a new company.

Interviewer: It's better to start from zero.

Speaker6: Absolutely, absolutely. I mean, sometimes it's better to say, OK, let's forget about history and start from scratch. So, I think they will shake the industry, the insurance industry and the regulators will give them the opportunity to make this market more open. Now the barriers to enter into this market due to legislation is very high, and I believe the legislator will lower down the barriers for newcomers to come and to make this market more competitive. As they did in the banking sector.

Interviewer: Ok. And are you working already with insurtech's?

Speaker6: I mean, we are working with them in some proof of concepts for certain things that we believe could be good for the industry but if as I said, is this proof of concept, not in a real production environment.

Interviewer: And do you feel there is a gap between the current technology that we're being talking in this interview and the one that is being used in your company?

Speaker6: Well, there are gaps, yes.

Interviewer: Your opinion about this gap is the main reason of this study, to think other insurance companies share the same scenario?

Speaker6: Yeah, I think in general, yes. And I mean, let's face it, the market will push us to move faster and to have more open technology more... When I say open technology, I mean in the sense of being able to integrate among some other companies and allow some of the companies to use our microservices or APIs to obtain certain information that we may give them. Give them, when I say, give them is not necessarily for free, I mean, one thing that the insurance industry didn't realize yet is that there is a potential new business model based on the data and the technology that you can provide to the industry and some other industries that they can take advantage and charge a fee for the use of that information. I know it may sounds weird, but…

Interviewer: It's something that was not explored yet in the market.

Speaker6: Yes, but there is a huge potential, and that is a reality now in the banking industry, and in the telcos, and even in the electricity companies, so the insurance companies can give to the market good information, of course being compliance with GDPR and the rest of it. All the confidential information you cannot sell, you cannot give to anyone but the more public information, you can give a huge amount of value to that and sell it to someone else that may

need that information to create a new product or business that won't compete with you, it will be complementary to you and that's a win win situation. And that will happen. It's a matter of time.

Interviewer: It probably will happen in the future, and you will see insurance companies selling data to other competitive markets. Why not? That happened on other industry. The insurance sector is a very conservative sector, like you said before. Much like what happens with the banking industry, for example. Do you think this is a relevant factor for the existence of these technological gap? Are the technology only implemented when they are sufficiently mature and tested in other sectors or is just a question of costs and priorities of the insurance companies.

Speaker6: Well, I think it's a combination of both. It's a less risk taker approach in the insurance industry in general and the technology is seen as a cost and not as an investment to have better opportunities and you can see the difference in the companies that are more technology driven.

They create a bigger gap in insurance company, they create a bigger gap with their competitors because they can take more advantage of the data that they are processing, the data analytics, artificial intelligence, robotics and what have you to explore that they tend to create more value to the shareholders and the company.

Interviewer: And how do you do in your company? You implement the latest trends on the market, or you wait a little bit to see some applications, results, or possible errors as well of these technologies in other companies?

Speaker6: Due to the nature of the shareholders of our company, I mean, we are not in the front line. We want the industry and some other the companies to test and to demonstrate that that is good enough and then we will apply it. We, as technology freaks, we also try to, you know, to do innovative things, but sometimes…you know, the general managers of the company, they don't understand exactly what is the value of that, and they may do an abort mission, but that's very specific of my company.

Interviewer: Ok. The interview is over [name], thank you very much for these answers.

Company 7

Interviewee: Speaker7, Information Technology Director of a Portuguese Insurance Company

Interviewer: Tiago Costa

Location of Interview: Microsoft Teams, 09/12/2021.

Interviewer: Obrigado pela abertura para participar neste estudo [Speaker7], a entrevista demora cerca de 20 a 25 minutos, tudo que são dados pessoais vão ser anônimos, como nomes, companhias de seguros, a companhia onde trabalha, tudo isso não vai constar na tese. Não existe resposta certa ou resposta errada neste estudo, só estou à procura de opiniões profissionais. Ok então as primeiras perguntas vão ser sobre a área seguradora e sobre as companhias de seguro.

Interviewer: Como classifica a companhia de seguros onde trabalha em termos de dimensão, é uma companhia de seguros pequena, média ou grande? Sendo que uma pequena é de 1 a 100 empregados uma média é de 101 a 999 empregados e uma grande mais de 1.000 empregados

Speaker7: Nessa formatação é uma empresa média, eu acharia pequena, mas nessa formatação é média.

Interviewer: Como considera a sua companhia de seguros em termos de tecnologia uma companhia mais conservadora ou uma mais inovadora?

Speaker7: Inovadora.

Interviewer: Ok. Como vê o setor segurador nos dias de hoje? Na sua opinião acha que a indústria seguradora teve que se reinventar para acompanhar as exigências dos clientes? Os novos tipos de clientes com uma mente mais aberta mais virados para a tecnologia

Speaker7: É um fato, nós próprios temos feito isso e algumas das congéneres das nossas concorrentes estão a tentar fazer o mesmo que é fazer recurso da tecnologia para inovar na forma de distribuir e vender os nossos produtos.

Interviewer: Sim é verdade, e o setor segurador hoje em dia é bastante competitivo já não é como há uns anos. Vou agora fazer umas questões sobre tecnologia nas seguradoras. O que acha dos avanços tecnológicos que fizeram sentir na última década. Como é que esses avanços se fizeram sentir na sua companhia?

Speaker7: Tiveram mudanças significativas, desde a automatização de processos a robotização de alguns processos também e a eliminação de papel quase total da companhia. Eu não sei se eram exemplos que queria exatamente.

Interviewer: Era nesses termos que a pergunta foi feita

Speaker7: A subscrição online de toda a nossa produção. Esta ligada um pouco com a redução de papel, deixou de haver papel ou produção entrar por emails não é...

Interviewer: Sim, está uma companhia muito digitalizada por assim dizer

Speaker7: Sim fizemos uma transição para a digitalização bastante vincada.

Interviewer: E qual é a sua opinião sobre as novas tendências tecnológicas que existem no mercado. Por exemplo o Big Data, a Inteligência Artificial, Blockchain, IoT e Cloud Computing. Estão a utilizar algumas destas tecnologias ou pensam implementam no futuro?

Speaker7: A nível de big data temos um projeto em curso para trabalhar a informação em termos de Analytics e de geração de informação e gestão de informação agregada, em termos de IoT, não temos nada aplicado porque não se aplica tanto, nós somos uma empresa de serviços não temos materiais. A nível de blockchain neste momento eu acho que ainda não é o momento certo para aplicar à indústria seguradora essa tecnologia, poderá vir a ser num futuro, mas neste momento eu acho que ainda não há grandes pontos para se utilizar, noutras áreas como falou

Interviewer: Eu depois vou-lhe fazer umas perguntas individuais sobre cada uma dessas tecnologias. São as tecnologias que nós estamos a aprofundar neste estudo e por isso não precisa de entrar agora em muito detalhe, era uma pergunta mais a nível genérico. Eu vou agora entrar um pouco mais em detalhe em cada uma delas porque são as tecnologias que utilizamos por base na revisão bibliográfica e são efetivamente algumas das novas tendências do mercado nos últimos anos. Vou começar por big data, existe várias possibilidades de utilização do big data no setor segurador, como por exemplo identificar possíveis alvos e fazer uma análise dos consumos e dos comportamentos dos clientes ou promover as vendas de novos produtos como os seguros de telemática. Já estão a utilizar ou planeiam utilizar big data no futuro?

Speaker7: Sim, temos um projeto em curso. Não está terminado, mas já iniciamos um projeto bastante grande nessa área.

Interviewer: Ok, e há pouco também já me respondeu, mas volto a perguntar a nível de IoT. Existem várias possibilidades de aplicação de IoT no setor segurador, como por exemplo utilizar data de sensores para apresentar aos clientes soluções personalizadas. Já estão a utilizar ou planeiam utilizar IoT no futuro?

Speaker7: Não tem tanta aplicabilidade porque IoT é a Internet das Coisas e as nossas coisas aqui são seguros, não é ... Portanto...

Interviewer: Às vezes por exemplo fosse uma seguradora mais virada para a área da saúde provavelmente poderia fazer sentido ter sensores para monitorizar clientes ou algo assim.

Speaker7: Ainda não temos nada, já analisamos algumas possibilidades nesse sentido e não quer dizer que não venhamos a utilizar no futuro a través de wearables, mas para já não temos nada nesse sentido.

Interviewer: E no que diz respeito à inteligência artificial. Já é uma realidade nos dias de hoje e mesmo no setor segurador, a Inteligência Artificial tem potencial para promover várias áreas como a subscrição, a parte de vendas e distribuição e mesmo a área de apólices e reclamações. Já estão a utilizar inteligência artificial na vossa companhia?

Speaker7: Ainda não, temos de alguns estudos feitos nessa área, mas ainda não fizemos aplicação prática de nenhum projeto de inteligência artificial. Isso pode ter interesse mesmo no apoio ao cliente, no atendimento automático de algumas questões que possam ser devidamente automatizadas e, portanto, melhoria na nossa resposta ao cliente, mas temos alguns estudos nessa área, mas ainda não aplicamos.

Interviewer: Ainda não está muito desenvolvido na vossa companhia. E no que diz respeito à tecnologia Blockchain? A Blockchain tem potencial para transformar o negócio segurador e tem também algumas aplicabilidades possíveis. Já estão a utilizar a tecnologia Blockchain?

Speaker7: Ainda não, acredito que a Blockchain possa vir a ter utilidade no futuro, mas neste momento não temos nenhuma aplicação nesse sentido.

Interviewer: Sim, poderá ter alguma utilidade no futuro em termos dos Smart Contracts.

Speaker7: Sim por exemplo.

Interviewer: Para já ainda é uma tecnologia recente. E nível de cloud computing, já é uma realidade na vossa companhia?

Speaker7: Temos alguns serviços que são fornecidos por cloud computing. Paralelamente à grande parte também de sistemas que são locais, on premise. Temos já alguns serviços, algumas coisas que estão na cloud, alguns serviços e algumas funcionalidades.

Interviewer: Já começam também a migrar para a cloud.

Speaker7: Sim.

Interviewer: E a nível de Insurtech's? As Insurtechs são já uma realidade no setor segurador. Qual é a sua opinião sobre as Insurtech's e que melhorias é que acha que podem trazer ao setor segurador?

Speaker7: Acho que podem trazer bastantes melhorias porque no fundo esses tipos de empresas exploram tecnologias e ferramentas ligadas ao mercado segurador que depois podem ser adquiridas e em parceria ou de outra forma qualquer por seguradoras e integrar como mais-valia tecnológica para as nossas ofertas não é.

Interviewer: Já estão a trabalhar com alguma Insurtech ou pensam trabalhar no futuro?

Speaker7: Sim temos um caso ou outro, já estamos a trabalhar.

Interviewer: E qual é a sua opinião relativamente ao gap tecnológico que existe entre a tecnologia que temos estado a falar aqui nesta entrevista e em que é utilizada na sua companhia? Na sua opinião acha que outras seguradoras partilham o mesmo cenário do que a sua?

Speaker7: Eu tenho ideia de que nós em termos de exploração de novas tecnologias estamos um bocadinho ou temos estado um bocadinho na vanguarda das nossas congêneres. Não quer dizer que as nossas congéneres sejam paradas, mas se calhar temos estado um bocadinho na vanguarda. É evidente que isso não invalida que estejamos em constante evolução e tenhamos ainda muita coisa para fazer nos próximos anos não é… Ou seja, face ao que realmente se pretende ou o que será uma seguradora daqui a cinco dez anos pode ser já bastante diferente do que é atualmente. Por tanto aqui entre o que se pretende e o que realmente somos há sempre um gap. Embora posicionando-nos face às nossas congéneres nacionais eu acho que estávamos bastante bem em termos de aplicabilidade de novas tecnologias.

Interviewer: Ok, e o setor segurador... O setor segurador é um setor muito conservador, muito à semelhança do que acontece com o setor bancário. Acha que isso é um fator relevante para a existência deste GAP tecnológico? Acha que as tecnologias só se aplicam quando já estão maduras o suficiente ou testadas noutros setores? Ou é uma questão de custo prioridade das seguradoras. Qual é a sua opinião?

Speaker7: Eu acho que são mercados diferentes, enquanto o cliente de um banco exige uma utilização diária de um acesso às plataformas digitais, hoje em dia praticamente o cliente exige

isso, na seguradora o cliente não precisa de ir todos os dias à seguradora ver como é que estão os seus contratos e as suas apólices.

Portanto nós temos que fazer uma evolução tecnológica, e estamos a fazer e já fizemos grande parte dela, outra ainda está em evolução, mas as realidades de uma seguradora não são as mesmas de um banco. O banco teve outras necessidades e tem uma necessidade diária, o homebanking é uma necessidade diária na grande maioria dos clientes bancários de hoje em dia.

A seguradora online já existe e nós também a temos, mas não tem tantas funcionalidades como tem um banco online porque os produtos oferecidos por cada um destes setores são bastante diferenciados e não tem a necessidade de resposta imediata. Na subscrição sim, ou seja, quando se está a vender o seguro sim, tem que ser uma coisa online ou deverá ser uma coisa online. Na gestão de um contrato não, enquanto na gestão do dia a dia bancário há uma necessidade quase diária de utilização de ferramentas online, na gestão de uma apólice as pessoas não vão todos os dias olhar para a sua apólice. Percebe o que eu quero dizer e a diferença que há…

Interviewer: E a nível das outras tecnologias. Porque é que acha que muitas delas não se aplicam no setor segurador? Acha que é mais uma questão de custo?

Speaker7: Mas que tecnologias?

Interviewer: Por exemplo Inteligência artificial, Blockchain, o IoT, estas que temos vindo a falar aqui na entrevista.

Speaker7: Eu acho que IoT não tem tanta aplicabilidade, quando muito através de wearables e... Mas aí estamos a entrar um bocado também com questões de RGPD, de proteção de dados. As pessoas partilharem o seu dia a dia através de uma monitorização física para uma, neste caso para uma cloud e para uma base de dados de uma seguradora também levanta questões de confidencialidade que têm que ser resolvidas e têm que ser assimiladas pela sociedade e pelo jurídico também.

A nível de outro tipo de utilizações, blockchain por exemplo, neste momento não há grandes trabalhos feitos nessa área para seguradoras, portanto também poderá vir a ter, e eu acredito que venha a haver no futuro, mas neste momento não temos assim grande aplicabilidade e onde que possa ser utilizado.

Interviewer: E mesmo nas outras tecnologias, por exemplo, vocês já utilizam algumas, mas provavelmente vai haver seguradoras que ainda não estão a utilizar estas tecnologias. Acha que o maior impedimento prende-se nos custos das mesmas ou é porque ainda não estão suficientemente maduras e o setor é um bocado conservador?

Speaker7: Eu acho que isto é uma mudança gradual, não é? Existem seguradoras mais ágeis e que tendem a fazer esta mudança mais rápida, e há seguradoras que não são tão ágeis e que demorarão mais tempo. No nosso caso, nós temos uma equipa interna, paralelamente também existem trabalhos que fazemos fora não é… Nós temos uma equipa interna que também ajuda na inovação e na implementação de novas soluções e paralelamente como digo, também temos parcerias com Insurtech's e com software houses para fazer evoluções tecnológicas. Mas há outras seguradoras que estão mais atrasadas talvez e tenham mais dificuldades.

Interviewer: E diga-me uma coisa, como fazem na vossa companhia, costumam implementar as novas tendências do mercado a nível tecnológico ou aguardam que a tecnologia esteja madura, que seja testada noutros setores antes de implementar na vossa companhia ou assim que sai no mercado uma nova tecnologia tentam logo uma abordagem para implementá-la?

Speaker7: Muitas vezes é isso que acontece. Muitas vezes somos inovadores na implementação de tecnologias na área seguradora.

Interviewer: Ok, perfeito [Speaker7]. Chegamos ao fim do questionário. Agradeço a sua participação neste estudo.

Company 8

Interviewee: Speaker8, Head of IT of a Portuguese Insurance Company

Interviewer: Tiago Costa

Location of Interview: Microsoft Teams, 16/11/2021.

Interviewer: Ok, [Speaker8], The interview is planned to take about 20 to 25 minutes. The anonymity interviewer will be protected. There are no right or wrong questions. I'm looking just for professional experience and opinions. In what range do you include your insurance

company? Small, medium, or large insurance company? Small insurance company is about 1 to 100 employees, a medium 101 to 999 employees and the large more than 1000 employees.

Speaker8: It is a small insurance company.

Interviewer: Ok. And how do you consider your company in the terms of technology and innovation, a more innovative or a more conservative company? What's the main reason?

Speaker8: We consider ourselves a conservative company. Hum…the main reason is basically because we are a new and young insurance company in the market, so it is normal that the investment is still limited by some factors like the business priorities.

Interviewer: Ok. And how do you see the insurance sector nowadays, in your opinion, did insurance industry have to reinvent itself to keep up the customer demands, new type of customers, with more open mind, technology driven?

Speaker8: I think the insurance sector is in a phase of digital transformation. We are talking about an industry that has been very conservative and only very recently started to make use of new technologies and take advantage of new technological opportunities, and in my opinion, it is good that the evolve, because the customers demand it.

When we talk about new types of customers, young people, technology driven, we are facing a market that in 10, 20, 30 years from now will be the regular customer of the insurance industry, and we are talking about people that buy insurances by internet, that prefer to make a call or send an email to get the things done instead of going to a physical location.

Interviewer: That's true. I will now make questions about the technology in the insurance companies. What do you think about technological advance that has been felt in the last decade, how technological advance made itself felt in your company?

Speaker8: The last decade its complicated because were a new insurance company here in Portugal. It's true that we have a major branch that have more than 50 years of experience but here in Portugal were new. Personally, I think in the last decade the number of new technologies that appear in the market are huge, and we face ourselves in a digital transformation phase, not only on insurance market but in every market, hum… about [Company name], we have a technological roadmap and were trying to do the things step by step.

Interviewer: And what's your opinion about the new technological trends that exist nowadays in the market, technologies like for example, big data, AI, blockchain, IoT, cloud computing? Are you using or plan to implement some of this technology in the future?

Speaker8: I think all of this technology it has the possibility, if used well, to generate value to any business, I mean, probably not so sure about blockchain because it's now on the beginning but if you talk about cloud, or AI, yea… nowadays are a reality in some well know software's on the market. About here on [Company name], we have implemented some of them already, not all of them because like I said were still giving baby steps, but I think in 2 or 3 years the situation may change.

Interviewer: Ok, according to these last questions, I will ask some individual questions about these technologies to know your opinion about it and to see the reality of your company. Exists several possible applications for big data in insurance sector, for example, identify possible targets, make a proper analysis of consumer behaviors or to promote sales of new products like telematics insurance, for example. Are you using or planning to use big data in the near future?

Speaker8: We are using it already but in a very small way. We have a project that already started, and we have started to put the data in a data lake and now our goal is to use that date to make an analysis of our clients, but like I said, were still on the beginning of it and were not making use of the data, I expect that in the next few months we could jump to that part.

Interviewer: Ok, and about IoT, exists several possible applications of IoT in the insurance sector, for example, use data from sensors to present customers with customizable solutions. How are you using or plan to use IoT in the future?

Speaker8: Were not yet using IoT and to be honest, at the moment are not on our roadmap.

Interviewer: And why not?

Speaker8: We see opportunity for it, it's a technology that will add value for sure but in my opinion because of our youth, we have other priorities.

Interviewer: Ok, and about artificial intelligence. Artificial intelligence is a reality nowadays. In the insurance business AI have the potential to boost various areas like underwriting, sales and distribution policy and claims. Are you using AI on your company? Why?

Speaker8: No, were not using A.I, it's true that this year we had one approach with a major company that produce chatbots but for the same reason that IoT, we got other developments that we believe that could bring us more value. Maybe in the future we would start using it.

Interviewer: Ok, and about blockchain technology. Blockchain can transform the insurance business and have also several types of use in the insurance sector. Your company is already using Blockchain?

Speaker8: Like I said before, blockchain it's not in our roadmap for the next 3 or 4 years, have potential but from having potential to see something tangible there is a big difference. Maybe I'm wrong and a startup appears with some brilliant idea and with a correct applicability of the blockchain in the insurance industry, who knows…

Interviewer: And about smart contracts, have a lot of potential in the insurance sector. What do you think that is the biggest impediments to not using or not have implemented this solution already?

Speaker8: Like I said before, we can't do everything, even more as a new insurance company, probably this is a technology for be tested by a big insurance company with more resources.

Interviewer: Perfect, and about cloud computing. Is cloud computing already a reality in your company?

Speaker8: Yes, we got something like 80 percent of our technology in the cloud, and around 20 percent out of the cloud because are older systems that were inherited, but for example, for all new projects that we have, we put all on the cloud due to is agility and scalability.

Interviewer: Ok, and about insurtech's, they are a new reality in the insurance business. What's your opinion about insurtech's? What improvement you think they could bring to the sector?

Speaker8: In my personal opinion insurtech's have the possibility to disrupt the insurance sector, like many fintech's in the bank sector. Why? Because this kind of startups don't have the legacy, have few maintenance costs and in general brings new ideas and new ways of thinking to an old fashioned and conservative sector like the insurance sector. In my opinion the biggest problem could be the regulation problems because insurance sector is a very regulated sector.

Interviewer: And your company are already working with some Insurtech's? Or planning to work in the future?

Speaker8: The answer is no, were not working, but probably we will work in the next year or so, like I said, one of the projects that we evaluated in the A.I field was the chatbot and that chatbot was not to be developed inhouse but instead use a solution presented to us by an insurtech company, so yeah, probably we will work together in a near future.

Interviewer: It's a thing that is on your roadmap.

Speaker8: For sure.

Interviewer: Do you feel there is a gap between the current technology that we've been talking about in this interview and the one that is been using in your company? Your opinion about this gap is the main reason of this study. Do you think other insurance companies share the same scenario?

Speaker8: Yes, for sure, in my company we have clearly a gap between the technology that you talked and the one that were using, but that is not only because of the maturity of our company, I think that other companies share the same scenario because at the speed that the new technologies appear is almost impossible to have all the technologies implemented. And don't forget that most of the insurance companies are very old and change or implement some of this kind of technologies is complicated, first because it's not cheap and second because you need to change the mindset of the users, and for example for old users have a technology that could replace their work it's not an easy approach, I think you know what I mean to say.

Interviewer: Yes, fully understood. And like you said before, the insurance sector is a very conservative sector, much like what happened with the banking sector. Do you think this is a relevant factor for the existence of this technological gap? Are technologies only implemented when they are sufficiently mature and tested in the sector, or it's a question of costs and priorities of the insurance companies?

Speaker8: In my opinion is a mix of the two of them, fist because in a big insurance company where you got legacy's system and all the things working, the same product of the last 5 or 10 years, etc… it's difficult to insert a new disruptive technology without some prove of concept, without see that this technology have worked in other insurance company or inclusive in other sector of activity. By other side at least that's what happened with us since were a new company

and don’t have much legacy, we have other priorities for the business, we prefer for example to develop and to improve our Erp instead of a chatbot, and I’m not saying that the chatbot or a big blockchain project or a IoT project don’t have value… Of course, that have value but at this point of maturity we must start by the basics and to prepare the foundations to start this kind of projects in some years. No one start the home by the roof.

Interviewer: I think that I already know the answer for this one but how do you do in your company? You implement the latest trends on the market, or you wait a little bit to see the results and the applicability of this technology in other companies?

Speaker8: We clearly wait to see some applications and to see some proof of concept in other sector or other companies before investing in a technology.

Interviewer: Ok, And the interview, it's over. Thank you very much for your participation in this study.