Insurance, Smart Information Systems and Ethics

A Case Study

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Abstract: This report provides an overview of the current implementation of SIS in the insurance industry, also identifies the positive and negative aspects of using SIS in the insurance industry, including ethical issues which could arise while using SIS in this area. Two companies working in the industry of health insurance are analysed in this report: a German health insurance company (Organisation Y), and a business intelligence centre for healthcare insurers (Organisation X). Further specific ethical issues that arise when using SIS technologies in Organisation Y and Organisation X are critically evaluated. Finally, conclusions are drawn on the case study and areas for improvement are suggested.

Introduction

Thousands of claims, customer queries and large amounts of diverse data make the insurance industry a natural use case for smart information systems. A study from 2015 conducted by Tata Consultancy Services reported that the insurance sector in 2015 invested in artificial intelligence far more than other industries $124 million dollars, compared with an average by other industries of$95 million(consumer packaged goods), $94 mil-

lion (high tech), $90 million (telecommunications) (Tata Consultancy Services Ltd (TCS), 2017).

From customer service to claims processing, artificial intelligence is frequently cited as a disruptive force [1] in the insurance sector (Expert System, 2018).80-85% of insurance companies use smart information systems in 2018, from scanning in text from documents, to determining fraud, identifying risks or in preventative medicine. There are already many start-ups in the insurance sector (such as Shift Technology, Lemonade, Clover, ABIe) which use smart technologies in many areas including claims processing, fraud detection, risk management, marketing, etc. All the insurance companies surveyed plan to use smart technologies in their processes by 2020. (Tata Consultancy Services, 2017; Tata Consultancy Services Ltd (TCS), 2017; Dutt, 2018)

Moreover there is a consensus among industry experts that artificial intelligence is going to be a key driver in making insurance products "smarter" in the coming 2-3 years (Bharadwaj, 2018; Zagorin, 2018).Most insurance executives already understand that smart information systems will change the insurance industry – 79 percent of insurance executives believe that it will revolutionize the way insurers gain information and interact with their customers (Zagorin, 2018).Despite all the financial aspects and the range of possible issues raised, there is a great possibility that in the near future insurance companies will be required to adopt smart information systems or risk being outperformed by other insurance companies (Accenture, 2018).

This literature review and the background research drawn mostly on information from three studies conducted by private companies on the use of smart technologies in the insurance sector, in which the benefits of smart technologies were also highlighted:

Accenture (2018). *Future Workforce Survey – Insurance. Realizing the Full Value of AI*;

Deloitte Digital (2017). *From mystery to mastery: Unlocking the business value of Artificial Intelligence in the insurance industry*;

Tata Consultancy Services Ltd (TCS) (2017). Getting Smarter by the Sector: How 13 Global Industries Use Artificial Intelligence).

Section 1 of this report provides an overview of the current implementation of smart information systems in the insurance industry. In Section 2 the positive and negative aspects of using smart information systems in the insurance industry are identified, includ-

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[1] A force that does not rely on incremental changes but rather transforms a sector quickly.

ing ethical issues which could arise while using SIS in this area. In Sections 3 and 4, two companies working in the industry of health insurance are analysed: a German health insurance company (Organisation Y), and a business intelligence centre for healthcare insurers (Organisation X). Section 5 will critically evaluate specific ethical issues that arise when using SIS technologies in Organisation Y and Organisation X, also those questions regarding data governance when using smart information systems and the use of smart information systems in the insurance industry. Finally, Section 6 draws conclusions on the case study and suggests areas for improvement.

2. The Current Use of Smart Information Systems in Insurance

There are many *t*ypes of data that are analysed in insurance data analytics. These include personal information such as place of residence, (location, marital or family status, education, occupation, income level is also gathered (Foggan and Panagakos, 2018) other customer data (concerning their driving habits, etc.) (Bharadwaj, 2018; Sennaar, 2018), information gathered by Internet of Things (IoT) sensors (Foggan and Panagakos, 2018; Koh and Tan, 2018), for homes, sensors for vehicles (Bharadwaj, 2018; Zagorin, 2018) and vehicle maintenance history (Zagorin, 2018). Moreover healthcare data and records (Foggan and Panagakos, 2018; Koh and Tan, 2018, Zagorin, 2018) of insured persons (especially in health insurance) is collected and processed by insurance and related companies. Insurance claims history (Marr, 2018; Koh and Tan, 2018) and incident-related information (Marr, 2018) is checked to prevent fraud or to decide about premiums. It is also possible to collect open source content which is free to use without permission (Deloitte Digital, 2017) and social data (Bharadwaj, 2018; Deloitte Digital, 2017) related to insured persons. Information is collected from a variety of sources in insurance, such as social networks, including Facebook, LinkedIn, Instagram, etc. (Bharadwaj, 2018; Zagorin, 2018), and other public sources, e. g. registries, statistical data (Dutt, 2018). Companies' call logs (Deloitte Digital, 2017) are also often checked to analyse possible scenarios of claims management and monitor the quality of services.

All gathered data is mostly applied to those areas of the insurance industry which can help to improve services and bring profit, such as the ones in figure 1, below

Figure 1. Areas of data use in the insurance industry.

Customer service   Marketing and sales   Tracking of market trends

Insurance product development   Strategic planning and corporate development

These data also plays a vital role in helping insurance companies in various ways as shown in figure 2:

- **Improving claims management**
- **Improving claims tracking**
- **Identification of fraudulent behaviour**
- **Finance and accounting**
- **Decision making**

Figure 2. Benefits of using collected data in insurance industry.

Faster analysis of large volumes of data and faster and customized claims settlement is now possible in the insurance industry, as smart technologies enable self-service, help to improve customer experience and use on-demand insurance (Zagorin, 2018; Foggan and

Panagakos, 2018; Deloitte Digital, 2017; Bharadwaj, 2018). Personalized interactions with customers and personalized insurance product development are now also possible (Zagorin, 2018; Koh and Tan, 2018; Bharadwaj, 2018; Accenture, 2018). Moreover, smart information systems also help insurance companies to get the latest knowledge in real time and identify new business opportunities (Bharadwaj, 2018; Deloitte Digital, 2017).

There are also benefits to the staff of insurance companies, because smart information systems improve productivity (Accenture, 2018), reduce resources needed (which decrease costs) (Bharadwaj, 2018), make the job simpler (Accenture, 2018; Deloitte Digital, 2017), give assistance in making decisions (Accenture, 2018; Koh and Tan, 2018) and even expand career prospects for workers (Accenture, 2018).

Smart information systems are and will be very important for insurance companies in the future. In 2016 1.33 % of insurance companies had invested in artificial intelligence (Deloitte Digital, 2017).But by 2018,even 49% of insurance companies' CEOs are looking at strategic alliances or joint ventures with insurance technology (InsurTech) companies to speed up their alignment with the digital marketplace. The expectations are high.

For example a report on two surveys conducted by consultancy Accenture P.L.C. in 11 countries in 2017 states that artificial intelligence is likely to transform the world of business and, "when synthesized with human ingenuity across the enterprise, will achieve exponentially more" (Accenture, 2018). According to information from the report, more than half of insurance CEOs believe that artificial intelligence and Big Data will transform their workplace, improve productivity, result in a net gain in jobs within their company, make their jobs simpler and improve their work-life balance (Accenture, 2018). Another big survey conducted in 2015 states that 100% of insurance companies plan to use cognitive technologies by 2020. Representatives of the insurance industry claim to be so optimistic about using smart technologies in the insurance industry because, they say, when they started to use smart technologies they reduced their losses by being able to identify fraudulent claims more easily (Bharadwaj, 2018; Zagorin, 2018; Foggan and Panagakos, 2018; Koh and Tan, 2018; Deloitte Digital, 2017) and improve predictive modelling (Foggan and Panagakos, 2018; Koh and Tan, 2018). It is also claimed that the insurance industry is already one of the top industries, by average, investing in smart information systems (Tata Consultancy Services Ltd (TCS).

There are many start-ups in which smart information systems are being used in the insurance sector worldwide. Some examples of these start-ups are described below.

Shift Technology uses artificial intelligence called Force™ for fraudulent claims identification. Shift Technology's official website claims that Force™ has already analysed over 100 million claims for fraud. It claims that Force™ goes beyond simple risk provision by furnishing clear, actionable insights on which indicators make the claim suspect (Shift Technology, 2018).Shift Technology claims to have fused the analytic powers of machines with industry expertise to reproduce the deductive reasoning of claims handlers to create Luke™ for claims handling. From the filing of a claim to the policyholder payout, Shift says that Luke™ will help at every step, reducing end-to-end handling time from weeks to minutes (Shift Technology, 2018).

Lemonade is an app for claims management, available for Mac and Android. It currently offers renters, condo, and homeowners' insurance in some states in the USA. While using Lemonade, claims are handled by artificial intelligence and humans. If the claim is instantly approved, Lemonade's artificial intelligence pays in 3 seconds. Otherwise, AI hands over the claim to the team of humans to handle (Lemonade Insurance Company, 2018).

Clover is a health insurance start-up that leverages artificial intelligence by using data and software to build clinical profiles of people. This app uses AI to identify gaps in care and fills them with visits and a free choice of doctor to avoid costly hospital stays (Deloitte Digital, 2017). Clover's official website claims that it also helps to find the right doctor or pharmacy, gives assistance in scheduling appointments and arranging transportation, gives medications reminders, offers 24/7 doctor visits by phone, video or mobile app, and gives access to a mail order pharmacy with 100-day refills (Clover Health, 2018).

Fabric is a life assurance start-up that is using artificial intelligence to generate quotes for accidental death claims. It is claimed that simplified processes enable a life assurance sign-up process in just two minutes (Deloitte Digital, 2017).

GetSafe is an InsurTech start-up that uses artificial intelligence to advise customers on which insurance policies to purchase by collecting relevant information (Deloitte Digital, 2017). GetSafe also proactively engages with clients to offer preventive health measures by setting reminders when it is time to have routine care, or to set an appointment with a health specialist, etc. (Wiens, 2018).

Trov is an on-demand property insurance start-up in which an artificial intelligence chat-bot[2] handles claims. Insurance can start immediately via an app to cover damage, loss, and theft. When using this app, customers can swipe insurance on their valuables on or off. The customer also has the option to easily organise important information about the things they own and back this up to the cloud, so it is accessible when needed (Trov, Inc., 2018).

Progressive offers the Snapshot® program, which personalizes driver's insurance premium rate based on their actual driving, known as usage-based insurance. There are other pricing factors, and drivers' rates may increase with high-risk driving (Progressive Casualty Insurance Company, 2018). Progressive is also using artificial intelligence to identify business opportunities in the auto insurance space. The company is using machine learning to interpret driver data to track market trends and identify business opportunities (Bharadwaj, 2018).

All these mentioned examples show, that there are loads of various cognitive technologies that are already being used in the insurance area. It strongly supports the point that in the near future smart information systems in insurance industry will be a necessity to stay competitive and the use of smart technologies will rise. That is why there is a great need to identify possible ethical issues before smart information systems are used such high rates and work to find effective ways to address or prevent those issues.

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[2] A computer program or AI, which can conduct a conversation.

3. Ethical Issues of Using Smart Technologies in Insurance

Despite the claims to business and consumer benefits smart information systems raise a range of ethical issues. The foundation upon which smart information systems is built is the harvesting of personal information from millions of people, and the use of that information to make decisions affecting millions more, which entails new concerns and risks, and ultimately may increase the number of issues which insurers must address (Foggan and Panagakos, 2018).

Information on the use of smart information systems in the insurance industry and the ethical issues arising there from is sparse. Most research is done on implementing smart information systems in insurance, and the benefits of that, but little information is available about ethical issues when using smart technologies, or its possible drawbacks. The following sections describe ethical issues identified in the literature.

Moreover, there are already many recommendations developed to address ethical issues when using smart information systems in insurance, but the problem is that it is not known how to implement those recommendations into policy.
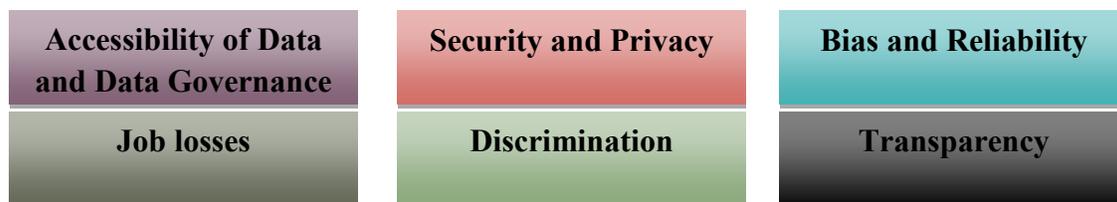
Accessibility of Data and Data Governance	Security and Privacy	Bias and Reliability
Job losses	Discrimination	Transparency

Figure 3. Ethical issues in the literature –smart information systems and insurance

3.1. Accessibility of Data and Data Governance

Insurance companies which are using smart information systems rely on data. Data make smart information systems a key competitive differentiator in the future of intelligent insurance (Deloitte Digital, 2017).

Within the organizational limits required by regulation and security, data is essential for insurance companies for training and machine learning (Dutt, 2018). Often there are problems in collecting data. The main limitation is accessibility of the data, because data often exists in different settings and systems, such as administrations, clinics, laboratories, registers, public and private companies (Koh and Tan, 2018).

There are many questions regarding data governance when using smart information systems and the use of smart technologies in the insurance industry currently lacks specific

regulations, except for the General Data Protection Regulation (GDPR) and other legal documents, which are being used in all industries across Europe. Moreover some additional questions need to be answered to clarify the situation. For example, when should a decision by an artificial intelligence be trusted? Is an AI to be used as a final decision maker or as an adviser to recommend certain decisions? How do you match outcomes to the decision made by artificial intelligence, and what is the feedback process to make changes to the artificial intelligence if errors are discovered? Only by creating a controlled environment for the use of artificial intelligence, is it possible for the technology to benefit as many people as possible and minimize its dangers (Dutt, 2018).

3.2. Security and Privacy

Adoption of smart information systems in the insurance sector raises many barriers and challenges. Concerns over security and privacy of sensitive information are increasing year by year because of several trends, such as wireless networking, health and personal information exchange, and cloud computing (Abouelmehdi et al., 2018).

When talking about security, authentication is very important. Authentication misunderstood as the act of establishing or confirming that claims made by or about a subject are true. It serves a vital function within any insurance organisation in many areas, such as securing access to corporate networks, protecting the identities of other users, and ensuring that a user is who he or she claims to be (Abouelmehdi et al., 2018).

The most obvious issues when using smart information systems concern privacy. For example, if artificial intelligence is able to determine that someone has ascertain disorder or disease by correlating public pieces of information gleaned from social networks or public sources, an argument could be made that this constitutes a violation of privacy rights or is, at the very least, ethically questionable (Dutt, 2018). Artificial intelligence uses not only publicly available information about the client but also their personal information which raises data protection concerns.

3.3. Bias and Reliability

Data may be missing, corrupted, inconsistent, or non-standardized (such as pieces of information recorded in different formats in different data sources), and lack a standard vocabulary. Data problems in healthcare are often perceived to be the result of the volume, complexity and heterogeneity of the data, their poor mathematical characterisation, and their non-canonical form (Koh and Tan, 2018). When data are not statistically sound, they reduce their efficacy for training (Dutt, 2018).As a result, artificial intelligence may make many false assumptions in the insurance sector which could end up being discriminatory (e.g. making insurance more expensive for minorities).

The validity of the results of AI-based decision making in the insurance sector may also be questioned. The familiar aphorism that correlation is not causation (meaning that not always statistical probability reflects a true cause) holds true here as elsewhere. Moreover, some characteristics that correlate with increased risk or suspicion of fraud might be challenged as discriminatory to the extent there is no demonstrable causal connection between the characteristic and the risk of suspicion (Bharadwaj, 2018).

3.4. Job losses

Although artificial intelligence and smart information systems have been promised as problem-solvers, they have also sparked concerns about job losses. Japanese insurer Fukoku Mutual Life Insurance announced that it would replace more than 30 employees with an artificial intelligence system (Newton Media, 2018). Mariana Dumont, head of new projects at Insurance Nexus, states: "in conversations I'm having with insurance executives, I've noticed that we are all very excited about where artificial intelligence is headed in the insurance industry, but there's a lot of uncertainty, we don't know how it will change the core business model, and peoples' jobs." (Bharadwaj, 2018)

The managers of insurance companies surveyed felt artificial intelligence could automate on average 10% jobs in their own departments in 2016. Looking further ahead, they anticipated that an average of 14% could be cut in 2020 in functions using artificial intelligence, and 18 % of jobs could be automated by 2025 (Tata Consultancy Services Ltd (TCS), 2017).

The lack of availability of artificial intelligence skilled labour is also a huge challenge for companies in the insurance sector. Any artificial intelligence technology integration would need technically skilled professionals in an organization to train these artificial intelligence systems (Bharadwaj, 2018). However, the skills requisite for training artificial intelligence will become redundant once the artificial intelligence is fully functional, to be replaced by a need for skills in maintaining artificial intelligence and relevant hardware performance.

3.5. Discrimination

As smart information systems become more sophisticated, discrimination issue also starts to emerge. The predictive modelling capacities of artificial intelligence systems constitute a natural "fit" to the assessment of risk inherent in the processes of insurance ratemaking and pricing. Advanced predictive modelling can generate "red flags" during the claim intake process, which enables suspect claims to be routed for investigation while proper claims proceed to payment. If an artificial intelligence is used to prevent some people from receiving health insurance (for example, by determining that someone has ascertain disorder or disease by correlating public pieces of information gleaned from social networks or other public sources) then the reasons should be clearly understood to prevent

implicit and harmful biases (Dutt, 2018).These developments could result in a charge of unfair discrimination in insurance which might also be levelled against practices which impact people based upon characteristics such as income level, place of residence, occupation, education, marital or family status (Foggan and Panagakos, 2018).

3.6. Transparency

Transparency means a possibility for users or staff to clearly understand when, why and how the decisions by artificial intelligence are made, when and why their personal information is used and for what purposes. Currently there are limited strategies to uncover all those questions. Even determining which set of variables are the most relevant for the artificial intelligence model is not always easy (Dutt, 2018), because artificial intelligence chooses those completely by itself in accordance with its experience. Although the customer has a legal right to be informed about the use of this personal data. That is why it is very important what methods insurance professionals will use to be able to respond fully to customer requests for explanation of the reasoning that underlies those determinations, given the mystery that cloaks the algorithms by which cognitive systems produce their results (Bharadwaj, 2018).

4. Organisation X: Insurance Company Using Smart Information Systems

This section will focus on Organisation X, a company that implements and uses smart information systems technology within the insurance sector (the organisation has asked that it and the name of the interviewee be anonymised). An interview was conducted with Interviewee X, the head of operating services in the company, who is responsible for underwriting, contracts, and management of claims, and who reports directly to the board of the organisation. Interviewee X is not involved much in working with smart information systems used by Organisation X, but Interviewee's X interest in this is the outcome of using smart technologies. The interview raised Interviewee's X interactions with smart information systems in the company, possible issues associated with ethics, technological drawbacks and use of data (accuracy of data and recommendations, employment, responsibility, ownership of data, transparency, trust, informed consent, use of personal data and security), and how the company addresses these issues. The interview was conducted in 2018 via telephone, and transcribed and analysed using the qualitative analytics software tool NVIVO to categorise, define, and evaluate the content of the interview.

Duration: 22 minutes	
Interviewee	Interviewee X
Reference in Case	Interviewee X

Study	
Role in Organisation	Head of operating services

Table 1. Organisation X's interview.

4.1. Description of Organisation X

Organisation X is located in the service and insurance industry. It is one of Germany's largest private health insurance companies, with more than 2 million members. The company serves approximately 5 million insured people by suggesting them most suitable health insurance according to their health information. Organisation X is a for profit organisation and an innovative health insurance company, which uses smart technologies for identifying fraudulent claims. As one of Organisation X's directors explained, the company wants to make sure that their members always have access to the very best procedures, when it comes to detecting and treating illnesses.

4.2. Description and Aims of Smart Technologies Being Used in Organisation X

Organisation X is using one smart information system at present. This is a customised, self-programmed software for fraud detection in private health insurance. The system stands alone, and is not implemented or supported by other systems in Organisation X. Interviewee X stated that the system is able to identify, as they refer, abnormal behaviour (for example, when a person gets medicine from a lot of different pharmacies instead of going to the pharmacy nearest to home). According to Interviewee X, this system makes it easier and faster to identify fraudulent claims.

4.3. The Effectiveness of Using Smart Information Systems for Organisation X

In fraud detection Organisation X no longer depends only on people paying attention during the claims management process.

"In fraud detection we no longer depend only on people or colleagues paying attention during the claim process. Now we have software, which selects cases with a possibility of fraudulence, so we can focus on these cases only" (Interviewee X, 2018)

The software selects cases with the possibility of fraudulent activity so employees need to focus only on those cases. Organisation X started using the software in one field in the

claims management concerning receipts of medication. Two facts serve as a motivation to expand the implementation of this system in the contracts department: the fact that the system works very well and Organisation X doesn't have any problems using it, and also that it simplifies the work of employees in the claims management and fraud detection.

Just one practical limitation was identified: the possibility of false positives, such as identifying strange or unusual behaviour as fraudulent even if it is not (for example, when a person gets the medicine from a lot of different pharmacies instead of from the pharmacy nearest to home). No other limitations of the used software have been identified yet.

"If a person gives us prescriptions for medicine for a claim and the person gets the medicine from a lot of different pharmacies, this could be identified as an abnormal behaviour. In these claims the possibility of fraud is higher rather than in situations when people buy medicine in a pharmacy near their home. Of course, there is a possibility that a person who needs medicine travels all over Germany" (Interviewee X, 2018)

Organisation X is working with the software according to the data protection regulation of Germany and of the European Union (General Data Protection Regulation (GDPR)) and Organisation X closely cooperates with the in-house data protection officer when using the technology. Moreover there is a process of quality control for using the software. But there is no organisational policy for using the software for fraud detection.

4.4. The Effects on Stakeholders

Interviewee X claims that there is no special impact on stakeholders from using smart information systems. Interviewee X claims, that more or less they are aware of smart information systems use in the organization. The main stakeholders in Organisation X are users, in-house data protection officer, the board, and decision makers.

Personal data of the users is used for the claims management process. For example, clients send personal information, what kind of medicine they have been prescribed, and the location of the pharmacy. All this information is used. There is some non-financial cost for users in terms of privacy and reduced understanding of the system because they don't know why smart technology makes the decisions it does.

The in-house data protection officer needs to make sure that using smart information system is complying with the general data protection regulation. The board of Organisation X needs sometimes to inform the media that Organisation X is using smart information system. Smart technology also assists the decision makers on making decisions about whether a claim is fraudulent and therefore whether it should be paid.

It is important that data protection officer, Organisation's X board of directors and other decision makers are able to provide their comments and opinions regarding smart information systems to the personnel of Organisation X.

5. Organisations Y: The Case of an Insurance Intelligence Centre Using Smart Information Systems

This section will focus on Organisation Y: all national healthcare insurance companies share their payments data to health care organisations with this organisation (the organisation has asked that it and the name of the interviewee be anonymised). An interview was conducted with Interviewee Y, who is not involved much in working with smart information systems in the organisation, although Interviewee Y has a broad understanding of the situation surrounding smart technologies. Interviewee Y is responsible for information security, insurance programs, and regulation. During the interview, Interviewees Y's interactions with smart information systems in the company, possible issues associated with ethics, technological drawbacks and using of data (accuracy of data and recommendations, employment, responsibility, ownership of data, transparency, trust, informed consent, use of personal data and security), and how the company addresses these issues were all discussed. The interview was conducted in 2018 via telephone. The interview was transcribed and analysed using qualitative analytics software tool NVIVO to categorise, define, and evaluate the content of the interview.

Duration: 23 minutes	
Interviewee	Interviewee Y
Reference in Case Study	Interviewee Y
Role in Organisation	Responsible for information security, insurance programs, and regulation

Table 2. *Organisation's Y interview.*

5.1. Description of Organisation Y

Organisation Y is a private organisation in the health insurance industry. It is the business intelligence centre for healthcare insurers, providers and the public. Organisation Y gets insurance data from the insurance companies and analyses it to develop relevant information for those companies and for research institutions, which they call "information prod-

ucts" (e. g. predictive models; information, helping to improve administrative processes in healthcare). It also provides public information, for instance on its website. Cities, individuals and research projects can make requests for analyses.

5.2. Description and Aims of Smart Technologies Being Used in Organisation Y

Organisation Y has long used software it designed itself for analysis of the insurance data given by insurance companies and insured persons. Organisation Y provides insurance companies or other interested institutions (universities, research institutes) with information products (they depend on what data analysis the health insurer has asked for) which they can use in research or developing policies in health insurance. Organisation Y creates insights in healthcare consumption (volume, cost and quality) based on data-analytics. Among its clients are hospitals, general practitioners, health insurers, the government, universities and other research institutes. The software helps Organisation Y to achieve the goals they agree with the aforementioned organisations.

5.3. The Effectiveness for Using SIS for Organisation Y

Organisation Y also has organisational regulation for proper use of the software. Moreover Organisation Y has an external auditor who audits processes to see if everything works according to the legislation once every year. That is why Organisation Y has been using the software for research for a few years and no significant technological problems have been identified.

The software creates insights in healthcare consumption (volume, cost and quality) based on data-analytics and helps Organisation Y to make qualitative information products. The greatest but not very significant limitation identified by the Interviewee Y is the limitation of data collection. Organisation Y uses only that data which is allowed by the health insurer. The interviewee stated that

"All the things we do, we do in consent of the health insurer" (Interviewee Y, 2018)

Although, if any other problems arise (technological, ethical, social, etc.), health insurance companies' representatives or the representatives of universities and other research institutes which order information products have a possibility to share their concerns with the responsible staff of Organisation Y. Organisation Y works for those companies by making information products based on the data the insurance companies give them, so it is very interested in keeping the used systems working smoothly.

5.4. The Effects on Stakeholders

In Organisation Y the stakeholders are mostly health insurance companies, health professionals and patients. Although sometimes universities and other research institutes ask to have an analysis of insurance data. According to Interviewee Y there is a direct and indirect impact made on the stakeholders: the insurance companies, research institutes are those interested stakeholders which get the information products about how the administrative processes in healthcare should be improved, and others (patients, health professionals, etc.) are those indirectly affected by the improved processes.

Health insurance companies are the main clients of Organisation Y. They provide insurance data for Organisation Y, and Organisation Y, after the data analysis, makes information products for them to use in policy making and research. Organisation Y has an obligation always to inform them and ask their permission about using the insurance data that they have provided. Insurance companies have the ability to provide suggestions and comments about the software which is used for analysing the data. Organisation Y has held group discussions with the participation of health insurance companies to get their opinions and insights about the data analysis.

Insurance data (including personal data) of the patients is used for analysis in Organisation Y. They provide their data to the insurance companies, and they must be informed about the possibility of their data being used for analysis. If patients want to get information as to what is done with their data they can read the privacy statements of their health insurer. The policy of Organisation Y is in line with the privacy statements of the health insurance companies.

Universities and other research institutes sometimes approach Organisation Y to undertake insurance data analysis with data from insurance companies. These situations are difficult because the universities don't provide any data themselves, so Organisation Y needs to ask insurance companies to let them use their data.

6. Ethical Issues from SIS Technology in the Insurance Field

There were a number of ethical issues identified during the interviews as a result of using smart technologies in the interviewed organisations. These are similar to those identified in the literature review, but not identical. Some ethical issues identified in the literature are not emphasized as significant or not identified as issues at all in the interviews (such as bias, reliability, discrimination, data governance, security and privacy, job losses). However, some ethical issues were not mentioned as significant in the literature but were identified as very important during the interviews (e.g. trust, informed consent, responsi-

bility).Also transparency and accessibility of data as ethical issues appeared to be important in both literature and practice.
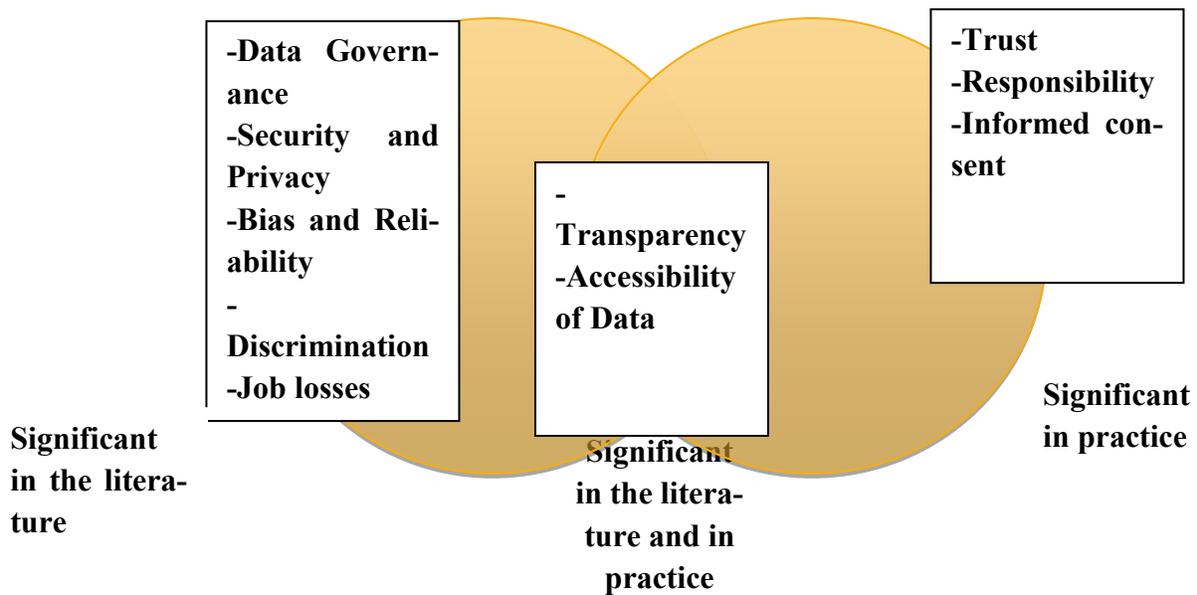

-Data Governance
-Security and Privacy
-Bias and Reliability
-Discrimination
-Job losses

-Trust
-Responsibility
-Informed consent

-Transparency
-Accessibility of Data

Significant in the literature

Significant in the literature and in practice

Significant in practice

Figure 4. **Correlation** between ethical issues: literature vs. practice.

6.1 Accuracy of Data and Recommendations

It is important to state that there is a strong link between accuracy of data and accuracy of recommendations. Organisation Y provides insurance companies or other interested institutions (universities, institutes) with information products which they can use in research or developing policies in health insurance. The recommendations of Organisation Y are based on the data given by insurance companies. As the interviewee stated, the accuracy of data provided reflects the accuracy of recommendations.

Organisation X is using qualitative medical data (e.g. medicine used, location of pharmacy) and quantitative medical data (information from the receipts for medication) for the identification of fraudulent claims. Also it gets personal information about the client

(the insured person). They get data from their clients (the insured persons) for claim process and enter it into the software. Interviewee X explained that when data is retrieved from an insured person, accuracy is very important. A human mistake could mean that the claim is incorrectly identified as fraudulent.

Another issue identified by Organisation X and related to data is accuracy of recommendations, e. g. when the software in some situations identifies uncommon behaviour as abnormal. For example, if a person travels all over the country and gets medicine from different pharmacies, this could be identified as abnormal and the claim incorrectly interpreted as fraudulent.

6.2. Employment

When using software for fraud detection, Interviewee X said that they do not need to depend only on colleagues' opinions, because the software selects cases with a possibility of fraud and people just need to focus on those cases, instead of inspecting them all. Moreover, Organisation X is planning to expand the use of this software and implement it in the contracts department. This means that in the future fewer people will be needed for identification of fraudulent claims and contracts processing.

6.3. Responsibility

Responsibility is understood quite differently between Organisation X and Organisation Y, but it is because of the differences in their functions. Organisation X is working with data received directly from insured persons, so they are responsible for it. That is quite clear for them. They are working according to all national and European data protection regulation laws, and they have in-house quality control mechanisms to protect the data.

Organisation Y uses insurance data from insurance companies, rather than from insured persons. Health insurance companies are the clients of Organisation Y. Organisation Y identifies itself as responsible for the data and conducts quality analysis of it as much as necessary to comply with the informed consent of the insurer and with the goals identified between Organisation Y and the insurance company. Organisation's Y responsibility is directed to the insurance company but not the insured person.

6.4. Ownership of Data

Organisation X has no issue with ownership of the data, because they clearly understand and identify that the data used for identification of fraudulent claims and for claims analysis is the data from insured persons and it is their (the insured person's) data. Although in practice there are situations (for example, when using the data for fraud detection) when they say that:

"The respective person perhaps does not know that they use the data for fraud detection"(Interviewee X, 2018)

Organisation X works according to all national and European data protection regulation laws, so they don't identify any problems in these situations, but a possible ethical concern may be, that the insured person isn't informed about what is being done with his/her personal information.

For Organisation Y, which uses insured persons' data for analysis to develop information products (predictive models, recommendations how to improve administrative processes in healthcare, etc.) for health insurers, the situation is perceived to be completely different. Organisation Y uses data of insured persons' (e.g. personal data and insurance data) but they identify it as the property of the insurance company, not of the person. The interviewee from Organisation Y said that insurance companies are responsible for ensuring that insured people are informed as to how their data is used. Organisation Y gets informed consent from insurance companies as their clients. They conclude an agreement, which states the goals of the relationship and elaborates the uses of the insurance data. Organisation Y does not worry whether insured persons know of the relationship. Organisation Y states that their work is transparent, that they are working according to the data protection regulation and also they have annual audits to ensure that their software is working properly. They give information about the use of insurance data in their website for the public, but they identify the insurance data as the property of the insurance company. As the interviewee stated, "*it's their data"*.

6.5. Transparency

Organisation X states that smart technology used in the organisation is more or less transparent for both the direct users and the personnel working with smart information systems (IT department). However, the smart technology used in the organization is not transparent to people outside the organization because Organisation X does not inform those people as to how smart information system in their organization works. For example, a person outside the organisation doesn't get the information about the criteria of how one or another claim is identified as fraudulent. Also clients are not always aware why smart technology makes one or another decision, but they are informed on the general level as to how it works.

Organisation Y tries to be as transparent as possible for the stakeholders: the insured persons, health insurance companies, and universities. Moreover, they have rules in the software itself. Yearly audits undertaken by an external auditor also help to ensure transparency in Organisation Y.

In both organisations (Organisation X and Organisation Y) all stakeholders have the ability to share any concerns with the organisation – if they find some aspects concerning

transparency in data collection, data analysis, informing about handling personal information troubling, they always have a possibility to share them. In Organisation X's situation there is a board of directors which can give their feedback about the processes in the company (including the software), and a quality control mechanism to ensure that everything is working as it should. Organisation Y gets feedback from insurance companies. As they say

"*We are trying to be as transparent as possible*"(Interviewee Y, 2018)

"*If they have problems they will directly tell us*"(Interviewee Y, 2018)

6.6. Trust

Trust is very important for Organisation Y. Health insurance companies are their main clients and it is very important for Organisation Y that health insurance companies would trust them. They are less concerned about the trust of insured persons, but that follows from the specifics of their functions.

It is very important for Organisation Y to follow the goals agreed between them and the health insurer,

"*We follow their orders*" (Interviewee Y, 2018)

They also send requests to health insurance companies every month to get their consent for using insurance data for other purposes, for example meeting requests from universities or institutes to use the data for research. Organisation Y states that they do not do anything without the consent of the health insurer.

6.7. Informed Consent

Organisation X uses personal information of insured persons in the identification of fraudulent claims. Interviewee X said that there is no specific informed consent sought for using their personal information for this purpose. Although Organisation X does not see a problem, that the person isn't informed clearly about this use of his/her personal information in that as they are working according to the data protection regulation of Germany and of the European Union.

Organisation Y has legal restrictions on its use of personal and insurance data of insured persons. As the interviewee stated,

"*Every time they are using the data for something they have to ask for the health insurers if they agree*"(Interviewee Y, 2018)

Organisation Y does not have an obligation to get informed consent from insured people whose data they use. On their behalf, health insurance companies have to get informed

consent from insured people. Organisation Y gets the data directly from the insurance companies: as they say, *"it's their data"*. The only informed consent Organisation Y is concerned, is the informed consent of the insurance company.

6.8. Use of Personal Data and Security

Both Organisation X and Organisation Y use personal data of insured persons to achieve their goals. Organisation X uses it for fraud detection and claims analysis, Organisation Y for making information products for insurance companies and research data for universities and institutes.

To address possible ethical issues associated with the use of personal data of insured persons, Organisation X is working according to the data protection regulations of Germany and the European Union, although there is no organisational policy for use of personal data in the Organisation X. Additional in-house mechanisms to ensure maximum security of the data used by the software for fraud detection are employed. They have a set of rules to use the software properly and a quality control system, which they apply to every process of their work.

Organisation Y, besides legal instruments (national, European and organisational), has an external auditor who conducts audits of the system and other processes every year, to ensure that everything is working properly. They also have implemented rules directly in the software to ensure security. They also send requests to health insurance companies every month to get their consent for using insurance data for other purposes, for example meeting requests from universities or institutes to use the data for research. Organisation Y states that they do not do anything without the consent of the health insurer. Organisation Y has also implemented rules directly in the software to ensure proper use of personal data.

All in all, both Organisation X and Organisation Y have mechanisms to address possible use of personal data and security issue, but they only tackle those aspects, which they identify as more important for the organisation. For example, Organisation X doesn't have any organisation policy for the use of personal information. Also, they state, that Organisation X is working according to the European Data Protection Regulation, but Organisation X doesn't have an internal mechanism to ensure that. In Organisation Y, the main concern is not the person himself/herself whose information is being used for the analysis, but only the information of the insurance company which is the direct client of the Organisation Y. All these remaining issues should be addressed in the future.

7. Conclusion

From 2016, more has been invested into implementing smart information systems in the insurance sector than any other. Today half of the insurance companies in the world are

looking at strategic alliances or joint ventures with InsurTech companies to speed up their alignment with the digital marketplace. This case study demonstrates where smart information systems are being used in the insurance sector, why they are required, what benefits and what possible harms they could bring to companies, employees and the customers. Despite the need of implementation of smart information systems which is understood as needed to compete with other insurance companies, there are many social and ethical issues that need to be addressed in the implementation of smart technologies in the sector.

The interviews show that when using smart technologies in the insurance sector some ethical issues identified in the literature are not emphasized as significant or not identified as issues at all in the interviews (such as bias, reliability, discrimination, data governance, security and privacy, job losses). However, some ethical issues were not mentioned as significant in the literature but were identified as very important during the interviews (e.g. trust, informed consent, responsibility).Transparency and accessibility of data as ethical issues appeared to be important in both literature and practice.

Of course, there is a possibility that such conclusions are associated with the different backgrounds of the interviewees, but their roles in the organisations are significant and broad, so their knowledge of the ethical issues should be considered as similarly significant. Also the mentioned issues could seem less important to the interviewees, because there is no clear legislation on those. Both organisations (Organisation X and Organisation Y) are private companies, so possibly their view on ethical issues is more practical - possibly they acknowledge those issues, which can raise legal questions and disrupt their work. If not – they are considered as not so important.

It is worth mentioning that both interviewed companies (Organisation X and Organisation Y) are putting considerable energy into addressing the issues identified by, for example, conducting annual audits, collecting feedback from staff and clients, cooperating with the board of directors, and following European, national and company regulations. Those smart information systems related internal issues, that have not yet been identified by organisations in the insurance sector, should be identified and addressed in the near future. That is a crucial part for ensuring flawless implementation of smart technologies and further use in the insurance sector, without harming neither the insured persons, nor other insurance companies and employees. Moreover the literature review and the case study has shown, there are few if any policy documents for using SIS in the insurance sector. The only policies used are General Data Protection Regulation and other national policies on data protection.

7.1. Limitations

There are no limitations of the technology itself, according to the organisations (Organisation X and Organisation Y) the software works as expected. Two significant limitations were raised in working with the software. First is the possibility of identifying strange or unusual behaviours of insured persons as fraudulent even if they are not (false positives). This is the limitation which is acknowledged by Organisation X, and explains why any final decision is still made by a human. The software merely identifies claims with a high possibility of fraud. After that a human goes through the claim and confirms that the software made the right decision. Organisation X has quality control systems to minimize the possibility of this kind of mistake, but the limitation still exists and must be acknowledged by the organisation and its employees. That the final decision is still made by humans resolves this limitation for the time being.

Another identified limitation is data collection. Organisation Y highlighted that the software is not able to get information for the analysis itself. It must be manually collected from insurance companies. The software only analyses collected information. It is important to state that there is a strong link between accuracy of data and accuracy of recommendations. Organisation Y provides insurance companies or other interested institutions (universities, institutes) with information products which they can use in research or developing policies in health insurance. Although, Organisation Y does not see it as an very important limitation for the company, because it makes information products only for those insurance companies who provided the information so actively nothing is being done to address this limitation. In the future, though, there should be some measures to control the quality of the information because the results of the analysis are sometimes used by other institutions (universities, other research institutions) in research.

7.2. Contribution to Knowledge

The findings of this case study could make a significant contribution to existing knowledge on ethical issues when using smart information systems in the insurance sector. One reason has been stated in the literature review - CEOs of insurance companies see great benefits of SIS (e.g. personalised interactions with customers, higher customer satisfaction, and financial savings). That means that in the near future smart technologies in the insurance sector are going to be a necessity if a company wants to compete in the field and the implementation of them will rise very fast.

Another reason has been found in the interviews. They have shown that when using smart information systems in the insurance sector some ethical issues identified in the literature are not emphasized as significant or not identified as issues at all in the interviews (such as bias, reliability, discrimination, data governance, security and privacy, job losses). However, some ethical issues were not mentioned as significant in the literature but were

identified as very important during the interviews (e.g. trust, informed consent, responsibility).Transparency and accessibility of data as ethical issues appeared to be important in both literature and practice. That shows that the theoretical knowledge of implementing smart information systems into the insurance sector and possible issues rising in the process differs from practice. Findings of this report could help to broaden the theoretical perspective of this situation and highlight other possible issues (e. g. lack of smart technologies related ethical knowledge in organisations, technologically oriented approach into the situation).

7.3. Implications of This Report

This report uses information from insurance companies using SIS in practice so the findings are highly significant. The differences between the considerations of importance of the ethical issues identified in the literature and in the interviews hopefully will provide guidance to the insurance companies integrating smart information systems. Moreover, the findings of this report will encourage insurance companies to analyse the situation in their organisations more closely before implementing smart information systems in their practice and help them to understand that smart technologies are not only tools to make their life better, but also tools of great responsibility, which, if not used properly could harm not only the company but also the insured people. Hopefully, in the future, the results of this report also provide policymakers with information about possible issues when using SIS in the insurance sector.

7.4. Further Research

This report offers literature review and findings on the case study on ethical and legal issues when using smart information systems in the insurance sector from both theoretical and practical perspectives, although there may be additional matters that need to be evaluated in the future. Additional case studies would be needed to evaluate the differences of ethical and legal issues between other types of companies (for-profit and not for-profit, huge corporations and small organisations, etc.).

It is substantial for companies in the insurance industry to acknowledge all ethical problems identified in this report as significant ones. There are already many recommendations developed to address ethical issues when using smart technologies in insurance, but the problem is that it is not known how to implement those recommendations into policy. Much more research should be done on the best possible ways to implement theoretical recommendations into policy and then into practice (e. g. practical examples, case studies, simulations, theoretical approach).

The conclusions of this report should encourage conducting similar case studies and provoke qualitative and quantitative studies in broader range of insurance companies, countries, smart technologies to get as most reliable results as possible in the future.

8. Acknowledgements

9. References

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