The Generic InsurTech Ecosystem and its Strategic Implications for the Digital Transformation of the Insurance Industry

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Abstract: The emergence of insurance technology companies (InsurTechs) through the easy access of digital technologies is transforming the entire insurance industry and heralding a new era of business models. With digital technologies such as big data analytics, robo advisors, and mobile distribution models or blockchain, InsurTechs are challenging the prevailing position of traditional insurance institutions. However, the literature does not provide a structured overview of digital transformation (DT) in the insurance industry, including strategic implications and inter-organizational innovation patterns. By analyzing 956 InsurTechs, this paper visualizes the 34 generic roles and value streams within the insurance ecosystem using the e3-value method. Moreover, through semi-structured interviews with industry experts, we identify and discuss five strategic implications following seven inter-organizational innovation patterns of DT in the insurance industry. We contribute to the literature by examining DT in the insurance industry from an inter-organizational perspective. Practitioners may apply the model to position themselves in a digital insurance ecosystem and to identify disruptive actors or potential business opportunities.

Keywords: Ecosystem, Insurance Industry, InsurTech, Digital Transformation, Innovation Pattern, e3-value model

1   Motivation

Disruptive technologies are the engine of digital transformation (DT). They transform industries, society, and governments by introducing the digital lifestyle and eliminating well-established business models [Bh13, Ri19]. Recent developments and adaptations, such as mobile payments, robo advisors, peer-to-peer, and blockchain [Os18], are some of the most promising drivers in the insurance industry.

The combination of new and innovative technologies and the development of new digital platforms fundamentally change the value creation of existing companies and how business is executed [LG09, Ti15]. The transformative impact on pre-digital products, especially in the insurance industry, has remained unnoticed in the information systems

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(IS) literature for years [YHL10]. However, companies are forced to overthink and redefine their business models to stay competitive against recently founded startups that are more agile given their IT-enabled digital business models [Lu13, Ve94]. In this context, the term InsurTech is often used for startup companies that deliver innovative or disruptive solutions to the market [Pu17, BC95]. Established insurance companies and insurance brokers are forced to compete with a rising number of new market entrants that provide customer-centric solutions for their customers and substantially engage in the current ecosystem [MHB15]. The industry is facing new trends, such as pay on demand insurance, data science for preventive health care, and insurance compare platforms, and new market entrants in this changing environment are shaping DT in the industry [Lu13, Ri19].

However, the existing literature does not provide an inter-organizational and strategic overview of the current and ongoing industry transformation, particularly through InsurTechs [Pu17]. Further, strategic implications for the industry through InsurTechs are particularly missing [Pu17]. Therefore, this paper aims to answer the following overall research question: What is the generic ecosystem of the DT in the insurance industry and which strategic implications can be observed?

We follow the research approach of Riasanow et al. [Ri18a] to identify 34 generic roles derived from analyzing 956 companies. We extracted company data from the Crunchbase database and used the e3-value method to develop a generic ecosystem of the DT in the insurance industry, including InsurTechs based on these 34 roles. Following Riasanow [Ri18a], we discuss five strategic implications following seven inter-organizational innovation patterns of the DT in the insurance industry, such as the aggregation of intermediaries.

The paper is organized as follows. First, based on the literature on DT, we analyze the related background on the DT in the insurance industry through InsurTechs. Second, we describe our methodology. Third, the 34 generic roles and the generic ecosystem are presented. Further, we provide a framework for five strategic implications following seven innovation patterns of DT in the insurance industry. Next, we discuss the results, implications, and future research. The final section presents the conclusion.

2   Digital Transformation in the Insurance Industry and the Role of InsurTechs

DT is currently one of those topics that practitioners and researchers can hardly avoid when talking about IS or developing business strategies. DT is an industry level phenomenon (see, for example, da Silva Freitas et al. [Si16], Downes and Nunes [DN13]) that changes the way organizations compete within and across industries. Therefore, DT "affect large parts of companies and even go beyond their borders, by impacting products, business processes, sales channels, and supply chains" [MHB15].

Following Horlacher et al. [Ho16], inherent to DT is the development of technology-enabled business models that are new to the organization that has initiated the transformation. This development is particularly relevant for the insurance industry as a number of emerging technology-enabled players penetrate the market [Pu17]. These organizations, the so-called InsurTechs, use innovative digital technology to create novel insurance services or products that either improve existing processes or create new business models, such as robo advisors [ZDS16]. According to Zeier et al. [Ze18], the central advantages of InsurTechs are cost efficiency, flexibility, speed, and scalability. Changes in the role of IT, customer behavior, ecosystems, and regulations are the main drivers for the success of InsurTechs [Pu17, ZDS16]. Moreover, DT means changing the manner in which value is delivered to customers , which is also observable in the insurance industry. Hence, InsurTechs revolutionize the insurance industry in several ways. They may improve established processes, products, or services, create competition through innovative products or services, or eventually disrupt established business models [Pu17, ZDS16]. To be successful, the evolution of a company's business model needs to be complemented by a co-evolution on the customer side [Ri19]. In particular, Haffke et al. [HKB16] emphasized the effects on "sales and communication channels, which provide novel ways to interact and engage with customers" and a "firm's offerings (products and services)" that replace or augment physical offerings. Recognizing this interdependence, researchers have analyzed DT through an intra-organizational perspective (see, for example, Bley et al. [BLS16]; Haffke et al. [HKB16]; Matt et al. [MHB15]; Piccinini et al.). However, research is missing the strategic implications for the industry and a detailed inter-organizational, macroeconomic analysis of the current and ongoing DT in the insurance industry [Pu17] given existing studies' sole focus on organizations' business models. Thus, we analyze the DT in the insurance industry from the perspective of its ecosystem.

3 Research Approach

We conducted a five-step research approach based on Riasanow et al. [Ri18a]. To develop the insurance industry's generic ecosystem, we first decided to use data from Crunchbase, a comprehensive database of existing companies and startups, to derive the roles in the ecosystem [Ma15]. To collect all organizations of the insurance industry and the related technologies, we filtered the Crunchbase category list by the search terms "InsurTechs" and "FinTechs and Insurance," resulting in a sample size of 1,424 worldwide funded companies. Screening the data, we found companies with no relationship to the insurance industry. Hence, we shortened the data set by a further 454 companies. Second, we presented the generic ecosystem based on the previously identified 34 roles and value streams. Third, we validated the model through seven semi-structured expert interviews. Subsequently, we identified strategic implications and followed and modified the discovered innovation pattern of Riasanow et al. [Ri18a] of the DT in the financial industry using qualitative content analysis.

4   Generic Ecosystem of the Insurance Industry including InsurTechs

Given the emergence of innovative digital technologies, the insurance industry is transforming, particularly as a result of new market entrants such as InsurTechs.

We first derive the roles of the actors in the ecosystem by drawing on data from 956 companies derived from the Crunchbase database. Actors, which offer similar services and products to the customer, are abstracted to one role based on a structured content analysis following Mayring [Ma10]. Because our roles are on a more abstract level than business models, one role can refer to different types of business models. Further, one company can act in different roles by offering different services to other players. In Table 1, we present the generic roles of the traditional actors in the insurance industry.

Role	Description	Example(s)
Consumer	Consumers request, among other applications, insurance services for business or private use. In some cases, the consumer is a prosumer by simultaneously using and creating a service.	Private, business client
Product Development	Develops and modifies products for new or changing customer needs and aims to create new products for an optimal customer journey with short development cycles [Go15].	Allianz, AIG, AXA
Underwriting	A primary insurer's or reinsurer's process to check applications, assess risks, and finalize them. Underwriting assumes real significance for businesses with industrial or general risks and for reinsurance [Go15, Fa06].	Allianz, AIG, AXA
Distribution Management	Translates an insurance company's strategic goals into sales targets that can be implemented operationally [Go15].	Allianz, AIG, AXA
Policy Service	The basic function of insurance administration that only indirectly serves the actual purpose of the operation and ensures that operations run smoothly by looking after client-related requests and issues [Go15].	Allianz, AIG, AXA
Billing & Collection	Because insurance companies handle large money streams, a large aspect of administration is billing and collecting insurance premiums [Go15, Fa06].	Allianz, AIG, AXA
Claims & Payment	Administration, assessment, and settlement of insurance claims and life insurance refunds are handled by a specified division in every insurance line [Go15, Fa06].	Allianz, AIG, AXA
Asset	Assesses and predicts future cash flows and adjusts	Allianz Global

Management	investment strategy accordingly to provide enough cash flow for claims payments and life insurance refunds [Go15, RM08].	Investor, AIG-Global Capital, AXA Assets
Global Agent	Coordinates the distribution of multinational clients and provides them with needed insurance coverage. In the respective markets, these agents have exclusive partnerships with insurance companies, which may differ between the insurance lines and countries [Go15].	Aeon, Willis Tower Watson
Independent Broker	Anyone who commercially handles the brokerage or conclusion of insurance contracts for the principal without being entrusted by an insurer or insurance agent.	FondsFinanz, Euroassekuranz
Fraud Detection	Aims to protect customer and enterprise information, assets, accounts, and transactions by analyzing activities. Fraud detection is not intrusive to a user unless the user's activity is suspect [Gr12, Ph10].	Trulioo, Fraugster
Business Service	Services handled by an external service provider in all aspects of the insurance industry, including Consulting, Human Resource Management, and Debt Collection services.	Aeon, Price Waterhouse Cooper, InkassoDirect
Claims Partner	Policyholders and insurers turn to claims partners as professionals with claims-relevant expertise and onsite capacity to handle claims. Claims partners support the parties in the event of a claim, especially during the claims settlement process [Go15].	Cognotekt, MotionsCloud, McLaren
IT-Service Provider	Related to the use of information technology and supports the insurance industry partner's business processes and digital identity management [Pu17].	Capgemini, Yoti, AimBrain, OneVisage
Service Insurance	Uses personal contacts with customers and a wide branch agent and broker network.	Allianz, AXA, Zurich
Direct Insurance	Offers comparison and purchase possibilities without meeting with agents or brokers. The customer receives advice only via Internet chat, e-mail, or a telephone hotline.	DirectCar, HUK 24, AllSecur
Reinsurance	Insurance for insurance corporations that transfers part of the risks assumed by a direct insurer to policyholders under insurance contracts or via statutory provisions, or transfers risk to a second insurer—the reinsurer—that is not directly related to the customer [Go15].	Munich RE, Swiss RE
Regulatory	Supervises the solvency of insurers and other	SEC, EIOPA,

| Authority | financial service providers. Its market supervision facilitates fair and transparent market conditions and protects consumers. | BaFin |

Table 1: Generic roles in the traditional insurance industry

Second, in Figure 1, we propose a generic ecosystem of the traditional insurance industry. Drawing on the e3-value method, the ecosystem depicts the identified roles and the value streams among them.
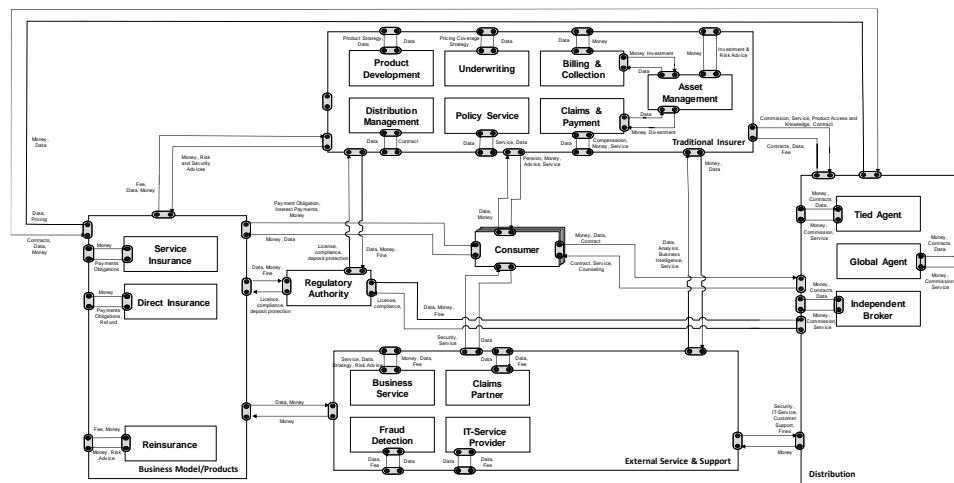
Figure 1: Generic ecosystem of the traditional insurance industry

Third, in Table 2, we show the generic roles of the emerging actors that are exclusively based on InsurTechs. Further, following the generic ecosystem for cloud computing, we included the four roles of cloud infrastructure provider, cloud platform provider, cloud application provider, and cloud market platform, as extracted from Böhm et al [Bö10].

Role	Description	Example(s)
Comparison Platform	Comparison platforms enable customers to form adequate decisions regarding different products and providers.	getinsured, impacthealth, comfortplan.de
Digital Broker/Robo Adviser	Digital brokers are intermediaries that offer insurance brokerage services by incorporating digital technologies, such as artificial intelligence, web-based platforms, and mobile applications.	Knip, Clark
Cross-Seller	Cross-sellers target the potential of insurance in a digital environment by focusing on e-commerce solutions for online shops that combine the traditional	Simplesurance, Check24

	insurance business with new digital online shopping through a one-click solution.	
Big Data Analytics/Predictives	Big data analytics and predictives provide services and solutions for risk takers to manage data and take advantage of large data collections for extensive analytics, such as analyses of target customers, calculations of quotes, decreases in claims-related expenses, fraud detection, frequent risk assessments, and stress-test simulations.	Laptetus, Fraugster, Cognotect
Smart Contract/Blockchain	Blockchain technology is a secure technology incorporated by InsurTechs to automate processes in claims regulation, payment management, and data and platform handling.	Black, safeshare
Instant Insurance	Instant insurance is a product for a selected period, in contrast to conventional insurance products that provide coverage at any time.	Trōv
Peer-to-Peer Insurance	Peer-to-peer insurance supplies competitively priced insurance products financed by eliminating moral hazard and profit margins through reinsurance contracts.	Friendsurance, Lemonade
E-Payment Provider	The term "e-payment" generally encompasses various functionalities that are handled via mobile phones [Ma07]. Provision of payments includes the use of mobile devices, such as smartphones.	PayPal, ApplePay, AliPay

Table 2: Generic roles of InsurTechs

Third, we used the e3-value method to develop a generic ecosystem of DT in the insurance industry, including InsurTechs. This method extends the ecosystem of InsurTechs in Figure 1 that we determined by drawing on the identified generic roles for InsurTechs; see Figure 2.
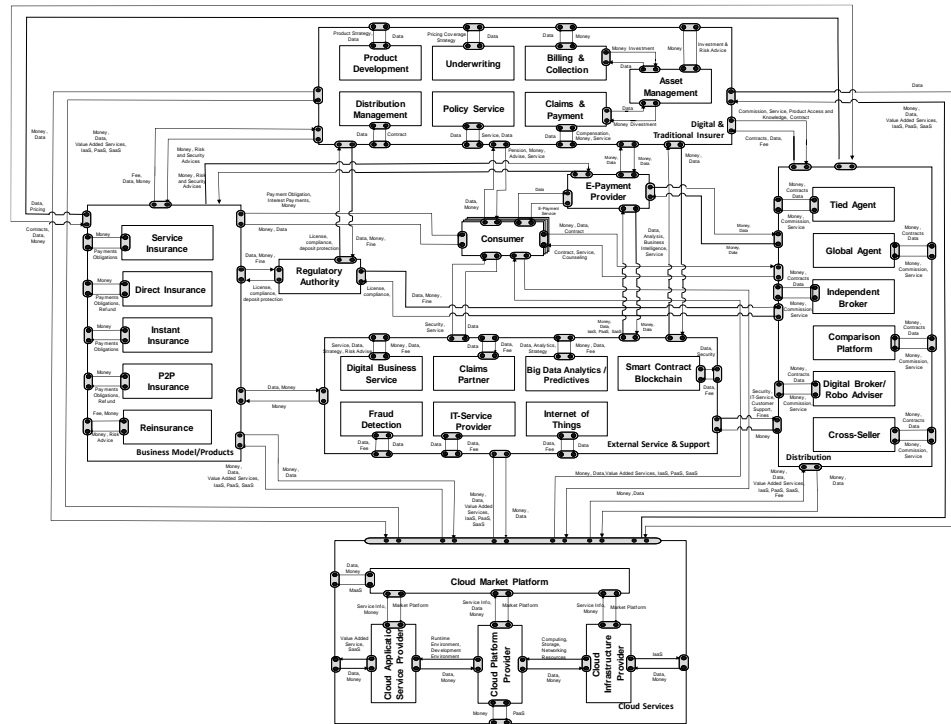
Figure 2: Generic ecosystem of the insurance industry including InsurTechs

5   Strategic Implications and Innovation Patterns in Insurance Industry

Based on the analysis of the DT in the generic ecosystem, such as comparing Figure 1 with Figure 2 and the interviews with seven industry experts, we extend and modify the research of Riasanow et al. [Ri18a] through strategic impactions and inter-organizational innovation patterns.

Strategic Implication	Innovation Pattern
Customer centricity	Aggregation of Intermediaries
Create coverage for customer ecosystem	Enhanced Transparency
	Service Aggregation
	Prosumption
Restructuring the organization to enable DT	

	Cloud-based Services
Leverage in-house collaboration	
Integrate partners with complementary services in the ecosystem	Service Integration
	Parallel Universe

Table 3: Strategic implications and innovation patterns

The first strategic implication is to provide *customer centricity*, which is independent of location and time, and is a key enabler of DT [HKB16, LV16]. Given accelerating media and channel fragmentation and evolving new customer expectations, omni-channel management has become more complicated for the insurer. Moreover, customer-to-customer interactions through simultaneously using and creating a service are creating significant challenges and opportunities for the insurer. Customer experiences are more social in nature, and peer customers also influence experiences. Overall, insurers also have much less control over the customer experience and the customer journey [LV16]. In reaction, insurers need to develop a new base of "digital only" clients and launch and support a new direct-to-customer channel, which is also shown in the *aggregation of intermediaries* by InsurTechs' roles as comparison platforms or robo advisers. They provide appropriate expertise such as personalized and digital app-based interactions with the customer by also integrating new customer services, such as robo advisors or smart contract interactions.

Creating coverage for customer ecosystems is the second strategic implication and is also related to transparency. *Enhancing transparency* refers primarily to the generic roles in the areas of distribution, coverage reliability, and product design, and is the second innovation pattern in the industry. There, the generic roles in distribution channels, fraud detection, asset management, and product development are intended to generate transparency in claims management, fund management, and the overall understanding of insurance products. This development provides a more customer-focused systems view in the industry, in contrast to the traditional focus on insurance services that only included a single insurance provider and a customer. We define the digital ecosystem as a conglomerate of all interactions that an insurer has with its customers within all of the ranges of products and services that the insurer provides to them. The need to identify customers' hidden interest in insurance coverage without an insurance stimulus on the customer side is critical for the insurer in this context. Therefore, *service aggregation* is the third innovation pattern in the insurance industry. There, the service provider aggregates a plethora of services and makes them accessible through a single solution, such as in the dimensions of customer-ecosystems in Smart Home, Connected Health, Life, and Mobility. These dimensions also introduce our fourth innovation pattern *prosumption*, enabled through cloud-based services [Bö10] and the integration of advanced big data analytics in which the customer simultaneously uses and creates a service (e.g., such as when a user shares personal data with Google Maps when navigating with the aggregated real-time traffic information of other users) [RGB17, Ri18a].

This innovation pattern needs to be integrated within the organizational processes and

structure that set the third strategic implications of *restructuring the organization to enable DT*. Because of the mentioned change in customer demands, new competitors such as InsurTechs, and increasing pressure from digitalization, insurers need to reorganize and close the "digital gap." Providing a flexible and comprehensive IT infrastructure enables new ways to enhance efficiency. Handling business tasks without human interaction is critical in the insurance industry to increase efficiency and profitability. The field of application ranges from manually setting up workarounds to complex software on a virtual machine. Providing IT services in an appropriate environment of *cloud-based services* is the fifth innovation pattern [Bö10]. These services are built on a modular cloud infrastructure that enables quick scalability and, therefore, eliminates the boundaries of traditional insurance administration, products, or services that are bound to the capacities of the insurance institution. Here, the scalability is bound to the computing power of the cloud infrastructure provider [YBS08]. In an environment of constantly increasing demands coupled with enormous cost pressure, cloud-based services, big data analytics, and process automation can deliver high-quality work results on a flexible schedule and offer new business opportunities, thus strengthening the position in the ecosystem.

Fourth, insurers should *leverage in-house collaboration* and human resources. Most insurers are functionally and regionally organized with standardized processes. For a company in a changing and agile market environment and given new digital technologies, company employees must be able to position themselves differently and adopt a stronger entrepreneurial focus. New types of collaboration empowered through cloud-based services and the use of new forms of organization and working methods encounter different cultures, visions, goals, and strategies. In particular, cross-company collaboration and design are needed, as are cultivating an entrepreneurial attitude and promoting it among all managers and employees. This collaboration and design also include modern ways of working and other ways to consciously take risks and establish the associated culture of error, which also contributes to positive cultural development. Within the organization, specific individuals can be engaged with this role to evaluate action-oriented future opportunities and, as a consultant in a structured approach, make these opportunities transparent and conduct business development. Insurance companies should establish Smart Circles across functionalities, regions, and silos to support a culture of continuous collaboration between different roles such as underwriting, product development, asset management, claims, and distribution. The purpose of these circles is to develop a joint understanding of current business performance and to identify areas of opportunity and action that are both aligned and understood by all different roles.

The insurance industry belongs to the network economy and is shaped by complementary network effects. Thus, the industry behaves like a massively interconnected network of organizations, technologies, consumers, and products. Hence, our final strategic implication is to *integrate partners with complementary services in the ecosystem*. The insurance industry and its value proposition for customers was the result of independent developments of standardized products driven by a regulatory background. The execution focus was on developing customer insights, building core competencies, and beating the competition in price and efficiency. Thus, companies devoted less attention to external

companies that were neither competitors nor customers. However, in the insurance industry, this centralized and vertical perspective has changed significantly. The management of dependencies on a multitude of external complementary companies is relevant to success in strengthening the position in the ecosystem. For the right position in the ecosystem, suitable partners are an important factor [Ri18a, Ba04], such that an insurer and its partners create value for the customer through additional services, which is the seventh innovation pattern of *service integration*. Therefore, the success of an insurance company depends not only on its own quality but also on its ability to manage a landscape of multiple partners to meet the customer's desire for a comprehensive product and service offer. Furthermore, the integration of partnerships for data generation and analysis is critical for business success. Additionally, the emergence and creation of a *parallel universe*—the sixth innovation pattern—is particular to the case for blockchain technology [Ri18b] and peer-to-peer insurance. The case of Trov shows that insurance products or services can be substituted by connecting customers to new platform setups and incentives.

6   Discussion

Based on this work, five theoretical contributions arise. First, based on our analysis of 956 companies, we contribute to the literature on InsurTechs given that existing studies solely focus on the business model of InsurTechs or the transformation of the business model of established financial institutions [Pu17]. Second, by developing the generic, inter-organizational e3-value model of the insurance industry, including InsurTechs, we provide a macroeconomic overview of the current and ongoing transformation of the insurance industry. We identified 34 generic roles for traditional and emerging players in the insurance industry. Third, this study shows that DT is more than an intra-organizational phenomenon because it affects the entire ecosystem. Thus, we extend Fitzgerald et al. [Fi13], who understands DT primarily as an intra-organizational phenomenon. Fourth, based on the comparison of the traditional actors and the emerging InsurTechs and industry insights derived from interviews, we identified five strategic implications following seven inter-organizational innovation patterns. In particular, these patterns that drive the DT in the insurance industry through InsurTechs were missing [Pu17]. Fifth, we confirm the generic cloud computing ecosystem of Böhm et al. [Bö10] by showing that most of the innovation in the insurance industry is driven by cloud-based services.

Six practical contributions arise. First, decision makers, such as from traditional insurance institutions, can apply the model to identify potential threats to their current market positions, potential opportunities to adapt to trends, or shifts in customer needs. Second, we show that the different layers of innovation patterns influence and drive strategic implications for the DT of insurance companies. Third, we prove that the innovation pattern of the financial industry discovered by Riasanow et al. [Ri18a] is also valid in the insurance industry, such as the recombination of insurance services in the service integrator role or the intelligent combination of existing services to generate a new service in the service aggregator role. As is typical for DT, the roles show that the way that value

is delivered to the customer is changing [Pi15]. Fourth, the inter-organizational innovation patterns differ in magnitude and effect. The innovation prosumption pattern shows that this is also true for the insurance industry because consumers are co-creating value with insurance service providers. Fifth, blockchain as a disruptive technology may be understood as the most promising digital technology for traditional insurance institutions. In all categories of insurance products and services and payment, asset management, and financing, we found insurance-related or process-optimizing InsurTechs using blockchain technology. Sixth, from an ecosystem perspective, InsurTechs do not possess a significant market share, and a crowding out effect or disruption is not visible. However, a number of traditional insurance institutions and regulatory authorities are increasingly experimenting with new and innovative technology. Seventh, we see that new business models as peer-to-peer insurance do not necessarily represent a parallel universe in this context. Nevertheless, many products and services are under strict regulations from governmental authorities. Therefore, the extent of the impact of new technologies, such as blockchain or new business models, on traditional insurance institutions is unknown.

7   Limitations and Future Research

Our study is subject to limitations. First, the model is limited by the information provided by the Crunchbase database and our coding of the generic roles. Second, drawing on the value streams between the roles, we relied on publicly available information, such as company websites, reports, press articles, and annual reports. However, we established intercoder reliability among two independent coders with an alpha of 0.87. Third, we conducted seven semi-structured interviews with experts from the insurance industry or InsurTech founders to validate the proposed generic ecosystem and the presented strategic implications and innovation patterns [Ri18a]. Following Puschmann [Pu17], we suggest that future research detect intra-organizational, microeconomic innovation patterns. Second, we are curious to further investigate the developed strategic implications. Third, many InsurTechs offer their services on digital platforms [ZDS16]; however, we invite scholars to investigate the success factors for the digital platforms in the DT process of the industry that remain uncovered.

8   Conclusion

This paper presents the generic ecosystem for the insurance industry based on 34 generic roles of traditional financial institutions and InsurTechs identified by a structured content analysis of the Crunchbase data of 956 financial organizations. DT creates new roles for value creation in the insurance industry and, thus, affects the entire ecosystem. The ecosystem shows that robo advisors, big data, or short-term insurance providers penetrate the market and, thus, threaten the value creation of traditional insurance institutions. To discuss this phenomenon, we developed five strategic implications following seven inter-organizational patterns of the DT [Ri18a] in the insurance industry, such as the

development of a customer-centric voice through the aggregation of intermediaries or the integration of new services in the creation of customer ecosystems. Our work contributes to the literature on InsurTech and to the growing body of knowledge on DT. We encourage traditional insurance institutions to actively experiment with innovative technologies or to collaborate with emerging new players in the market.

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