Structural Change in Insurance: The Emergence of Comprehensive Value Networks

Albrecht Fritzsche[1], Alexander Bohnert[1]

[1] Friedrich-Alexander-Universität Erlangen-Nürnberg, School of Business and Economics, Nuremberg, Germany
{albrecht.fritzsche,alexander.bohnert}@fau.de

Abstract. In the course of the digital transformation, a convergence of business activities across different sectors of critical social infrastructure can be observed. This paper studies such convergences in the context of insurance and finds two distinctive patterns in current industry. One can be described as a bundling of offerings, the other as a bundling of value delivery. Especially the latter creates deeper interdependencies between the different sectors. This suggests that there is a need for a revision of current approaches to infrastructure security and the regulative measures to inforce it.

Keywords: Insurance, Digital Innovation, Value Networks, Ecosystems, Risk Management, Infrastructure.

1 Introduction

The insurance industry provides critical infrastructure to modern societies whose incapacity or destruction would have a debilitating impact on public and private life [1]. Critical infrastructure is usually subdivided into different sectors such as energy supply, healthcare, telecommunication or law enforcement, with separate administrative structures for control and regulation [2]. In the course of the past centuries, most industrialized countries have designed infrastructure in each sector to operate independently from one another. From a closer technical point of view, this design approach is still pursued today. However, there are several other kinds of interdependencies which must be taken into consideration [3]. Regarding the business applications built on the infrastructure, for example, a convergence across the sectors can be observed, which is driven by digital technologies. Although many households may still be connected to different network structures for gas, electricity, water, etc., smart digital services connect them all to the internet for data exchange, which in turn relies on communication networks and electricity sources. In a similar way, cashless payment creates an integral connection between financial transactions, telecommunication and energy supply. Whatever happens in one critical infrastructure will therefore directly affect the other sectors as well, whether it is an innovation that lowers transaction costs or a disturbance that affects the integrity of its systemic operation.

This paper explores similar phenomena of convergence in the context of insurance. In contrast to other research approaches which focus on operative issues and the robustness and resilience of finance and insurance to stress [4], the paper thus turns the attention to the business processes of the companies in studying convergence effects along the value chain. Based on the analysis of revelatory cases of offerings which are already on the market or in discussion among experts, the paper identifies two general patterns of convergence across different sectors of infrastructure. While the first pattern mainly concerns the customer interface and the bundling of offerings, the second one has much wider implications, as it affects the whole value delivery process in the insurance industry. The two patterns have different implications for further investigations of infrastructure from a network perspective. Business operations that follow the first pattern are still compatible with the treatment of infrastructure in each sector as a separate network. When it comes to the second pattern, this is not the case. Interdependencies across sectors are so strong that they must be considered as part of a common network.

2 Theoretical Background

As a critical infrastructure of modern societies, the insurance industry is subject to extensive legal regulation which puts strong constraints on its further development [5]. Nevertheless, the insurance industry does not remain untouched by the digital transformation, which creates various new challenges for the insurance value chain and the insurability of risks [6]. Digital technology has a direct impact on marketing and sales activities [7], business models and ecosystems [8], and internal company processes [9], [10]. It changes the role of insurance agents [11] and allows for more customer orientation [12], as well as increased competition due to a wider reach and more transparency and comparability of online offerings [13], [14]. With a gradual change of regulatory measures, further potential for development can be created [15]. Insurance and financial products become more closely related [16] and the available information can be used for additional purposes [17], [18].

Recent findings suggest a positive relationship between business performance and comprehensive digital agendas [19], which address the transformation of internal operations as well as the exchange with customers and business partners. The digital transformation can thus be said to go along with the development of a new understanding of insurance [20], which also gives space to new organizational forms [21]. This corresponds with a wider notion of digital innovation as a larger process, reaching across organizational boundaries up to the customer [22], [23]. Digital innovation has a horizontal and a vertical dimension, concerning a variety of different operations which have to be performed at the same time and different layers on which novelty can surface [24]. In this sense, the impact of the digital transformation concerns not only subject and the operational structure of business activities, but also the involvement of stakeholders in larger ecosystems and the ways how value is created [25].

With increasing speed in which changes occur in technology and business operation, network structures are in a state of continuous development, in which external

forces can exert influence on numerous occasions. As a result of the abovementioned considerations, such forces need to be studied not only on the operational level where the actual configuration of the network finds expression, but also on other levels where decisions about the distribution of workload between different actors and the resulting value are made. As already mentioned in the introduction, these layers provide the focus for the study of convergence phenomena presented here.

3 Research Design and Case Vignettes

This paper studies patterns of convergence across different sectors of infrastructure from the perspective of the insurance industry. It presents evidence from revelatory cases, which provide particularly important insights into the phenomenon [26]. In order to collect such cases, the paper uses three sources of information: (1) annual reports and other official publications from insurance companies, (2) focus group discussions with experts from industry, and (3) internet search with keywords gained from the other two information sources to further expand the data basis and increase the breadth of the investigation. The study focusses on the European market for insurances, due to the fact that infrastructures and their management have generally reached a particularly high level of maturity in Europe when compared to other continents. Focus group discussions were mainly conducted at the International Insurance Society Global Insurance Forum held in Berlin in 2018. The internet was accessed from computers in Germany, such that a bias in favour of the German industry must be taken into consideration, although offerings from other countries are also reflected in the collected data.

As the paper is not interested in individual offerings but their underlying structure, the cases are condensed to case vignettes [27], which give insight into the business logic of the different offerings without taking specific characteristics into account. The usage of case vignettes also helps to alleviate all concerns of the experts involved about the undue disclosure of strategies and practices within the companies. While the case vignettes result from the aggregation of single cases, they are accompanied with specific illustrations for the general business logic, such that practical applications can be more easily discussed. Table 1 gives a brief overview of the vignettes that were created from the input material.

Table 1. Case vignettes and infrastructure sectors involved in value delivery

No.	*Title*	*Illustration*	*Sectors involved*
1	Multi-sector online marketplace	An online portal for air travel allows a combined purchase of tickets, accommodation, travel insurance, medical and other services.	Insurance, hospitality, transportation, health
2	Intermediary for specific target groups	A motorists association offers road assistance, rescue, travel information, driver training and different kinds of insurance related to driving.	Insurance, health, transportation, education

No.	*Title*	*Illustration*	*Sectors involved*
3	Extended customer services	A life insurer recommends additional services such as routine health checks, prevention courses, or other long-term financial products.	Insurance, health, finance, education
4	Product servitization	An automotive manufacturer sells mobility packages which ensure that customers always have travel options, independently from a specific car.	Telecommunication, insurance, transportation
5	Comprehensive smart solutions	A smart homes provider offers package deals for access control, fire prevention, energy optimization, fire, loss and damage insurance.	Telecommunication, insurance, security, energy
6	Assisted living	A health insurer supports clients with mobile personal devices in decision making and assists in financial transactions.	Telecommunication, insurance, health, finance

While there are various other illustrations for the different vignettes which can be used as well, the following considerations focus on those given in Table 1, such that any confusion can be avoided.

4 Analysis

Vignettes 1-3 are already implemented in various forms. They have reached a considerable level of maturity. In contrast, Vignettes 4-6 are still in an emergent state and have only partially reached the market. However, they receive a lot of attention among experts in the field. All six vignettes follow platform logics and rely on strategic alliances, where the participating companies play very different roles. In Vignette 3 and Vignette 6, the insurance company assumes the role of a platform leader, while it only appears as a complementary contributor in the others. For the customer interface at the moment when the contractual agreement is reached, the situation looks quite similar. However, one can think of different ways to structure the customer interaction in the following steps of service provision.

In Vignettes 1-3, digital technology appears as a facilitator, but it is not necessarily essential for the business logic. While e-business might provide the most efficient, far-reaching and accessible implementations, the underlying logic does not require it. In fact, first experiences with merging offers as described in Vignettes 1-3 have already been made before the internet became popular. Patterns of convergence can mainly be recognized in the first contact with the customer and the establishment of contracts. In consequence, a fair amount of customer data is also being shared between contributors from different sectors, although the eventual data set on which each company operates is still very likely separate and enriched by additional information which the other companies do not have. As all companies remain individually responsible in their respective domains, convergence in Vignette 1-3 can be said to concern solely the bundling of offerings. The subsequent value creation processes are governed by separate contractual agreements and remain in different hands. As a

consequence, the operational networks in each sector can still be managed separately, even if strategic decision making requires larger arrangements.

In comparison to the aforementioned examples, Vignettes 4-6 show a pattern of convergence which reaches further down into the delivery process. All contributions from the different companies are integral parts of a common business offering which is the subject of one general contract. In the fulfilment of the contract, the available delivery systems can be utilized in different ways: mobility can result from reliable planning and fail-safe technology or from good risk and accident management; health can result from a precautionary life-style with suitable algorithmic decision support or from good care-taking in case of diseases. As the customer pays for the complete package, the consortium of companies has some freedom of choice in the distribution of efforts and revenues between the different companies which are involved, for example by favouring the most efficient delivery systems. This creates interdependencies in the development of the respective infrastructures.

Mobile, connected digital devices also make it possible to include the customer as an active resource in the delivery process. On the one hand, the devices can be used to exert more influence on customer behaviour; on the other hand, the response to the customer to these influences can be used as input for a dynamic adaptation of risk calculations and precautionary measures. Both requires a continuous data exchange between the customers and insurers, as well as a co-operation with the providers of health, transportation or other infrastructure in order to gain an understanding of the actual effects of customer behaviour.

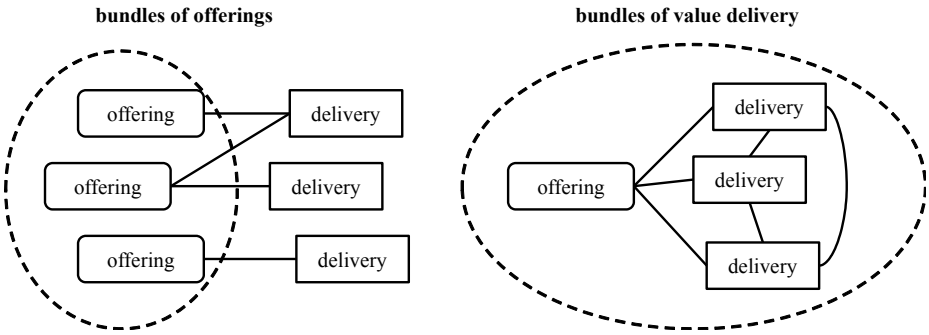

Figure 1. convergence patterns in the case vignettes

Figure 1 gives a brief overview of the two different patterns of convergence found in the case vignettes. While the pattern on the left shows a bundling of value offerings, the pattern on the right can rather be described as a bundling of value delivery with mutual dependencies between the operations of all parties which are involved.

5 Discussion

Bundles of offerings, which are made available on different kinds of platforms, create network effects for the benefit of all participants. By making suitable products or

services available at the same time, sales can be increased in scale and contractual agreements can be made more efficiently. Subsequent interaction with the customer, however, can proceed separately. Insurers, telecommunication, transport and healthcare providers, etc. carry out their operations independently from each other. This is not the case when the bundling expands further into value delivery processes. The customer now faces the entire platform as a counterpart in contractual agreements, which provides mobility, security or quality of life as a whole. Decisions about the utilization of different sectors of infrastructure are taken out of the hand of the customer and integrated into the delivery process, which allows further optimizations in the distribution of the workload and revenues across all parties that are involved.

Such phenomena of convergence create new opportunities for insurance companies to expand their business activities, but they also create new risks. Insurance companies have access to large amounts of customer data and possess the necessary expertise to make efficient use of them, especially in the provision of comprehensive solutions for security and quality of life. At the same time, however, they are constrained by legal regulation and also by tradition focussed on very specific business practices, which puts them at disadvantage in comparison to social network providers and other companies which can relate to the whole bandwidth of human experience. It is therefore unlikely that insurance companies can take a leading role in the platform economy, apart from specific cases concerning highly sensitive data which require specific attention and trustworthiness in the eyes of the customers.

As contributors to larger bundles of offerings, insurances companies expose themselves to stronger market dynamics, as they become dependent on more volatile economic developments in other sectors. This effect is further increased if the bundling expands into value delivery, such that their core business cannot further proceed without their partners in telecommunication, healthcare, security etc. If risk calculations begin to rely on a continuous stream of data about customer behaviour and the possibility to intervene with it, problems with critical infrastructure in other sectors will also have a direct effect on insurance.

It should also be noted that an optimized utilization of different sectors of infrastructure in bundles of value delivery creates different incentives for the further development of infrastructure. Without regulative interventions, sectors in which infrastructure is already strong are likely to be favoured, while the others receive an increasingly worse treatment. As a systemic structure, they might sustain their operative integrity, but lose their ability to handle larger workload and adapt to social change.

6 Conclusion and outlook

Critical infrastructure risks have lately been discussed extensively, in particular on the background of cybersecurity threats [28] and natural disasters [29]. This paper takes a different approach in looking at the implications of convergence in business activities across different sectors of infrastructure. The focus of the investigation is set on insurance, which has lately shown various signs of opening up to new types of offerings and business models in the course of the digital transformation, which relate them

more closely to other sectors of infrastructure in various different ways. Based on an explorative study in industry, two different patterns of convergence could be identified, which have been described here as a bundling of offerings and a bundling of value delivery. Both are based on the concept of platform business solutions. However, they show important differences in terms of the interdependencies they create between the different activities that they involve. Approaches to critical infrastructure which only look at operational integrity in specific sectors are not able to address such interdependencies in an appropriate way and therefore likely to miss some of the risks that result from it.

Due to the heterogeneity of critical infrastructure in different sectors, specific findings in the context of insurance may not be easily transferable. Nevertheless, there is good reason to believe that the general problem of converging business operations in the course of the digital transformation applies to all sectors of critical infrastructure in some way. Further research is necessary to gain a better understanding of the implications of this phenomenon for the design of digital business applications and the regulative measures which must be taken to avoid negative consequences for society.

References

1. Department of Homeland Security: National Infrastructure Protection Plan. https://www.dhs.gov/national-infrastructure-protection-plan (Accessed: 01.09.2018)
2. Alcaraz, C., Zeadally, S.: Critical Infrastructure Protection: Requirements and Challenges for the 21st Century. International Journal of Critical Infrastructure Protection, 8, 53–66 (2015)
3. Rinaldi, S. M., Peerenboom, J. P., Kelly, T. K.: Identifying, Understanding, and Analyzing Critical Infrastructure Interdependencies. IEEE Control Systems, 21(6), 11–25 (2001)
4. Frame, W. S.,White, L. J.: Technological change, financial innovation, and diffusion in banking. In: Berger, A. N., Molyneoux, P., Wilson, J. O. S. (eds.) The Oxford Handbook of Banking, vol. 1, pp. 271–291 (2012)
5. Meier, K. J.: The Political Economy of Regulation: The Case of Insurance. The State University of New York Press, Albany (1988)
6. Eling, M., Lehmann, M.: The Impact of Digitalization on the Insurance Value Chain and the Insurability of Risks. Geneva Papers on Risk and Insurance – Issues and Practice, 43(3), 359–396 (2018)
7. Seitz, M.: Online Insurance Management among German Farmers. In: The Proceedings of the 17th International Joint Conference Central and Eastern Europe in the Changing Business Environment, pp. 212–220 (2017)
8. Desyllas, P., Sako, M.: Profiting from Business Model Innovation: Evidence from Pay-As-You-Drive Auto Insurance. Research Policy, 42(1), 101–116 (2013)
9. Schmidt, R., Möhring, M., Bär, F., Zimmermann, A.: The Impact of Digitization on Information System Design – An Explorative Case Study of Digitization in the Insurance Business. Business Information Systems Workshops, 137–149 (2017)
10. Barkur, G., Varambally, K. V. M., Rodrigues, L. R.: Insurance Sector Dynamics: Towards Transformation into Learning Organization. The Learning Organization, 14(6), 510–523 (2007)

11. Eastman, J. K., Eastman, A. D., Eastman, K. L.: Insurance Sales Agents and the Internet: The Relationship Between Opinion, Leadership Subjective Knowledge, and Internet Attitudes. Journal of Marketing Management, 18, 259–285 (2002)
12. Kaiser, J.: The Customer Shall Lead: E-Business Solutions for the New Insurance Industry. Geneva Papers on Risk and Insurance – Issues and Practice, 27(1), 134–145 (2002)
13. Schulte-Noelle, H.: Technological Changes in IT and Their Influence on Insurance: The Change Ahead (I). Geneva Papers on Risk and Insurance – Issues and Practice, 26(1), 83–88 (2001)
14. Taylor, M.: Technological Changes in IT and Their Influence on Insurance: The Change Ahead (II). Geneva Papers on Risk and Insurance – Issues and Practice, 26(1), 89–104 (2001)
15. Meyer, S., Krohm, G.: An Overview of Regulatory Developments of Insurance Transactions on the Internet. Journal of Insurance Regulation, 17(4), 551–554 (1999)
16. Beltratti, A., Corvino, G.: Why are Insurance Companies Different? The Limits of Convergence among Financial Institutions. Geneva Papers on Risk and Insurance – Issues and Practice, 33(3), 363–388 (2008)
17. Seog, S. H.: Insurance Markets with Differential Information. Journal of Risk and Insurance, 76(2), 279–294 (2009)
18. Schmidt, R., Möhring, M., Bär, F., Zimmermann, A.: The Impact of Digitization on Information System Design – An Explorative Case Study of Digitization in the Insurance Business. Business Information Systems Workshops, 137–149 (2017)
19. Bohnert, A., Fritzsche, A., Gregor S.: Digital Agendas in the Insurance Industry: The Importance of Comprehensive Approaches. Geneva Papers on Risk and Insurance – Issues and Practice, 44(1), 1–19 (2019)
20. Nicoletti, B.: Digital Insurance: Business Innovation in the Post-Crisis Era. Palgrave MacMillan, London (2016)
21. Zwack, T., Habicht, H., Lüdemann, V.: Peer-to-Peer-Absicherung privater Risiken: Eine Exploration am Beispiel von Wildschaden. Zeitschrift für die gesamte Versicherungswissenschaft, 105(4), 325–353 (2016)
22. Nambisan, S., Lyytinen, K., Majchrzak, A., Song, S.: Digital Innovation Management: Reinventing Innovation Management Research in a Digital World. MIS Quarterly, 41(1), 223–238 (2017)
23. Fichman, R. G., Dos Santos, B. L., Zheng, Z.: Digital Innovation as a Fundamental and Powerful Concept in the Information Systems Curriculum. MIS Quarterly, 38(2), 329–353 (2014)
24. Yoo, Y., Henfridsson, O., Lyytinen, K.: Research Commentary: The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. Information Systems Research, 21(4), 724–735 (2010)
25. Skog, D. A., Wimelius, H., Sandberg, J.: Digital Disruption. Business & Information Systems Engineering, 53, 1–7 (2018)
26. Yin, R. K.: Case Study Research Design and Methods (5th ed.). Thousand Oaks, CA: Sage (2014)
27. Spalding, N. J., Phillips, T.: Exploring the Use of Vignettes: From Validity to Trustworthiness. Qualitative Health Research, 17(7), 954–962 (2007)
28. Luiijf, E., Žutautaitė, I., Hämmerli B. M. (eds.): 13th International Conference, CRITIS 2018, Kaunas, Lithuania, September 24–26, 2018, Revised Selected Papers (2018)
29. Pescaroli, G., Alexander, D.: Critical Infrastructure, Panarchies and the Vulnerability Paths of Cascading Disasters. Natural Hazards, 82(1), 175–192 (2016)