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THE VALUE OF INNOVATIVE TECHNOLOGIES FOR CUSTOMER-CENTRIC BUSINESS MODELS IN CAR AND HEALTH INSURANCE

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The value of innovative technologies for customer-centric business models in car and health insurance

Abstract: This work aims to serve established European car and health insurer understand pan-European customer needs and make recommendations how to address these needs with and without using technology. 167 customers from 10 European countries were surveyed. As a result, it could be identified technology is not the most important driver of an insurer's business success, it is the trust of their customers. Nevertheless, it was elaborated that AI provides the highest economic value for car and health insurer. This trust advantage over new competitors is to be used as a lever to maintain relevance and customer-centricity by deploying innovative technologies.

Keywords: Car Insurance; Health Insurance; Customer Centricity; Artificial Intelligence

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1 Introduction

In the past, there was little innovation in the insurance industry and technology trends entered business models with less dynamic (Cooper, 2018). The low involvement of insurance products and stable margins gave no reason to advance technologically. However, with the rise of the GAFA (Google, Amazon, Facebook, Apple) companies, expectations of consumers have changed. Personalized content, highly engaging products and a central access to a range of services set new standards for how customers are served. Exemplifying for how GAFA companies set new standards is the Fire TV Stick from Amazon. The order can be placed anytime from anywhere. The delivery can be done within one day. Once plugged into the TV, you are recognized by your name. You are automatically connected to the Wi-Fi and you are automatically logged into your Amazon Prime account to continue watching your favorite TV shows. This is called customer centricity. This kind of customer centricity is getting more and more adopted cross-industry. The banking industry was first exposed to this development. GAFA companies and startups have been the first to recognize and meet changing customer needs by offering services that go beyond the traditional business model, such as wireless payments, mobile-first approaches, and personalized services like spending categorization.

Now, the insurance industry is under pressure to innovate and adopt new technologies. To the question of which technologies these can be, ZhongAn has found an answer. According to China's biggest online insurer with over 400 million customers, Blockchain, Cloud Computing, Smart Devices and Artificial Intelligence are among the technologies to change the industry (Accenture, 2019b). Reflected in Hypothesis 1, these technologies have been chosen to appraise their economic value for car and health insurer.

Hypothesis 1: Artificial Intelligence is the technology with most economic value for a customer-centric car and health insurer

Still, is it not absurd that the most customer-centric companies like Amazon do not enjoy the most trust by customers? (Capgemini, 2018). Hence, the question arises to what extent such success models can be adopted in the same way in the insurance industry, that is based on trust. This question is reflected in the Hypothesis 2.

Hypothesis 2: Technology is the most relevant driver for an insurer's economic success

As Europe's largest insurance company, Allianz enjoys great trust (Yahoo finance, 2020). Allianz identified a cross-country persona with similar needs and aligned its strategy to meet these needs with one master product for the entire European market (Allianz, 2018).

The survey conducted as part of this work, for the first time, provides a pan-European view of how consumers regard innovation, data sharing and technology in car and health insurance. It also provides an answer to the question of whether an Allianz-like model is promising, or customer needs vary significantly across countries.

Lastly, car and health insurance are chosen for a reason. New business models like car sharing, ridesharing or electric scooters are changing mobility needs of individuals and thus the expectations on car insurance. The relevance for health insurance arises from the fact that it affects each and every one of European's 743 million citizens (Statista, 2020b). Additionally, COVID-19 circumstances illustrate that customers choose trusted brands and pay more attention to their personal health (GSK, 2020). In this work, focus is primarily on private health insurance, as it is less subject to legal regulations and more closely aligned with economic market principles.

Ultimately, this work aims to serve established European insurers understand pan-European insurance needs and make recommendations on how to address these needs with and without the use of latest technologies. In addition, the aim is to propose key technologies whose implementation makes most economic sense. The methodology of this thesis is as follows: First, key characteristics of the four technologies are described. Afterwards, customer centricity and the business model of car and health insurers is explained. The next part is related to the survey.

In addition to methodology and demographics, results are outlined and compared with other studies. As part of the discussion, first technology fit to customer needs is discussed. Then a framework is presented and applied to assess the economic value for each technology in car and health insurance. Subsequently, recommendations are made to car and health insurer. Lastly, possible limitations of this study are discussed, the two hypotheses are answered, and a brief outlook is given.

2 Innovative technologies in the insurance industry

2.1 Blockchain

A blockchain can be described as a decentralized database for the permanent and irreversible record of transactions or information attached to them, distributed among a network of nodes (Crosby et al., 2016). A chain results from the linkage of individual blocks of transactions.

A distinction can be made between public and private blockchains. In private blockchains, the operator decides on permission and participation rights in the network (Hans et al., 2017). To only allow access to policyholders of an insurer, a private blockchain is most applicable.

Peer-to-Peer: As interaction only takes place directly between individual parties, the role of an intermediary is obsolete. In this manner, no information can be seized by an intermediary.

Transparency: All transactions ever recorded are traceable for all users at all times in the order in which they were included in the blockchain (Crosby et al., 2016).

Consensus: The trust and control function of an intermediary is substituted by consensus building among all network participants. Trust is created as each transaction and new block is verified by each participant against criteria before being distributed to peers (Antonopoulos, 2015).

Immutability: A blockchain is considered immutable. The only way possible to manipulate transactions is by having enough computation power to build a separate chain, faster than the original chain. As participants always accept the longest chain existing, they eventually recognize the separate chain as original. (Antonopoulos, 2015). Considering Bitcoin, it would need

51% of the existing computation power to manipulate the chain. This is almost impossible as the computing power required for this, would demand an electricity consumption of half of Switzerland (Baraniuk, 2019). However, past attacks on less computation intensive networks revealed that blockchains are vulnerable to so called 51% attacks (LedgerOps, 2019).

Data Security: To access or share information, a private key that can be considered a password, and is only known to the owner, must be provided to solve an irreversible mathematical function (Antonopoulos, 2015). As the private key cannot be inferred, the only option to obtain a private key is trial and error. This can take 2^{256} attempts and decades versus hours for conventional passwords (Sectigo, 2020). However, if a private key is lost or stolen, it is not possible for the owner to regain access to their data (Deloitte, 2017a).

Scalability: Highly secure blockchains like Bitcoin lack in scalability as it takes 10 minutes to confirm a transaction (Croman et al., 2016). The redundant storage of the ledger can imply high storage needs for the individual. Other blockchains increase scalability by chaining transactions directly and disclosing only relevant transactions to the individual (R3, 2020b).

2.2 Smart devices

In this work, smart devices refer to wearables and smartphones. Wearables are defined as electronic devices to perform computing functions that can be worn on the body (Verma et al., 2017). Smartphones relate to portable computing devices that are connected to the internet, equipped with sensors and touchscreens to interact with them (Oxford Dictionary, 2020). Frequently, the term telematics is used in car insurance. It denotes a composition of telecommunication and informatics and relates to the use of wireless devices to transmit data provided by sensors (Gartner, 2020). Expanding this definition, telematics also include the downstream inference of specific measures from sensor data, such as acceleration or hard braking.

Capture data: Built-in sensors like GPS, Bluetooth, Wi-Fi, cellular and external complementary sensor systems like accelerometers and gyroscopes are utilized to capture data related to

motion (Wahlstrom, Skog, and Handel, 2017). Wearables can be employed to measure specific data like sleep, blood sugar and pressure, heart rate, stress, or weight (Spender et al., 2019).

Precision: Since smartphones are not specifically designed to collect automotive or health data, the diversity of sensors must be used to derive measures accurately (Meng, Mao, and Choudhury, 2014). Nonetheless, also more specific wearables can lack precision, and discrepancies between devices may occur (Buckle et al., 2020). Problems also arise, if measures are derived rather than directly captured (Spender et al., 2019).

Ubiquity: Today, around 80% of European citizens own a smartphone (Wigginton, Curran, and Brodeur, 2017). Decreasing selling prices for wearables and smartphones continue to ensure a large diffusion (Gartner, 2019; IDC, 2020).

Applications (short apps): Apps are software programs adapted to smart devices that provide an direct interface to company's standard service offerings (Flick and Morehouse, 2005). Serving as central access point to company's services, users can conveniently access them and retrieve information anytime and anywhere (Nisar, 2018).

2.3 Cloud computing

Cloud computing refers to the outsourcing of computation power and data storage to a network of remote servers (Sheng et al., 2017). Cloud hereby stands for a virtualized IT resource which is not physically present at the user's location (Marks and Lozano, 2010). If such IT resource is located on the company's premises, this is referred to as on-premise (Zwicker, 2018).

On-demand & Collaboration: Cloud services can be accessed on-demand and from anywhere over the internet. By contrast, on-premise solutions imply only local access to data and applications. To access data outside the company or share it with external service providers, data must be downloaded or sent via less secure protocols (Leroy, Fontenay, and Murugavel, 2018).

Variability: Users only pay for resources when needed (Sheng et al., 2017). More fundamental, with the use of on-demand cloud computing, insurers convert fixed costs to variable costs. Thus,

the investment risk of IT resources is minimized and no large amount of cash upfront is required.

Scalability: Users can quickly scale up computation capacity when required (Salesforce, 2020). Cloud solutions enable automatic capacity adjustment to peak service demands (Barr, 2018).

Speed: The installation and integration of a new on-premise server can take days to weeks, whereas as a new cloud-based server can be accessed within minutes (Sheng et al., 2017).

Security: Gartner concludes that on-premise solutions are 60% more exposed to cyber-attacks than cloud solutions (Smith, 2017). This shows that hackers consider on-premise infrastructures as more vulnerable than the cloud. It also requires a significantly larger staff to withstand these attacks (Smith, 2017). Since the business model of cloud providers is based on the secure handling of data, they have an even greater interest in ensuring security than end-user organizations. In addition, cloud operators provide 24/7 security monitoring and response (Smith, 2017).

2.4 Artificial intelligence

Artificial intelligence (AI) can be defined as the design of computer systems, capable of performing human-like tasks such as perceiving, classifying, learning, abstracting, inferring, and acting (MIT, 2020; Oxford Reference, 2020). Generally, AI can be subdivided into Machine Learning (ML) and Deep Learning (DL) (Copeland, 2016). Simple forms of AI can be regarded expert systems (if-then statements). The key difference to ML and DL is that simple forms of AI require human action to adjust parameters of the function or statement. In ML and DL, the setting of parameters is completely done by the machine itself (Mueller and Massaron, 2018). In the following, simple forms of AI are left aside, and the use of AI refers to ML and DL explicitly. As there is no superior AI model existing, choosing one model over the other is a question of the specific problem to be solved (Mueller and Massaron, 2018). In ML and DL, the function to the desired output is not known at first. To obtain such function, an algorithm identifies certain features of a given input and evaluates their extent to then come up with unique classes or numeric values (output) (Mueller and Massaron, 2018).

Training: To infer an output with high certainty, a model needs to be trained. Training refers to the process of providing a model with known input data in order to provide feedback on the correctness of the inferred output by the model. Dependent on the design, only 0.1% of outputs need human feedback (Deepmind, 2017). If the inferred output does not match the desired one, the model adjusts certain parameters of the function (LeCun, 2020). The amount of training data is important as insufficient data may lead to the use of training records that are irrelevant to the inference, also called overfitting (Ahrens, Ahrens, and Schotten, 2019).

Recommender systems: Applying an AI model to new customer data, it recognizes similar features to those found in training data to recommend the same output (Qazi et al., 2020).

Anomaly detection: Based on historic data a confidence region is set, within this region outputs are declared to be of normal pronunciation. Applying such model to current data, determines whether the input can be assumed normal or abnormal (Ahrens, Ahrens, and Schotten, 2019).

Prediction: Leveraging historic data and real-time data from external sources, enables to predict future outcomes (Mueller and Massaron, 2018).

Volume: The number of inputs that can be considered by AI models in decision making is significantly larger than for humans (Nintex, 2018).

Bias: In general, the probability of biased data is especially high if training data captures the decisions of a rather small number of people or certain input features are overrepresented in a training dataset (DeBrusk, 2018).

3 Customer-centric business model

3.1 Customer centricity

Putting the customer at core of all business activities and responding to the customer's changing needs and expectations refers to customer centricity (Al-Qahtani, 2015). In the following, the 6-pillar customer first approach developed by KPMG is presented, to later identify how addressing requested customer needs makes an insurer customer-centric (Hernandez, 2020).

Integrity: A company is perceived to be doing the right thing, both on a personal and corporate level. They act fairly and in consumer's best interest to eventually create trust.

Resolution: The focus lays on the response to needs and finding solutions, rather than products. Customer needs are addressed rapidly, and companies are willing to go the extra mile.

Expectations: To satisfy customers, the actual service delivery must meet or exceed expectations. Therefore, it is essential to set expectations accurately and fulfill them consistently.

Empathy: Safety and wellbeing of customers is made the prime concern. Companies show that they care by investing extra time to understand customer's need and explain things to them. The company is willing to deviate from general policies in order to help the customer.

Personalization: Personalization refers to understanding the customer's individual circumstances and tailoring services to meet their specific needs. Services are offered that are relevant to the individual and put them back in control to encourage an emotional connection.

Time and Effort: Efforts are reduced in all customer engagements, so customers accomplish their objectives quickly and easily. Information is provided when needed, and waiting times are minimized. It is made sure that customers know what to do next in their task or purchase.

3.2 Car insurance business model

As for all private insurances, the objective of a car insurer is to make profit or at least as much revenue in premiums as reimbursements for claims and operating costs. The value proposition to customers is that in case of an incident the policyholder does not bear the cost of the damage in full. They rather pay an insurance premium in fixed intervals. To protect consumers from high losses, car insurance is mandatory in the EU (Your Europe). The idea is to cover risk of an individual by distributing it across all policyholders. The here underlying principle is that premiums paid by individuals, that are not affected by any incident, are used to cover incidents that occur in the risk-sharing community (BearingPoint, 2019). Such incidents refer to causing an accident or any other form of damage to or by a car to individuals (Ross, 2015). This business

model is based on a high level of mutual trust. On the one hand, the insurance company must trust the customer that damages have not been incurred intentionally (fraud). On the other hand, the customer must trust the insurer that it is willing and economically able to compensate them in the event of an incident.

3.3 Health insurance business model

The business model of health insurers varies between the character of the insurer. In the EU three different types of health insurance exist. First, there are National Health Systems (NHS) which are governmental controlled and operated. They are financed by taxes and ensure every citizen access to health care. Second, there are Social Security Systems (SSS) which are governmental controlled, but privately operated. They allow the coexistence of several health insurers (Aragonés, 2019). However, insurers are not allowed by law to make profits (Euro-Informationen, 2020). Unlike the NHS model, SSS have various sources of funding. These can be subsidies from the government or customer and employer contributions (BMG, 2019). Contributions to the health care system vary across society because they are related to income levels. Such a solidarity system ensures that the sick and elderly receive the services they need, regardless of their financial means. The third option to be health insured is to enter private health insurance. The principle of SSS and private insurance remains the same as for car insurer, which is to use premiums of individuals that currently do not need medical services, to provide health care to the ones in need.

4 Survey

4.1 Methodology and Demographics

The survey consisted of 5 parts: An *Introduction* part, with questions about awareness and use of mobile apps of insurers, as well as to the perception of GAFA companies and startups. A *Car Insurance* related part. A *Health Insurance* related part. An *Insurance Interaction* part, in which participants were asked when and how they engage with insurers. And a *Demographics*

part. The tool used to conduct the survey was *Typeform*. Aside from an English version there was also a German one. In the 17 days (from 13.11-30.11) that the survey was online, altogether 167 responses were recorded. Taking both versions together, about 78% (167/214) of people who started the survey completed it. The participation was voluntarily, and all questions had to be answered to be recorded as one response. On average it took a respondent 9:55 minutes to complete the survey. The knowledge of participants towards insurance innovations was not known beforehand. To make sure all participants were on the same level, less familiar concepts have been explained. The demographics were the following:

Gender	*%*	*Abs.*	**Age**	*%*	*Abs.*	**Country of birth**	*%*	*Abs.*	**Profession**	*%*	*Abs.*	**Education level**	*%*	*Abs.*
Female	49	*(83)*	**18 or younger**	4	*(7)*	**Germany**	61	*(102)*	**Student**	56	*(93)*	**Graduate Degree**	44	*(73)*
Male	51	*(85)*	**19-23**	36	*(60)*	**Portugal**	23	*(39)*	**Employed full-time**	24	*(40)*	**Undergraduate Degree**	41	*(69)*
Other	0	*(0)*	**24-39**	38	*(63)*	**Poland**	2	*(4)*	**Self-employed**	5	*(9)*	**High School**	10	*(17)*
			40-55	8	*(13)*	**Italy**	2	*(4)*	**Employed part-time**	5	*(9)*	**Some College/ University**	2	*(3)*
			56-64	12	*(20)*	**Morocco**	2	*(3)*	**Other**	4	*(6)*	**Doctorate**	1	*(2)*
			65 or older	2	*(4)*	**France**	1	*(2)*	**Retired**	2	*(4)*	**Vocational training**	1	*(2)*
						USA	1	*(2)*	**Interning**	2	*(4)*	**Less than High School**	<1	*(1)*
						Remaining	7	*(11)*	**Unemployed**	1	*(2)*			

The data was processed and analyzed with the use of Microsoft Excel. Averages and relative frequencies were built and evaluated as to whether they varied across demographics. The academic degree of participants was rather high and may vary from an insurer customer base. Affecting every citizen, the demographics of a health insurer are reflected in those of an entire country. Age groups are relatively well distributed in car insurance (Statista, 2020). Accordingly, this survey does not fully represent the customer base of either auto or health insurers, as the 19-23 and 24-39 age groups are slightly overrepresented in the survey (For survey and results see Appendix 1, for data see Excel file).

4.2 Results

Introduction and Insurance Interaction

40.1% of participants indicated they were aware of whether their insurer had a mobile app or not (1c). The awareness was notably lower for those under 24 (29.9%). These 40.1% were

furthermore asked, if they use services provided within such app. The most frequent answer was *Never*, accounting for over a third of answers (1d). On a likelihood scale, 58.1% chose to *Probably not* or even *Definitely not* more likely to entrust their data rather to a GAFA company than to their insurer (1e). To compare awareness, sympathy, purchase intention, and past purchases of incumbents and startups, participants were shown mobile websites from incumbents and startups. 69.5% were aware of at least one of the incumbent providers mentioned, compared to 23.4% for startups. Similarly, past purchases were higher for incumbents. Sympathy as well as purchase intent were significantly higher for incumbents, at 40.7% versus 19.2% for startups (1f, 1g). For Portuguese respondents this difference was even more pronounced. 67.7% were *Definitely not* or *Probably not* open to buy insurance products from foreign countries such as the U.S. or China (4a). Women were almost 10 percentage points more skeptical then men. Students were still the most open to foreign insurance policies. Half of participants named *Friends and Family* as their first point of contact when experiencing symptoms of illness; among Portuguese, the figure was as high as three quarters. 22.4% of men choose *Google* as their first point of contact, compared to 9.8% of women. This response option was also particularly pronounced in the age group of 24-39 (28.6%) (4b). If insurers would provide medically founded and fast answers to physical complaints, 8 in 10 would consult such service, *Sometimes* or even more often (4c). Only 4% were visiting an insurance agency *Sometimes* or more often (4d). Major reason for not visiting was the ubiquity of online information and the time consumption of such visit (4e_2).

Car insurance

Only 5.4% of participants declared to use a telematic based policy (2a). There was no Portuguese among telematics users. Women were more likely to have such policy (7.3%). Across respondents, almost 3 quarters were neutral or positive about telematic based pricing (2b). However, also 1 quarter remained sceptic, especially men. From fulltime working participants who

chose to *Definitely not* prefer telematic based pricing, 80% were male. Less than 11% stated to not appreciate a car ecosystem (2c). An ecosystem refers to a partner network or "one-stop-shop" operated by an insurer to provide a range of services in one integrated experience to meet various needs, here related to car. The willingness to provide personal data was highest for receiving *Lower prices.* From the three possible selections per participant, 34.1% choose at least once *Data Security and Transparency* (2d). *Individual services* were especially chosen by 19-39 year olds, at 30.1%. Moreover, 81.7% of women were willing to change their driving behavior for *Higher safety of other road users*, versus 44.7% of men (2e). 28.2% of men were not willing to change their driving.

Health insurance

11.4% of all respondents use a fitness reward program of their health insurer. Only 4.5% of individuals younger than 24 are committed to such a program (3f). No Portuguese was committed to such program. Compared to pricing based on personal driving, pricing based on personal fitness was less appreciated. 65.9% were potentially open to such pricing method (3a). In the over 40 age groups, less than half of respondents were neutral or positive about pricing based on personal fitness. In comparison, appreciation for a health ecosystem was higher than for cars (52.7%). 62.3% of respondents would *Probably* or *Definitely* appreciate an ecosystem (3b). In terms of willingness to provide personal data, *Individual Services* was selected by 43.1%, only 3 percentage points less than most chosen *Lower Prices* option. From three choices allowed, 24.6% of respondents chose at least once *Benefits for Society* (40.7% for car insurer) (3c). No other nation like the Portuguese considered such benefits more important. For several incentives, consumers were willing to live a healthier lifestyle. With three choices allowed, half of participants selected *Free gym-memberships* once. *Professional advice regarding diet and exercise questions* was chosen by 37.1%. The least willingness to change their lifestyle was among 40-55 year olds, at 38% (3d).

4.3 Comparison to existing studies

Two other insurance consumer studies were used for comparison. The first was *2019 Accenture Global Financial Services Consumer Study* (Accenture, 2019a). Accenture surveyed 47,000 banking and insurance customers from 28 markets. Similar to the survey results, health ecosystems were more in demand than car ecosystems, with 53.1% interested and 33.5% willing to pay for ecosystems. 64.4% of respondents were interested in telematic based pricing. Just as in the survey, the greatest willingness to share data for was lower prices, at 83.5%, followed by faster and easier services, at 81.3%. Ranking their top three reasons to leave their provider, almost half of study respondents identified data security concerns as one primary reason. Participants were similarly skeptical about the engagement of non-traditional providers. Only 35.4% would trust them to look after their long-term financial well-being. By contrast, in the second consulted study *Customer Behavior and Loyalty in Insurance* from Bain, about 50% of Germans were open to buy insurance from new entrants (Naujoks et al., 2017). In the survey, respondents viewed foreign and GAFA companies with more skepticism (4a, 1e). Bain surveyed 174,003 insurance customers from 18 countries. Bain also found that the greater the number of customer interactions, the greater the loyalty of customers. However, their quality was decisive for not being annoyed by the interactions. Still, highest value for customers had functional elements like *quality* or *save time*. Anyhow, 18-34 year olds especially valued higher ordered elements such as *motivation* and *affiliation and belonging*. This also coincides with the great willingness to share data for societal benefits of 19-39 year olds in the survey (2d, 2e). Due to the global perspective of both studies, the results are not fully comparable with the survey.

5 Discussion

5.1 Valuation of key technologies

5.1.1 Valuation framework

Oliver Wyman identifies four value generation opportunities (Sheng et al., 2017):

Support additional sales: acquire new, or maintain existing, customers

Reduce losses: improve reimbursement and claim settlement costs

Reduce distribution costs: decrease sales and distribution costs

Reduce administration costs: decrease costs related to internal processes

On the basis of these opportunities, the value of a technology can eventually be assessed in the expression of very low – low – medium – high – very high.

5.1.2 Care insurance: Technology fit

The survey and the Accenture consumer study show consumers are positive about **telematics** as a means of pricing (2b). Being priced on personal driving behavior refers to the *Integrity* and *Personalization* pillar of the 6-pillar customer-first framework. For the purpose of capturing individual driving data, **smart devices** and in particular smartphones can be used. The combination of sensors and the access to the internet results in a 96% accuracy of OBD devices, which are primarily designed for cars (Meng, Mao, and Choudhury, 2014). However, the in part incomplete technologies, such as GPS, can lead to incorrect conclusions, such as recognizing speeding violation even though a parallel road is used (Steiner, 2019). Inferring concrete measures from data records, distinguishing the driver from the passenger, and the distinction of data points that do not reflect actual driving, cause efforts and costs (Wahlstrom, Skog, and Handel, 2017). All these data pre-processing efforts are necessary to make us of AI (Burge, 2020). At present, only a few insurer have such expertise (Chakravorti, 2020). On the consumer side, the cost of deploying smartphone telematics is rather low because an existing device can be used. This makes the technology scalable. Tests revealed that the amount of data captured

for one trip can be up to 42MB (Meng, Mao, and Choudhury, 2014). With 7.45 million insurance policies, Allianz would accumulate 319 terabytes of data if each policyholder made one trip per week (Statista, 2020a). This amount of data needs to be processed and analyzed implying further costs for insurers. **AI** serves as a technology to price individually. Since data inputs are more diverse, previously unaccounted risk factors can be used for individualized pricing, such as time of day or smartphone use while driving. However, there may be a lack of accuracy due to the limited telematics data available and the missing traffic context. In addition, data may be biased if telematics users are only of one gender or generally drive cautiously. Training a simple model of image recognition today can cost $10 or less. At the same time, the cost of training a model decreases by a factor of 10 on average every year (Wang, 2020).

89.2% of participants of the survey are neutral about or would appreciate a **car ecosystem**. Such ecosystem relates to the *Time and Effort* and *Resolution* pillar of customer centricity. **Cloud** computing enables insurer to collaborate with other car service providers. The cloud constitutes a central access point for data exchange to which all partners are connected (AWS, 2020). Without the use of cloud, adding a third-party service to an ecosystem requires an insurer to connect with each single ecosystem partner. Establishing an individual connection to partners takes time and provokes costs. Such an approach entails a high risk as it can prove to be uneconomical if the partnership is only of short duration. Hence, cloud technology sets a standard to add or terminate partnerships without serious costs. Insurers can benefit from the scalability of cloud computing, as demand for ecosystem services increases. **Smart devices** can provide the central access point and user interface to mobility services. Costs occur for the design of a mobile app with superior user experience. However, the low adoption rate of insurance apps underlines the difficulty of attracting and convincing customer of such apps (1d).

Data security and transparency were specifically valued by survey participants. Also, lack of data security was a main reason for leaving the current provider according to Accenture consumer study (Accenture, 2019a). Being customer-centric here translates into meeting customers' *Expectations* for responsible handling of their personal data. **Blockchain** ensures data security as only the customer themself has access to their data (Temperli, 2018). Before the insurer can access data, permission must be obtained from the customer. The immutable recording transparently shows how costumers' data is used. Due to the central character of the private blockchain operator, the insurance, it provides a central point of attack to get control over the network. Another major problem is the handling after loss or theft of the private key, as there is no way to regain access to one's own account (Berke, 2017). It is questionable how services that require AI algorithms or central analytics can be offered to the customer if data should not leave the own device. Using most sophisticated encryptions, the continuing investments in security and dedicated workforce just for data security makes **cloud** a suitable technology to store data in (Linn, 2018). Due to the disproportionate number of attacks on on-premise solutions, it would take more workforce to enable similar security as in the cloud (Smith, 2017).

5.1.3 Car insurance: Technology valuation

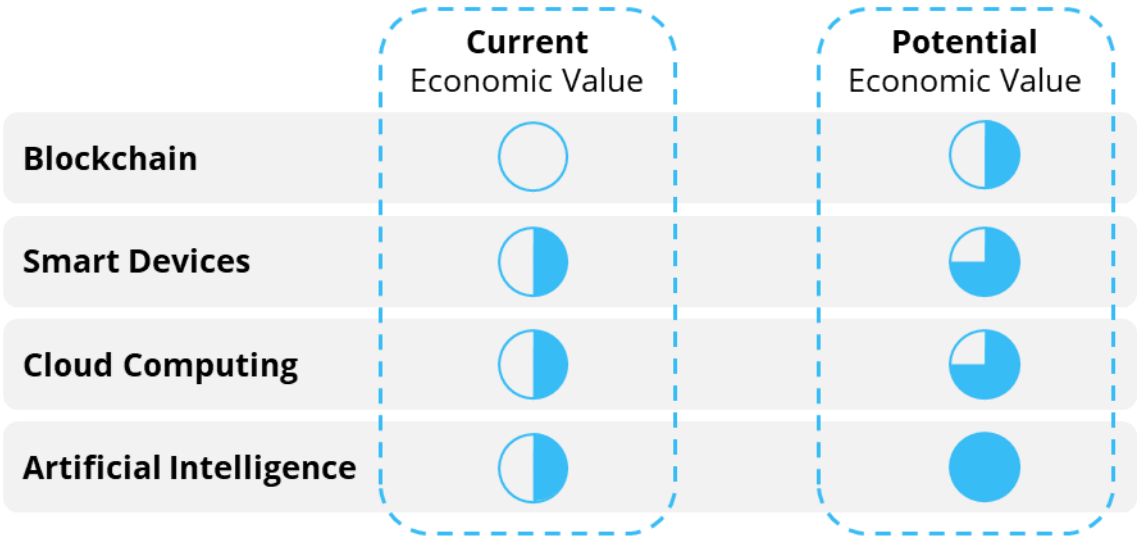

Figure 1: Car insurance: Technology valuation (Author's own illustration)

Blockchain: Currently, the lack of standards and technology knowledge in the industry, as well as inflexible IT infrastructure leads to very low value (Deloitte 2017c). Existing applications refer to the reduction of administration costs (R3, 2020a). Before the benefits of decentralization and security can be made available to customers, just mentioned obstacles must be overcome. Therefore, the potential value is medium.

Smart devices: Today the value of smart devices is medium. Incumbents offer in-app services like contract overviews or personal data changes to reduce administration costs. Using smartphones of customers for telematics reduces distribution costs and attracts new customers. Once an ecosystem app is used, sales costs for additional services are low and increased customer touchpoints promote loyalty. Potential value of smart devices can be considered high.

Cloud computing: Today, the value is medium as also incumbent insurers move important business parts to the cloud (Allianz, 2019). Being able to flexible integrate partners into a collaborative cloud minimizes investments in own services and supports additional sales. The outsourcing of server operations reduces costs. Potential value for car insurer is high.

AI: Currently, AI is of medium value as models are already carried out on static customer data (DAV, 2020). The ability to identify and respond to variables at high risk of loss using AI can reduce losses. AI recommender systems can propose insurance policies that are highly relevant to a customer. This can ultimately lead to up- and crosssells and reduced sales costs. Eventually, the potential value of AI can be classified as very high.

5.1.4 Health insurance: Technology fit

Almost half of respondents were interested in **individually tailored services** (3c). The foundation for *Personalization* services is data. **Smart devices** can be used as main instrument to collect health related data. The high penetration of smartphones and wearables among customers facilitate a rapid and cost-effective data access. However, their accuracy is disputed. Underestimation of -42% or overestimation of over 100% are not seldom, especially for derived

measures like calories burned (Buckle et al., 2020). Also, measures do vary between devices and manufacturers. If pricing or reward systems are based on data from smart devices, they invite manipulation and fraud, which does not prove difficult in practice (Buckle et al., 2020). Similar to car telematics, data processing efforts are necessary to generate insights. Equally, storage and computation resources are needed to handle data from potentially millions of customers. To provide a personalized service, such as an early warning system for diseases or injury prevention, the use of **AI** is suggested. AI research showed that the risk of falling – especially relevant for older adults – could be correctly predicted in 75% of the time based on wearable sensor data (Nait Aicha et al., 2018). In practice, existing AI models are capable of detecting anomalies, especially for unusual heart frequencies measured by wearables (Apple, 2020). Because the effectiveness of wearable data to identify diseases has not been fully explored, AI can help identify recurring patterns, but also carries the risk of not finding significant patterns (Buckle et al., 2020). However, the additional consideration of more sophisticated data such as regular medical checks or radiographs, can lead to higher success in identifying significant risk factors (Buckle et al., 2020). Once such a model is trained, it can take only a few milliseconds to run it on a customer (Rajkomar et al., 2018). To design and train a model, AI experts are necessary. Getting AI expertise could prove difficult as there is a shortage of AI specialists across industries in Europe (Anderson, 2020).

62.3% of survey participants would probably or definitely appreciate a **health ecosystem**. Providing health services in one place save customers *Time and Effort*, contributes to the *Resolution* of all health needs, and conveys *Empathy* by offering 24/7 individual care. With five times more app downloads than industry average, insurance startup Oscar shows that **smartphones** are well suited as central access point to ecosystem services (PR Newswire, 2020). Compared to sophisticated AI models, the amount of data and level of expertise to build a superior customer app is rather modest and it is rather a process of constant iteration (Oscar Health,

2020). Even though precise examinations cannot be carried out, smartphones are sufficiently mature to enable personal contact to physicians in form of video chats for example. Moreover, a particularly valuable ecosystem contribution can be made by an **AI**-based diagnostic system that suggests a condition based on the symptoms indicated by the user. Since the scale of preliminary findings and diagnoses can be up to 10,000, the use of AI can be beneficial, and the time for diagnosis is significantly reduced (aerzteblatt.de, 2018). A study of BMJ Open revealed first results on the accuracy of diagnostic apps. In 71 percent of the time, leading symptom assessment app Ada reached the same diagnosis as a physician (Gilbert et al., 2020). This shows that AI can already contribute to saving healthcare resources, such as those of physicians, but cannot yet be fully relied upon as still more data is needed to increase accuracy. Also, used misdiagnosis by physicians or manipulated wearables data for training can result in incorrect or biased predictions.

The need for **data security** was particularly pronounced among women and Portuguese respondents. Here, meeting *Expectations* for responsible handling of health data and maintaining *Integrity* relates to customer centricity. Due to the sensitive nature of health data, it can make sense to rely on the expertise of external **cloud** providers. Provider's 24/7 security monitoring and response does not require own resources for security purposes. The whole health care system consists of several entities such as the customer, physicians, pharmacies, treatment and research institutions, and the insurer. Hence, it requires a data exchange to guarantee most effective treatment. As the number of parties with access to a central cloud increases, the risk of data abuse and data breaches does too (Panetta, 2019). Alternatively, a **blockchain** based approach ensures maximum security as each participant in the blockchain network maintains ownership of their data, different to a centralized cloud server. This implies data changes and exchanges can only be performed by the customer as they hold their private key (Nill, 2020). Since interaction is reduced to the customer and the receiver, no intermediary can intercept data.

However, major advantage of a cloud-based system is the seamless connection of new data sources and new entities. A blockchain integration in existing IT infrastructure and the interoperability of separate blockchains proves difficult in practice (Deloitte, 2017c).

5.1.5 Health insurance: Technology valuation

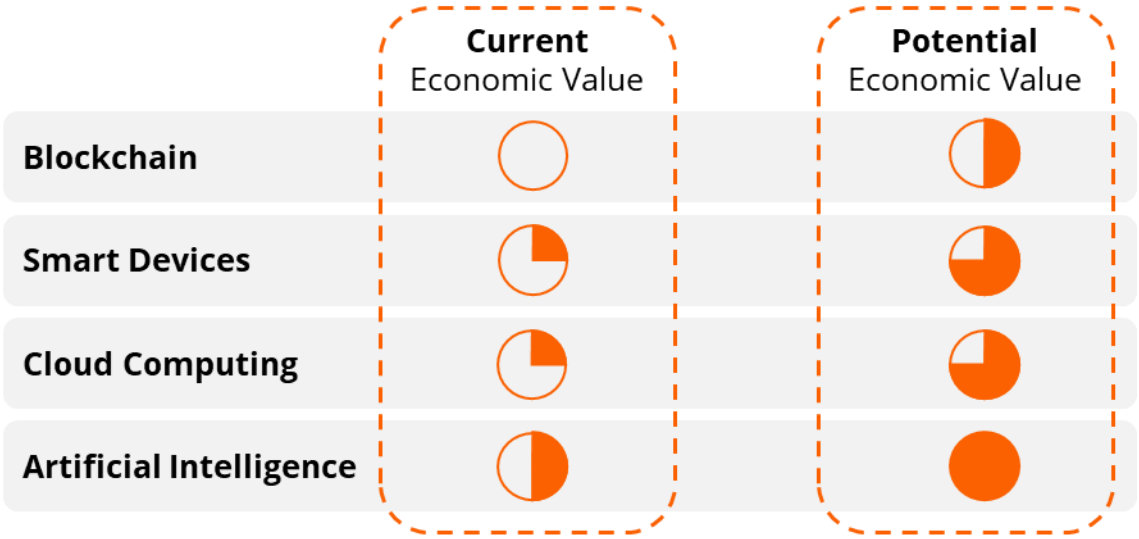

Figure 2: Health insurance: Technology valuation (Author's own illustration)

Blockchain: Since there are no existing applications in health insurance practice today, the value of blockchain is very low (Deloitte, 2017b). Increased transparency and ownership of data can attract customers to support additional sales. Before that, however, standards must be developed and knowledge acquired. The potential value for health insurer is medium.

Smart devices: Smart devices are still hardly used as data collectors, and mobile services offerings are still lacking (Fraunhofer, 2018). Thus, today's value can be assessed as low. Apps are highly scalable and offer direct consumer access to decrease distribution costs and offer additional sales potential. Digital in-app health services reduces unnecessary physician visits and lead to less costs (Weber, 2016). Smart devices hold high potential value for health insurer.

Cloud computing: Current value is low due to the remaining skepticism among insurers, and strict legal data security requirements slowed a widespread adoption (Fraunhofer, 2018). The

adoption of cloud computing reduces administration costs as data exchange among health entities is more efficient. Increased flexibility and the reduced need for IT workforce also reduces administration costs. The potential value of cloud computing can be considered high.

AI: Existing applications of AI like prediction of hospital stays lead to a medium value today (DAV, 2020). Promoted by superior data availability, AI prediction allows early warning before serious illnesses and high costs occur. Self-services like diagnosis system can reduce administration costs. Personalization increases relevancy of services to enhance customer loyalty and support sales by attracting new customers. The potential value for health insurer is very high.

5.2 Recommendations to insurers

Cross insurance:

Leverage trust advantage: Unlike sharing data with GAFA and foreign companies, customers are willing to share personal data with insurance companies. Start leveraging this trust advantage by collecting customer data and use it to create relevant services.

Take data security & privacy seriously: Due to the sensitive nature of location and health data, consumers expect responsible handling of their data. Increase efforts to ensure data privacy. Consider new technologies like cloud computing or blockchain to maximize data security.

Communicate digital services more effectively: 40.1% of survey participants did not know their insurer has a mobile app. Intensify efforts to make costumers aware of digital services. Improve services on the basis of customers' feedback, as 32.8% of customers having an app do not use it. Also, use appropriate communication channels to reach younger customers as they have the lowest commitment to reward systems, but are most open to fitness-based pricing.

Enhance online & rethink offline experience: Even older generations do not visit insurance branches regularly. Across all survey respondents, 56.7% find all relevant insurance services online. Make sure your online services are superior to competitors' and your internet presence

has great user experience. Restructure stores to make a visit worthwhile, especially as consumers consider the visit too time-consuming. For instance, rebuild some branches to experience hubs, where customers can experience ecosystem products like smart devices.

Car insurance:

Offer telematics: Base premiums on extent of driving and driving behavior, rather than vehicle and ZIP code. Provide gamified learning experience for the old and young, as they have highest appreciation for individual driving feedback and the highest risk of causing accidents. Start with rewards for good driving or competition for best driving among policyholders. Do not exclusive rely on smart devices for pricing as they still lack in accuracy.

Build superior ecosystem app: Make your app the go-to app for every car related service. Increase consumer touchpoints and loyalty by providing ecosystem services within app. Test different versions and include customer in an iterative building process.

Collect data: Leverage high penetration of smartphones to collect data. Gain access to new data formats, not previously considered for individual risk determination. Use that data to train AI models for more accurate pricing and individualized services.

Health insurance:

Prevent instead of react: 77.3% of customers already track their workouts and health. Get access to this data to understand what keeps individuals healthy. Invest in AI or collaborate with startups and research departments to identify health risk factors and predict diseases. Access to great computation power and data, provides the first-time opportunity to prevent severe diseases and act on identified symptoms in advance, before high claim costs arise.

Become personal health service provider: Transit from health insurer to health service provider. Utilize superior trust and be the first point of contact for all health-related issues. Facilitate access to health services such as with digital physician consultations. Be a personal health advisor who alerts customers to increased health risk and encourages treatment adherence.

Provide non-monetary services & motivate customers: In some age groups the willingness to live healthier was significantly higher than for non-monetary incentives. Survey respondents expressed particular interest in fitness offerings and professional advice on their personal health. Motivate customers with realistic health and fitness goals, but do not push them.

6 Conclusion and Outlook

All in all, there was consensus in the responses of survey participants. There was a lack of trust towards foreign insurers and GAFA companies, high appreciation of ecosystem services, and great interest in personalized services and data security. Therefore, a pan-European model like the one advocated by Allianz can be successful. However, there were also demographic differences that could impede such an approach. Different receptiveness to innovation and different social attitudes between countries and age groups must be considered. Nonetheless, the success of GAFA companies has shown that it is not the one product that is most important, but the customer-centricity and dynamism to adapt its services to the ever-changing customer needs.

In the discussion it was elaborated that AI has indeed the highest economic value for a customer-centric car and health insurer. This is because AI can create value by both reducing losses and supporting sales. Thus, **Hypothesis 1 is confirmed**. However, it was moreover elaborated that the value of AI itself is interdependent on other technologies. Without the ubiquitous provision of training data from multiple sources provided by the cloud and the collection of data and presentation of results by smart devices, the value of AI is limited.

Beyond that, survey results indeed revealed that technology is not the most relevant driver of an insurer’s economic success. Customers are skeptical towards technology and innovation.

Low sympathies and purchase intentions towards startups showed that integrity and trust are difficult to make up in a short time. Also, the values for what companies stand for are highly important and innovation from abroad does not supersede personal culture and language. Human contact is exceptionally valued as customer do not use AI apps for health assessment, but rather seek the contact of family, friends and physicians. Thus, **Hypothesis 2 is rejected.**

This work has some limitations. The economic use of the four technologies for internal processes was neglected. The existing IT infrastructure, processes and rigid workforce of incumbents may lead to challenges with regard to technology adoption. Furthermore, the implementation of technologies such as cloud computing or AI may be restricted due to data regulations by governments. Also, the lack of representation of the survey must be mentioned here again.

Looking ahead, promoted by the use of technology, a possible cherry picking of individuals by new insurance providers undermines the principle of risk sharing. Individual risk determination and pricing implies an adverse selection. This may leave incumbents with only high-risk customers, or even worse, the rejection of individual customers due to their risk profile. This would not only be a business challenge, but a problem of societal relevance. It can therefore be doubted that such development is in line with the social thought of costumers, found in the survey.

All in all, customer centricity is key to success and trust of customers beats application of technology. A successful insurance company of the future will use technology in a way that creates more relevance while maintaining trust of their customers. The insurance industry indeed faces new competition, but getting data is easier than getting people's trust. For this reason, I would like to conclude my work with a quote from Head of Google Health, David Feinberg:

”The technology is mind blowing, but if we don’t have the trust of the doctor, the nurse, the mum, the dad, the elderly person, the patient, it doesn’t matter how good the technology is” (Google, 2019).

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Appendix

Appendix 1: Survey questions

Survey start:

Hey, Olá and Hallo 👋

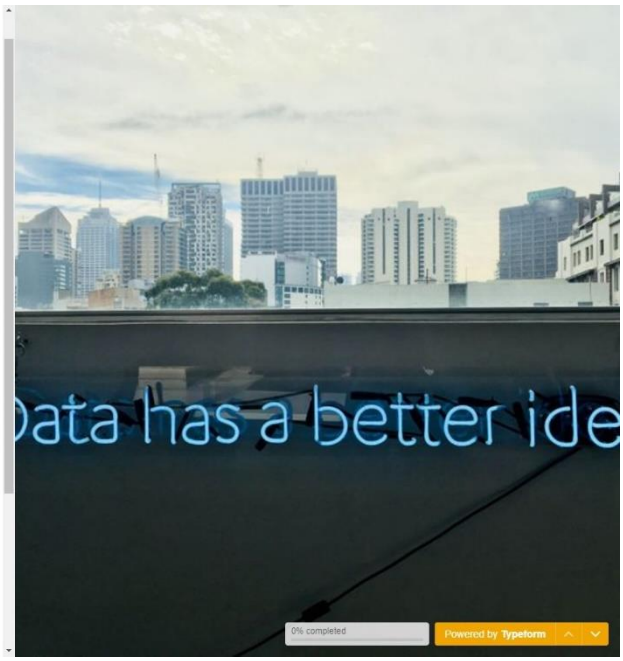
You don't know how you ended up here. Besides, you think **insurance is boring** and there is no innovation in the industry?
Let me introduce you to **new concepts** and give you some food for thought.

The **goal** of this survey is to **assess consumer expectations** towards **insurance products** and elaborate within the scope of my thesis, how these expectations can be met by **leveraging technologies** like **Artificial Intelligence** (AI), **Internet of Things** (IoT), and **Big Data**.

This survey consists of 4 different parts:
1) Introduction
2) Car Insurance
3) Health Insurance
4) Insurance Interaction
Filling out the survey will take approx. 10 min.

To give you a special motivation I **give out** a **25€ Amazon** voucher to the person making the most people complete my survey. Simply enter the name of the person who referred you at the **end of the survey**.

Thank you very much in advance for supporting my thesis!

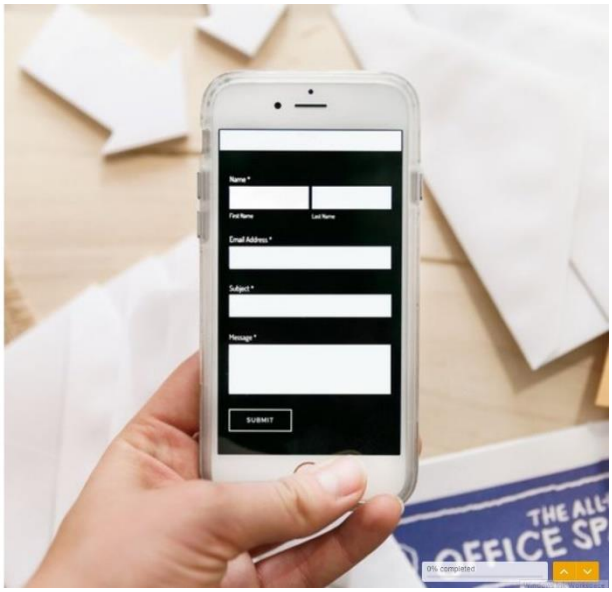


1 Introduction

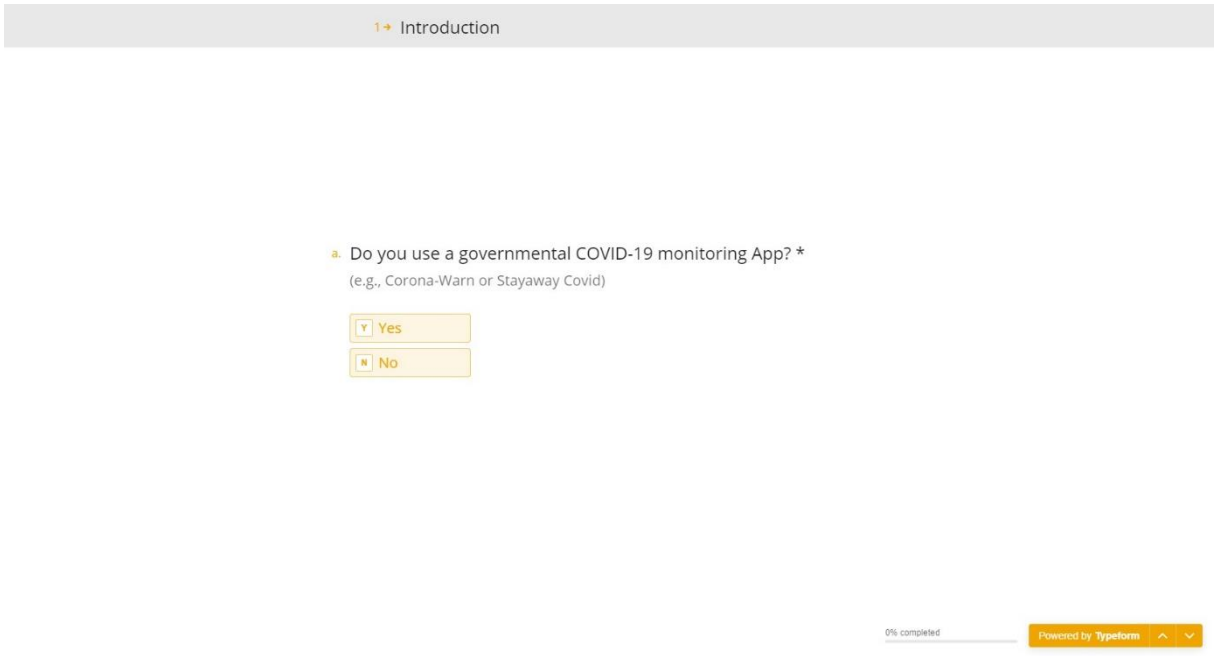
1→ Introduction

To begin with, you will be asked a series of questions ranging from personal motivation to data sharing, illustrated by the example of COVID-19 and the perception of different insurance appearances.

Continue



1a


1→ Introduction
a. Do you use a governmental COVID-19 monitoring App? *
(e.g., Corona-Warn or Stayaway Covid)
Y Yes
N No
0% completed
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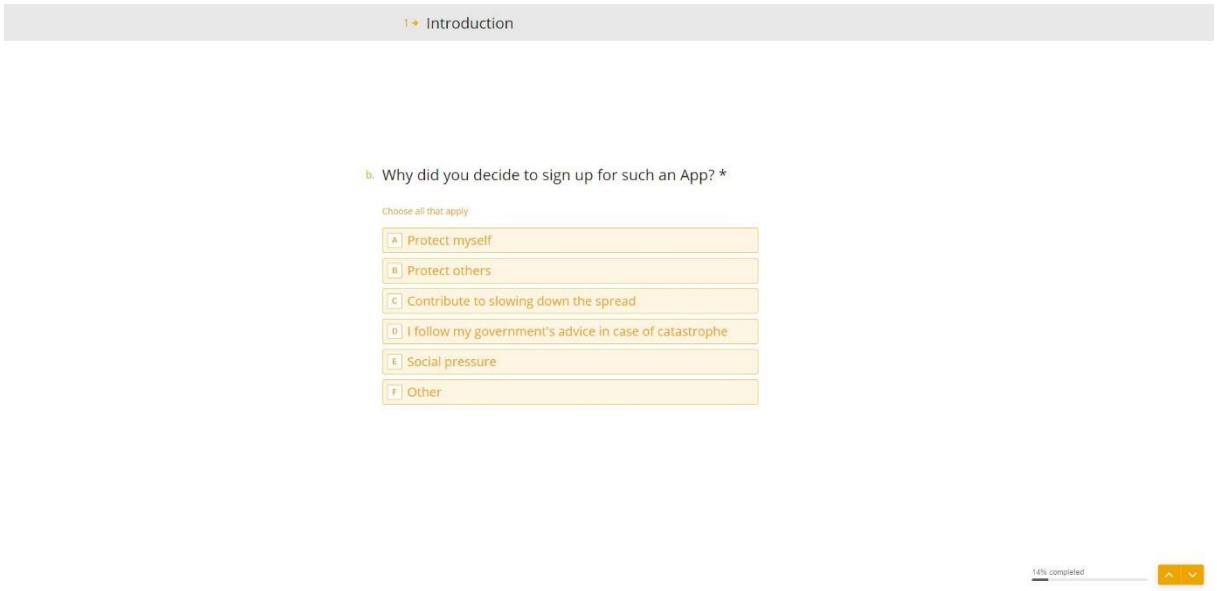
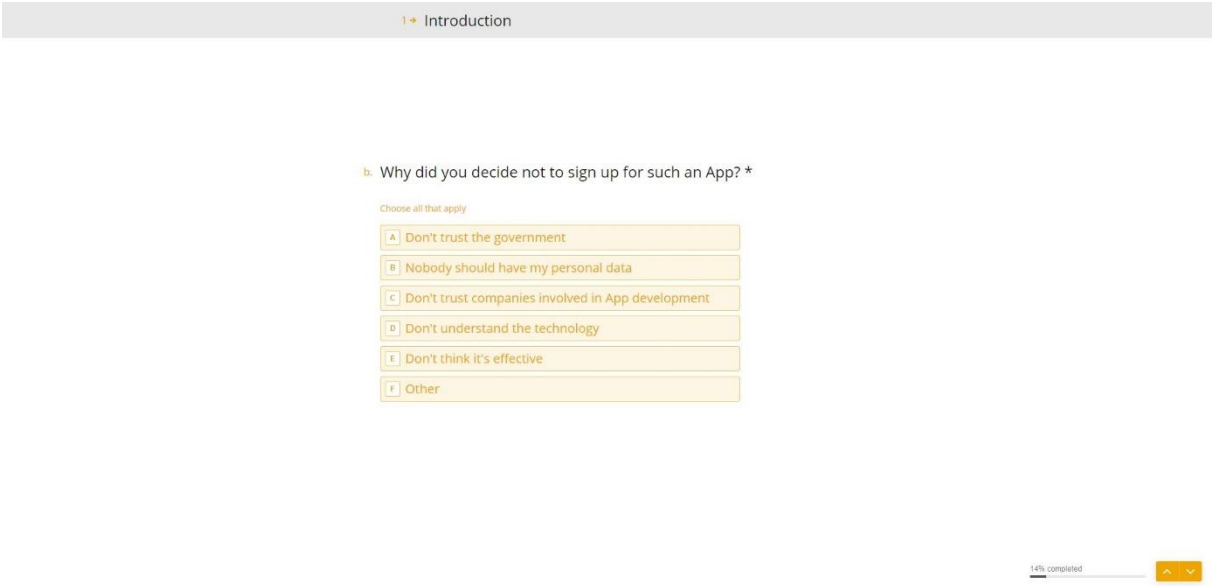
1b_1


1→ Introduction
b. Why did you decide to sign up for such an App? *
Choose all that apply
A Protect myself
B Protect others
C Contribute to slowing down the spread
D I follow my government's advice in case of catastrophe
E Social pressure
F Other
14% completed

1b_2



1 a_b	Yes		No	
Item	%	*Abs.*	%	*Abs.*
Do you use a governmental COVID-19 monitoring App?	**62.3**	**104**		
Protect myself	59.6			
Protect others	68.3			
Contribute to slowing down the spread	76.9			
I follow my government's advice in case of catastrophe	33.7			
Social pressure	2.9			
Other	1.0			
Do you use a governmental COVID-19 monitoring App?			**37.7**	**63**
Don't trust the government			6.3	
Nobody should have my personal data			17.5	
Don't trust companies involved in App development			7.9	
Don't understand the technology			3.2	
Don't think it's effective			42.9	
Other			39.7	

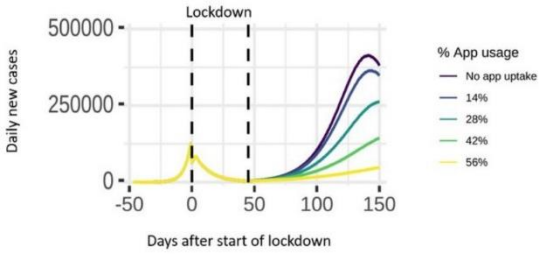
1.1

1 → Introduction

" Harvard Study April 2020:

We find that the **epidemic can be stopped with 80% of all smartphone users using the app**, or 56% of the population overall.

Continue



Sources: https://www.research.ox.ac.uk/Article/2020-04-16-digital-contact-tracing-can-slow-or-even-stop-coronavirus-transmission-and-ease-us-out-of-lockdown
https://www.technologyreview.com/2020/06/05/1002775/covid-apps-effective-at-less-than-60-percent-download/

29% completed

1c

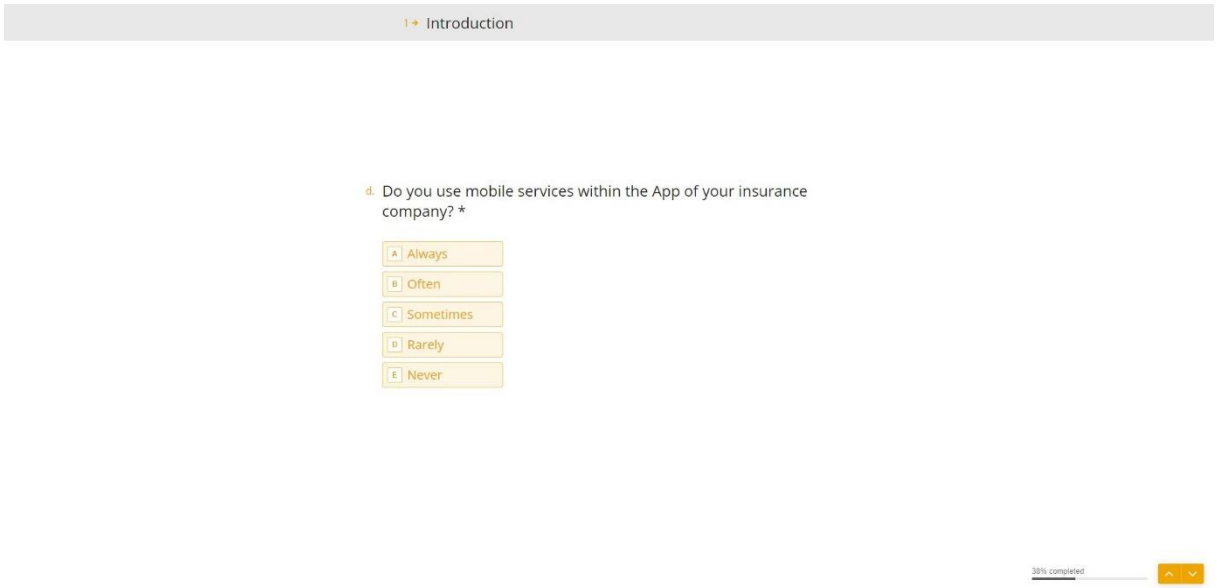
1 → Introduction

c. Do you know if your insurance company has a mobile App?

Y Yes
N No

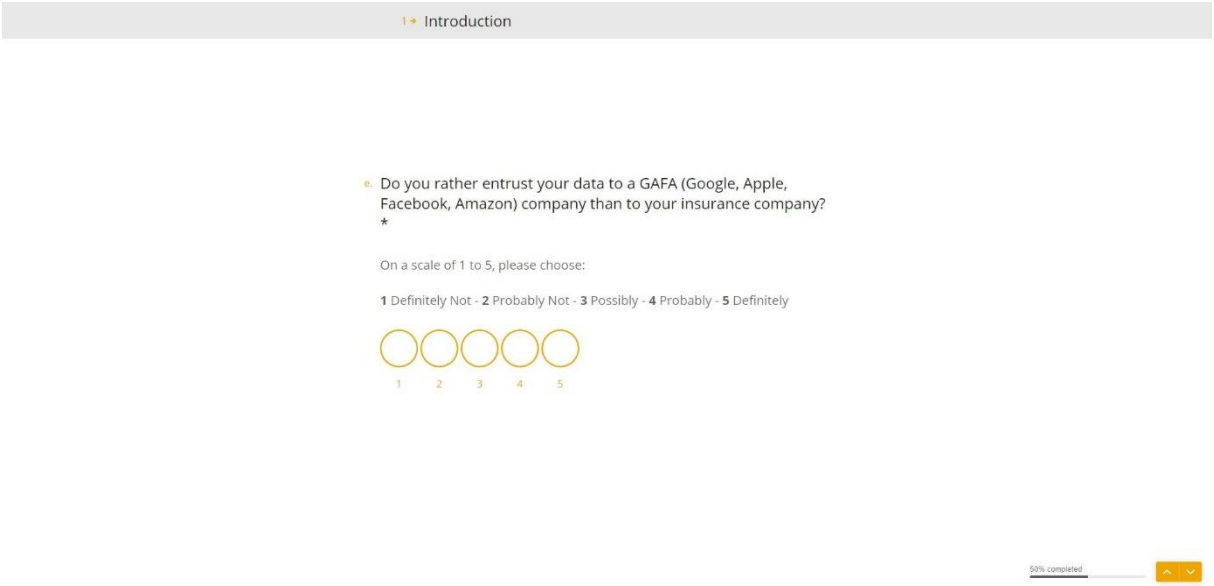
29% completed

1d



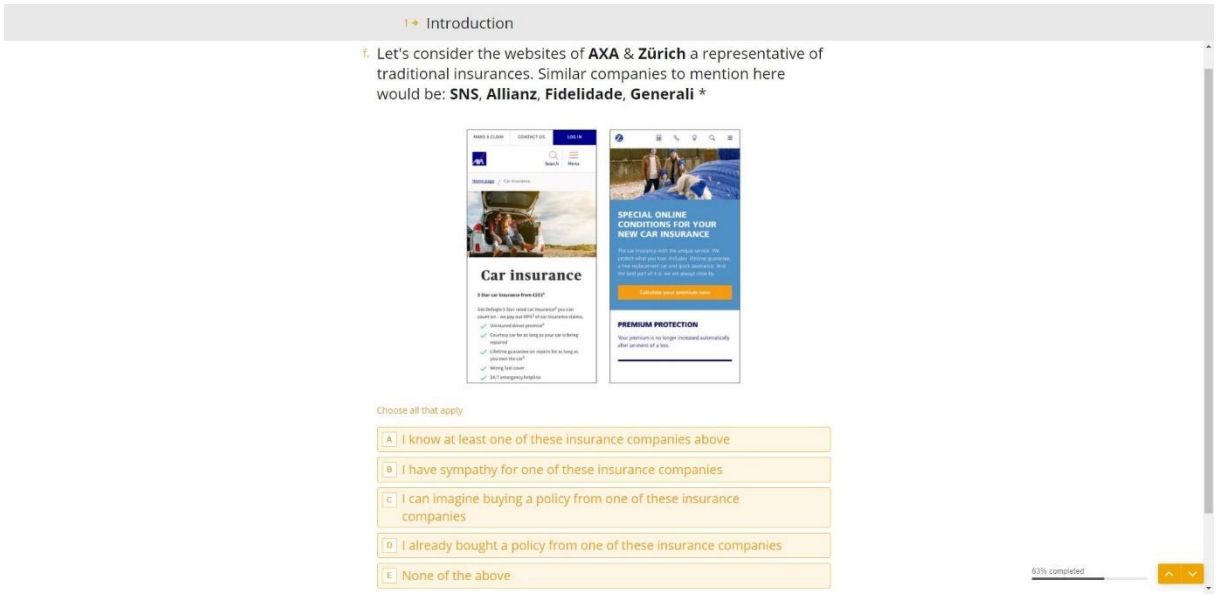
1c_d Item	Yes (%)	%	*Abs.*
Do you know if your insurance company has a mobile App?	40.1		
Do you use mobile services within the App of your insurance company?			
Never (1)		32.8	22
Rarley (2)		23.9	16
Sometimes (3)		19.4	13
Often (4)		14.9	10
Always (5)		9.0	6

1e



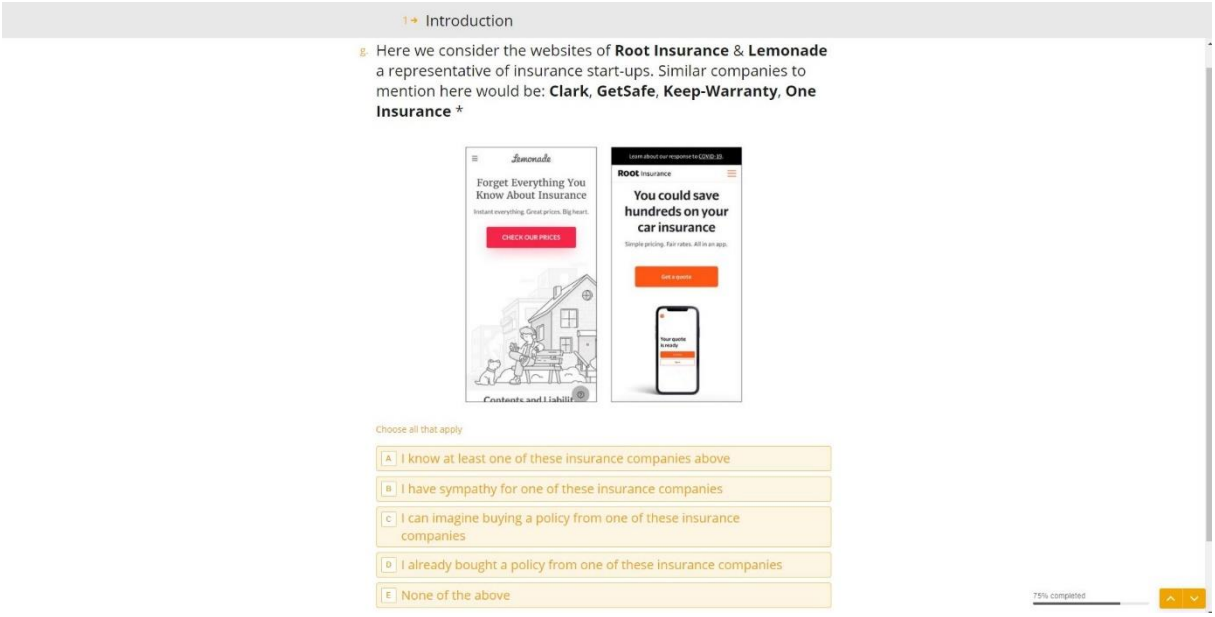
1e	Item	*Average*	*%*	*Abs.*
Do you rather entrust your data to a GAFA (Google, Apple, Facebook, Amazon) company than to your insurance company?				
	Definitely not (1)	2.35	28.1	47
	Probably not (2)		29.9	50
	Possibly (3)		24.0	40
	Probably (4)		14.4	24
	Definitely (5)		3.6	6

1f



1f	Item	%
Let's consider the websites of AXA & Zürich a representative of traditional insurances (choose all that apply)		
	I know at least one of these insurance companies above	69.5
	I have sympathy for one of these insurance companies	21.0
	I can imagine buying a policy from one of these insurance companies	40.7
	I already bought a policy from one of these insurance companies	37.1
	None of the above	1.8

1g



1g	Item	%
	Here we consider the websites of Root Insurance & Lemonade a representative of insurance start-ups (choose all that apply)	
	I know at least one of these insurance companies above	23.4
	I have sympathy for one of these insurance companies	12.6
	I can imagine buying a policy from one of these insurance companies	19.2
	I already bought a policy from one of these insurance companies	1.2
	None of the above	61.7

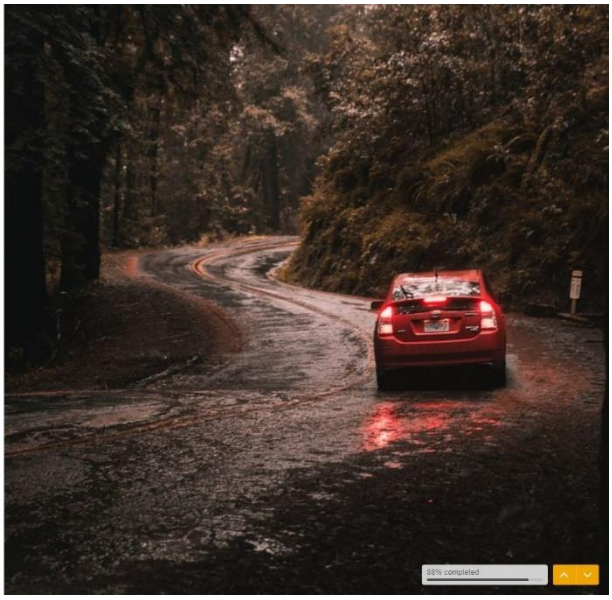
2 Car Insurance

2→ **Car Insurance**

Traditionally, car insurances assess a driver's risk based on **prior incidents**, **credit history**, policyholder **demographics** (like age, marital status, gender, and ZIP code), **prior insurance**, and **vehicle** information.
Some of these factors cannot be influenced by the consumer. In the end, this results in **prices not directly tied to actual driving**.

So, isn't there a **more progressive form** of assessing a driver's risk and determine pricing?

Continue



2.1

2→ **Car Insurance**

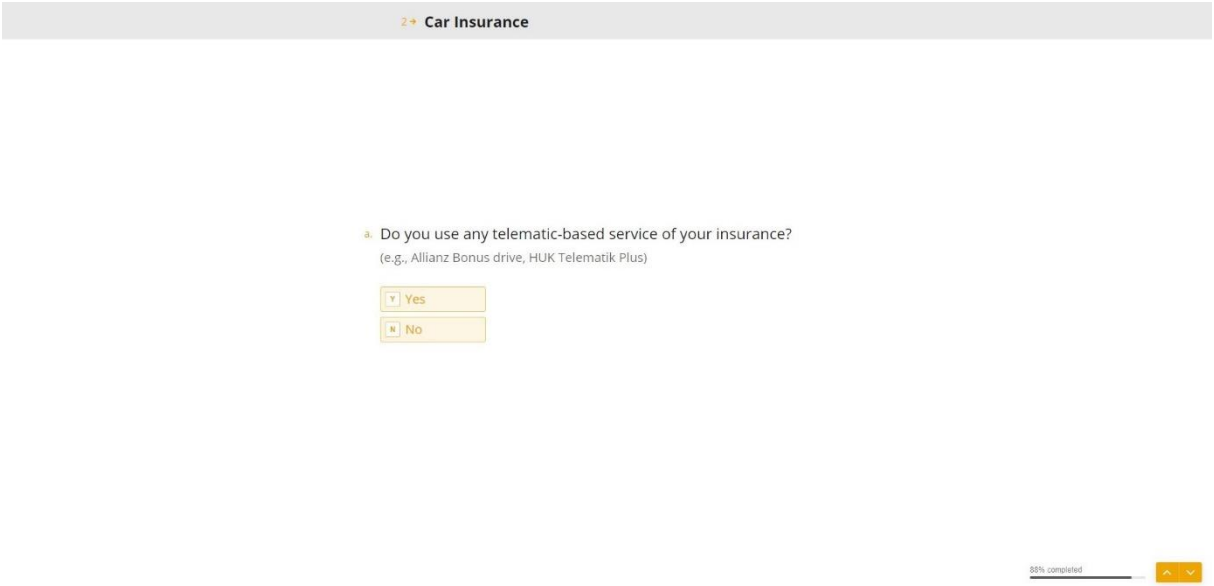
Let me introduce you to the concept of **Telematics**:

The first incorporation of telematics-based insurance policies revealed that **driving behavior** is the **leading indicator of risk**. With the advancement of smartphone sensors, driving behavior like **hard braking**, **hard turning**, **night driving**, or **speeding** can be easily assessed and ultimately used to **price** a **customer**.

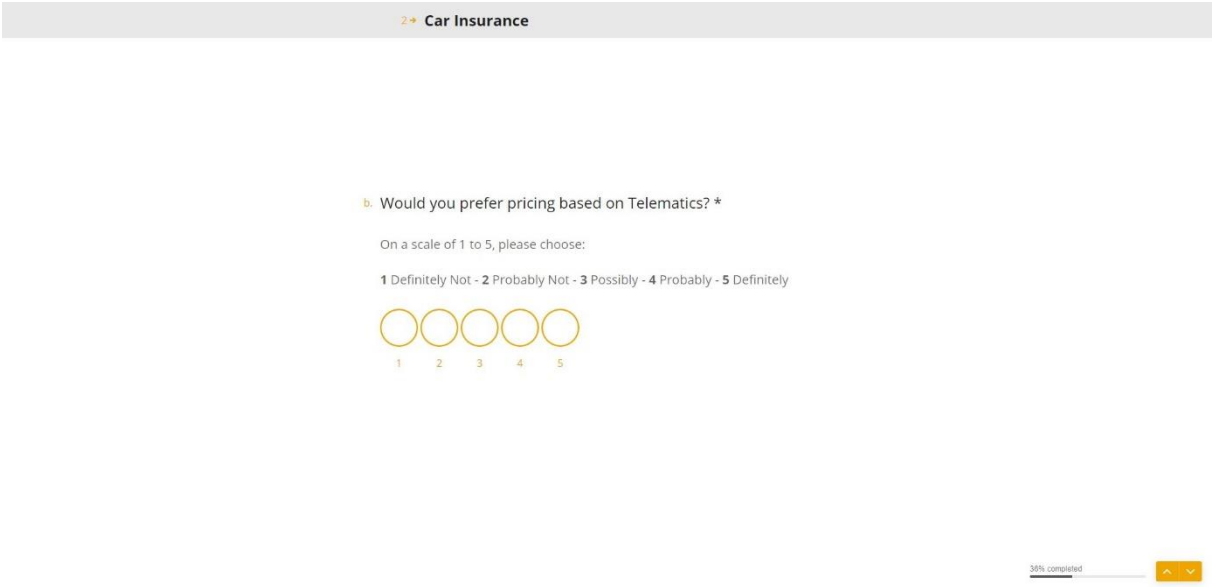
Continue

88% completed

2a

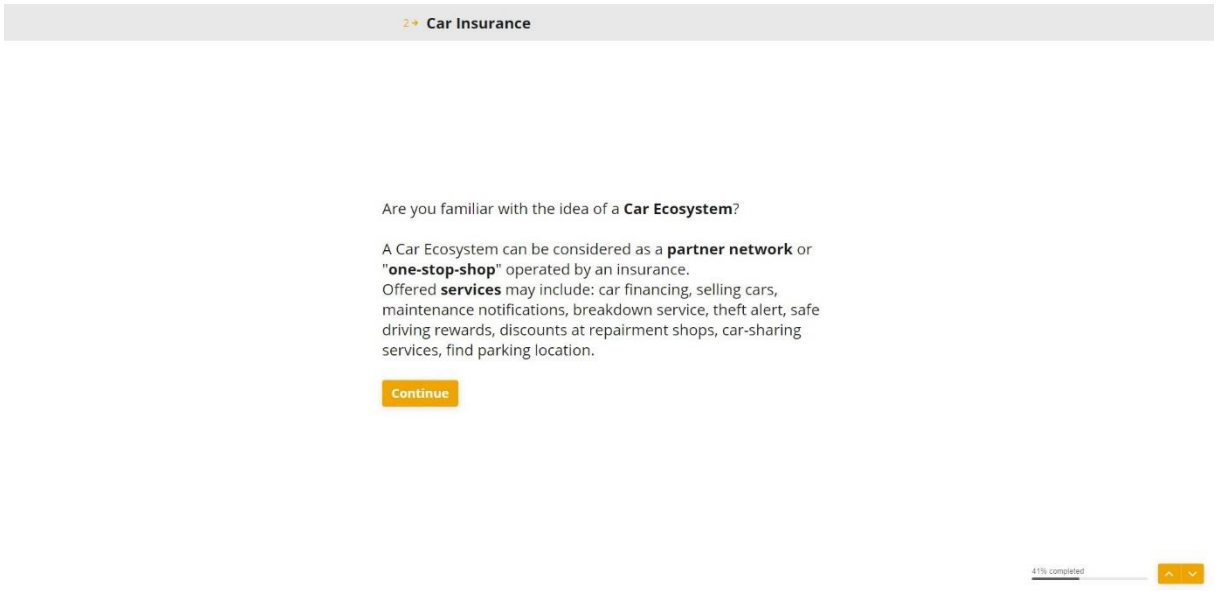


2b

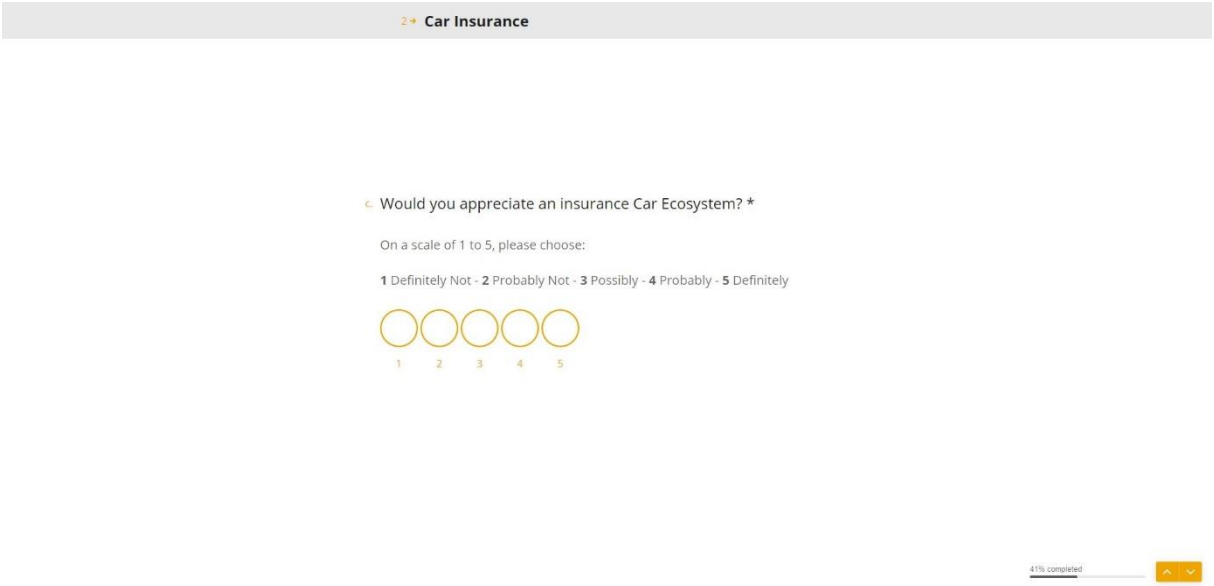


2a_b Item	Yes (%)	*Average*	*%*	*Abs.*
Do you use any Telematic-based service of your insurence?	5.4			
Would you prefer pricing based on telematics?				
Definitely not (1)			13.3	21
Probably not (2)			13.3	21
Possibly (3)		3.15	32.9	52
Probably (4)			26.6	42
Definitely (5)			13.9	22

2.2

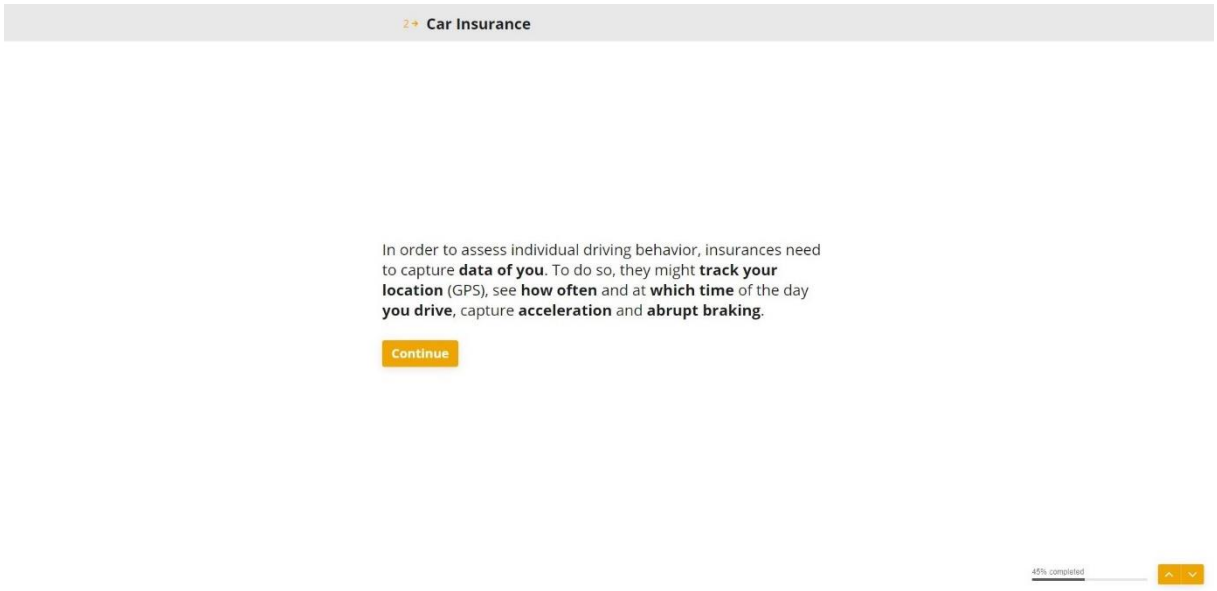

2 → Car Insurance
Are you familiar with the idea of a **Car Ecosystem**?
A Car Ecosystem can be considered as a **partner network** or "**one-stop-shop**" operated by an insurance.
Offered **services** may include: car financing, selling cars, maintenance notifications, breakdown service, theft alert, safe driving rewards, discounts at repairment shops, car-sharing services, find parking location.
Continue
41% completed

2c

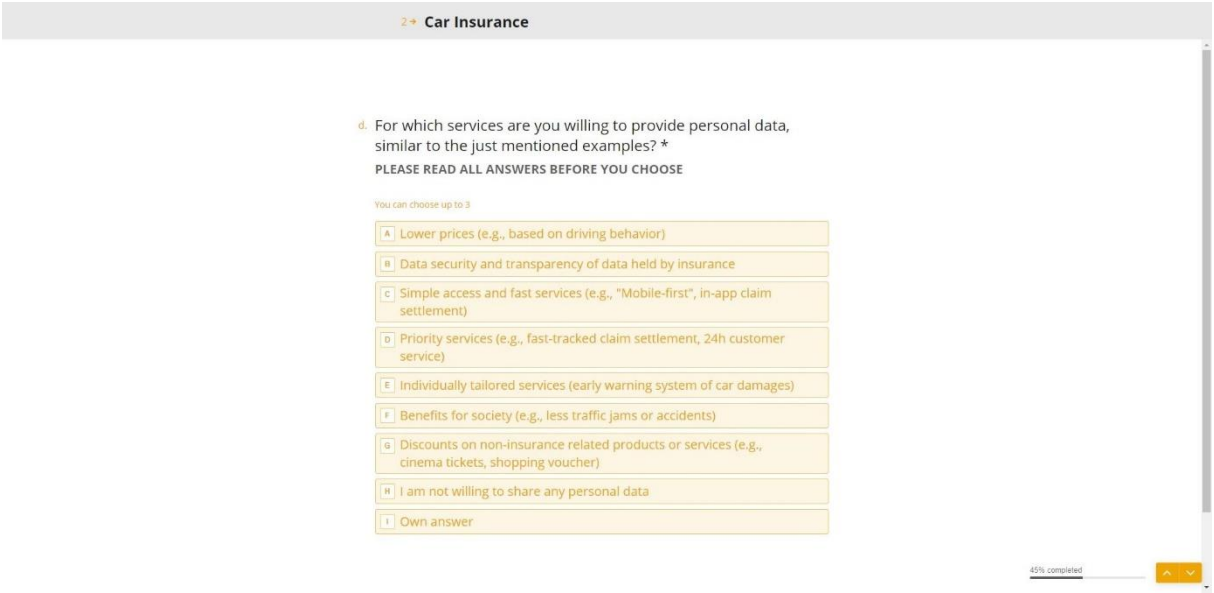


2c	Item	*Average*	*%*	*Abs.*
Would you appreciate an insurance Car Ecosystem?				
	Definitely not (1)	3.53	2.4	4
	Probably not (2)		8.4	14
	Possibly (3)		36.5	61
	Probably (4)		39.5	66
	Definitely (5)		13.2	22

2.3

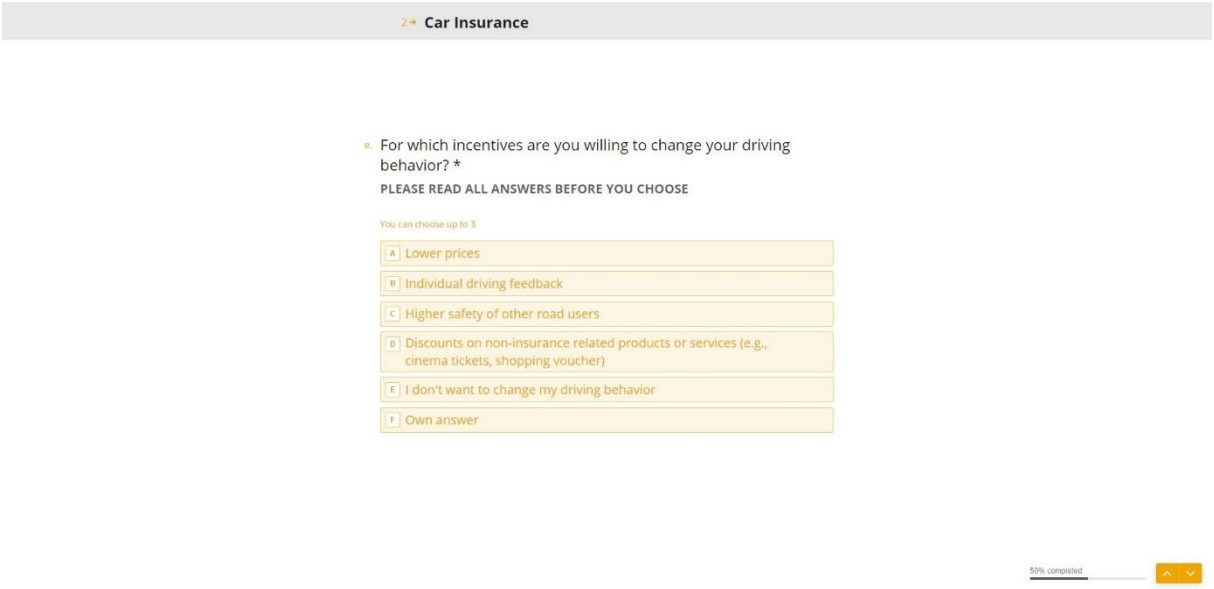

2→ Car Insurance
In order to assess individual driving behavior, insurances need to capture data of you. To do so, they might track your location (GPS), see how often and at which time of the day you drive, capture acceleration and abrupt braking.
Continue
45% completed

2d



2d	Item	%
	For which services are you willing to provide personal data, similar to the just mentioned examples? (choose up to 3)	
	Lower prices (e.g., based on driving behavior)	58.1
	Data security and transparency of data held by insurance	34.1
	Simple access and fast services (e.g., "Mobile-first", in-app claim settlement)	18.6
	Priority services (e.g., fast-tracked claim settlement, 24h customer service)	20.4
	Individually tailored services (early warning system of car damages)	26.3
	Benefits for society (e.g., less traffic jams or accidents)	40.7
	Discounts on non-insurance related products or services (e.g., cinema tickets, shopping voucher)	5.4
	I am not willing to share any personal data	16.2
	Other	1.8

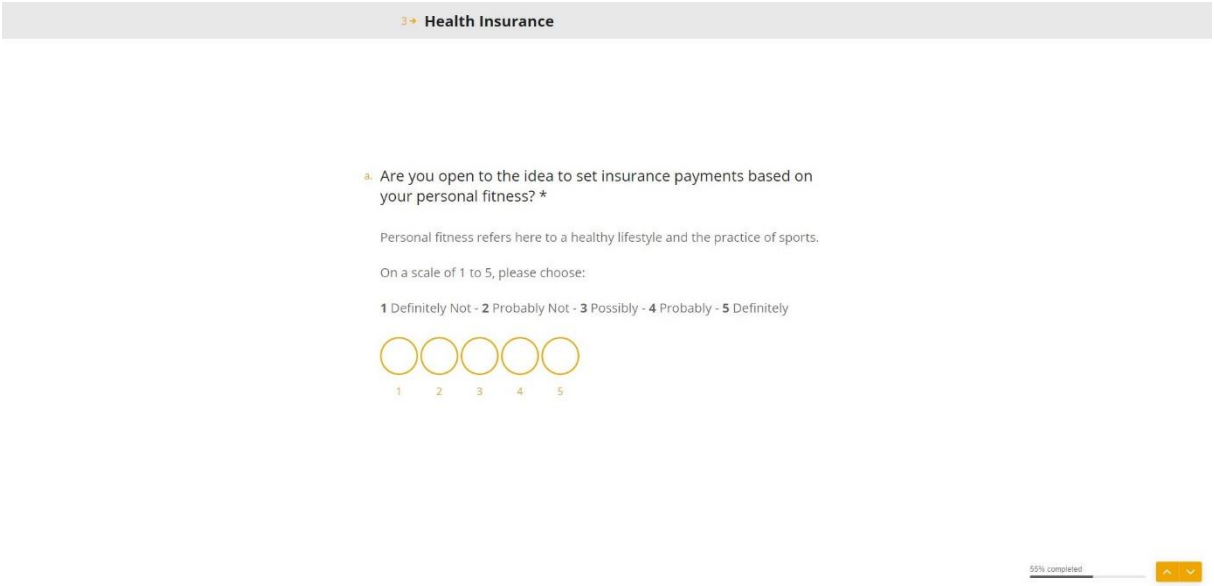
2e



2e	Item	%
	For which incentives are you willing to change your driving behavior? (choose up to 3)	
	Lower prices	55.7
	Individual driving feedback	21.6
	Higher safety of other road users	62.9
	Discounts on non-insurance related products or services (e.g., cinema tickets, shopping voucher)	19.8
	I don't want to change my driving behavior	18.6
	Other	0.6

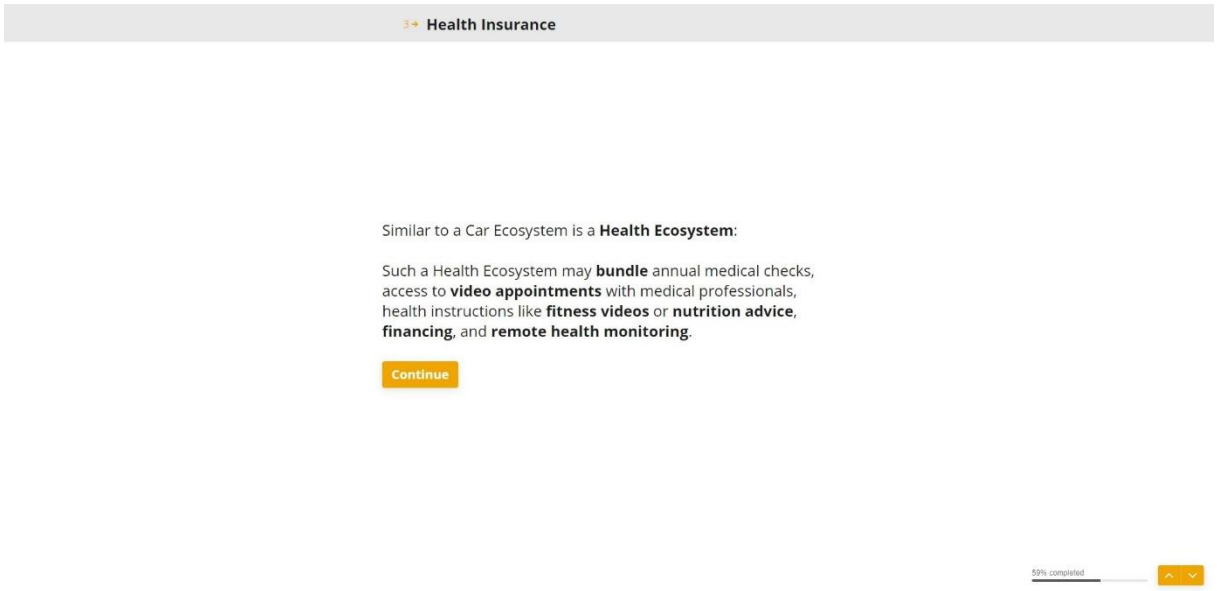
3 Health Insurance

3a

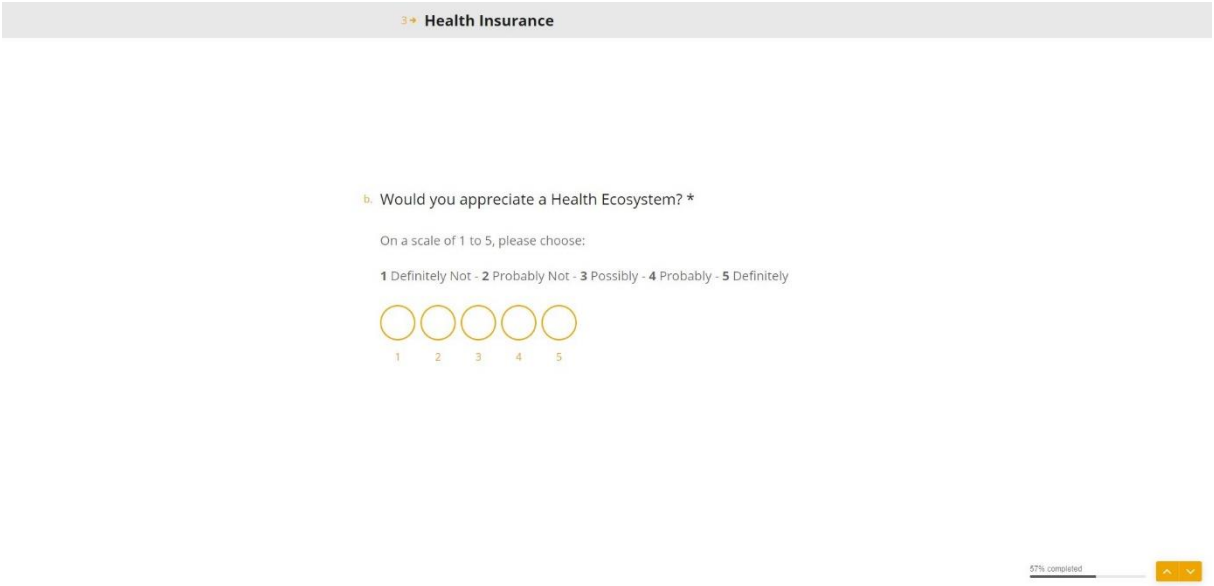


3a	Item	*Average*	*%*	*Abs.*
Are you open to the idea to set insurance payments based on your personal fitness?				
	Definitely not (1)	3.14	14.4	24
	Probably not (2)		19.8	33
	Possibly (3)		23.4	39
	Probably (4)		22.8	38
	Definitely (5)		19.8	33

3.1

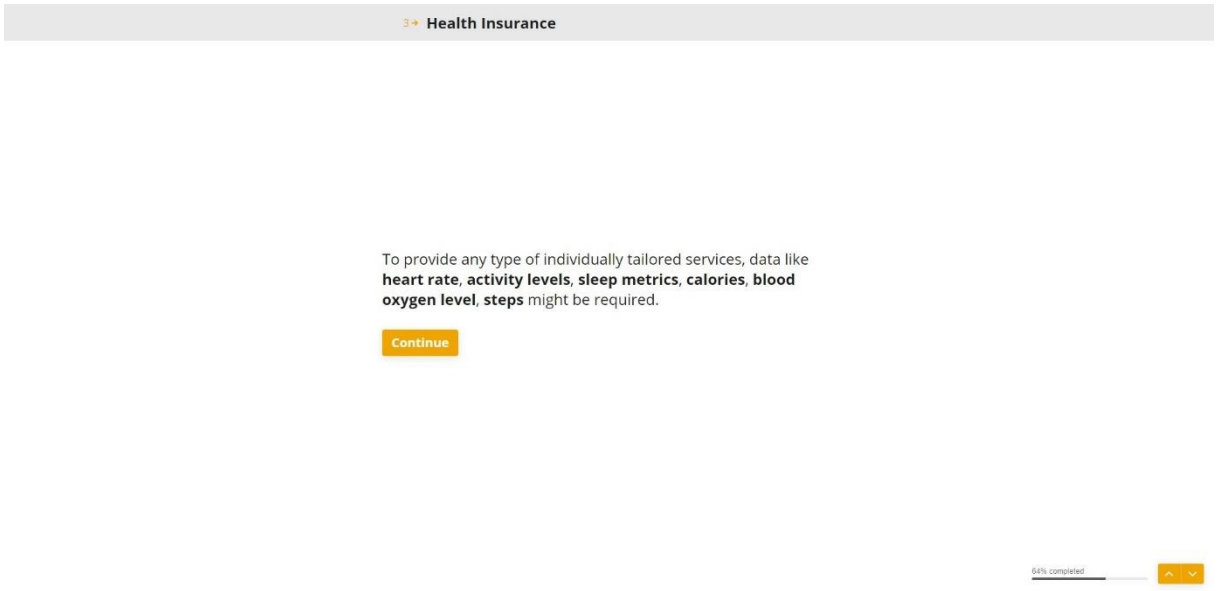

3→ Health Insurance
Similar to a Car Ecosystem is a **Health Ecosystem**:
Such a Health Ecosystem may **bundle** annual medical checks, access to **video appointments** with medical professionals, health instructions like **fitness videos** or **nutrition advice**, **financing**, and **remote health monitoring**.
Continue
59% completed

3b



3b	Item	*Average*	*%*	*Abs.*
Would you appreciate a Health Ecosystem?				
	Definitely not (1)	3.63	5.4	9
	Probably not (2)		11.4	19
	Possibly (3)		21.0	35
	Probably (4)		38.9	65
	Definitely (5)		23.4	39

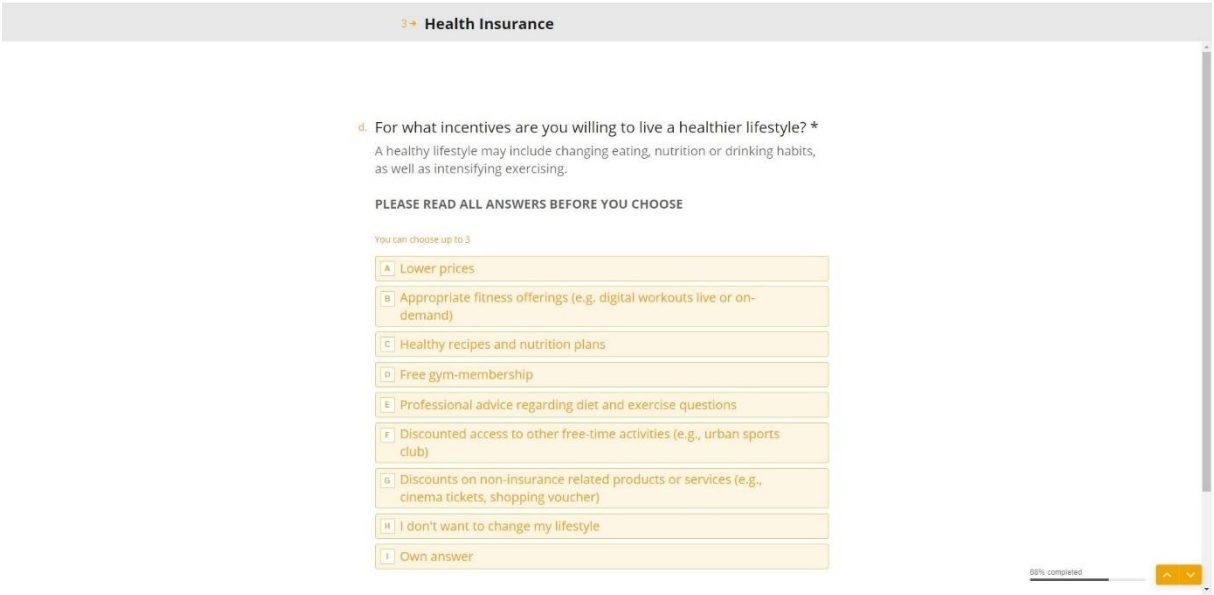
3.2


3
Health Insurance
To provide any type of individually tailored services, data like heart rate, activity levels, sleep metrics, calories, blood oxygen level, steps might be required.
Continue
64% completed

3c

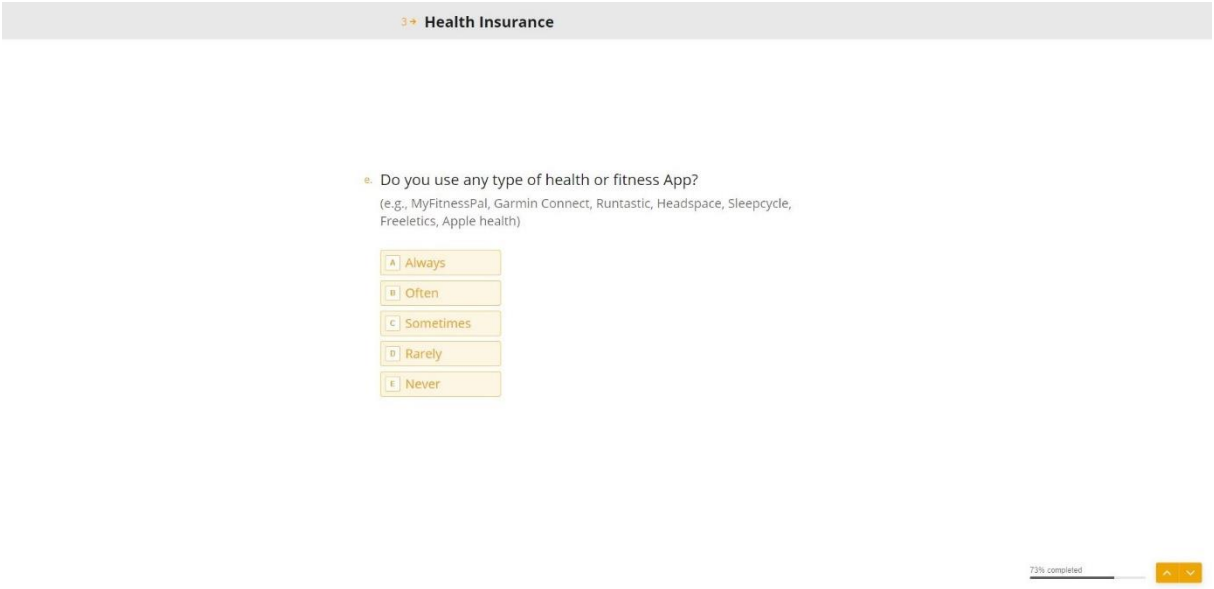
3c	Item	%
	For what services are you willing to provide personal health data, similar to the just mentioned examples? (choose up to 3)	
	Lower prices (e.g., based on health, exercise habits, etc.)	45.5
	Data security and transparency of data held by insurance	28.7
	Simple access and fast services (e.g., fast life-insurance approval, in-app personal data change)	20.4
	Priority services (e.g., priority physician appointments)	33.5
	Individually tailored services (e.g., early warning system of health inconsistencies)	43.1
	Benefits for society (e.g., data used for research studies)	24.6
	Discounts on non-insurance related products or services (e.g., cinema tickets, shopping voucher)	4.8
	I am not willing to share any personal data	18.0
	Other	0.6

3d



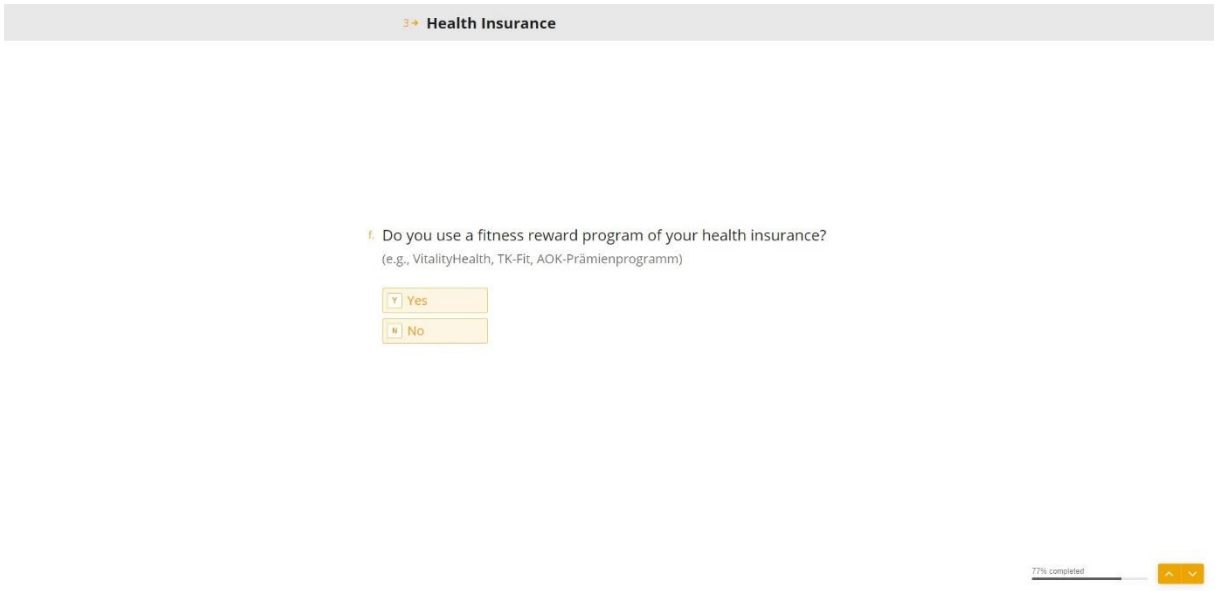
3d	Item	%
For what incentives are you willing to live a healthier lifestyle? (choose up to 3)		
	Lower prices	35.3
	Appropriate fitness offerings (e.g. digital workouts live or on-demand)	29.3
	Healthy recipes and nutrition plans	32.9
	Free gym-membership	49.7
	Professional advice regarding diet and exercise questions	37.1
	Discounted access to other free-time activities (e.g., urban sports club)	26.3
	Discounts on non-insurance related products or services (e.g., cinema tickets, shopping voucher)	6.0
	I don't want to change my lifestyle	11.4
	Other	2.4

3e



3e	Item	*%*	*Abs.*
Do you use any type of health or fitness App?			
	Never (1)	22.8	38
	Rarley (2)	13.8	23
	Sometimes (3)	31.1	52
	Often (4)	16.8	28
	Always (5)	15.6	26

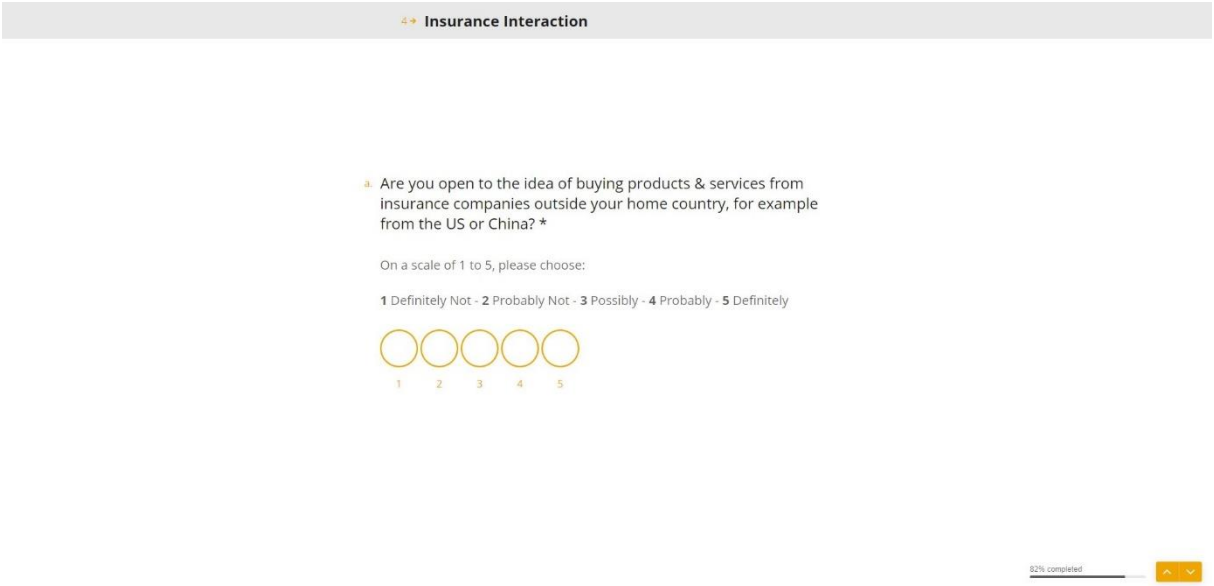
3f



3f	Item	Yes (%)
	Do you use a fitness reward program of your health insurance?	11.4

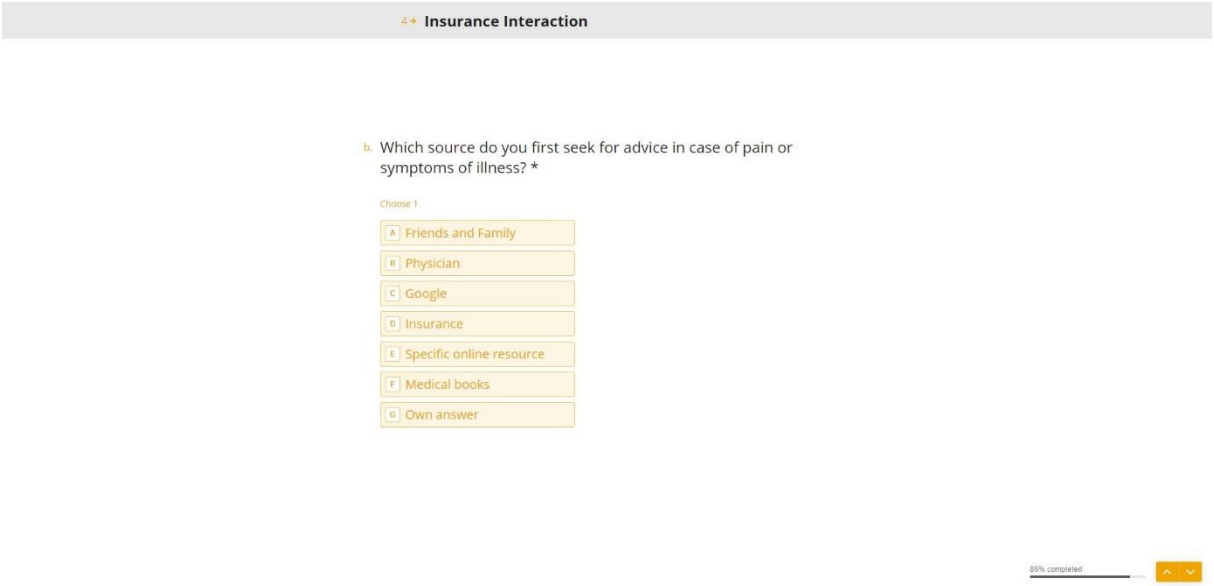
4 Insurance Interaction

4a



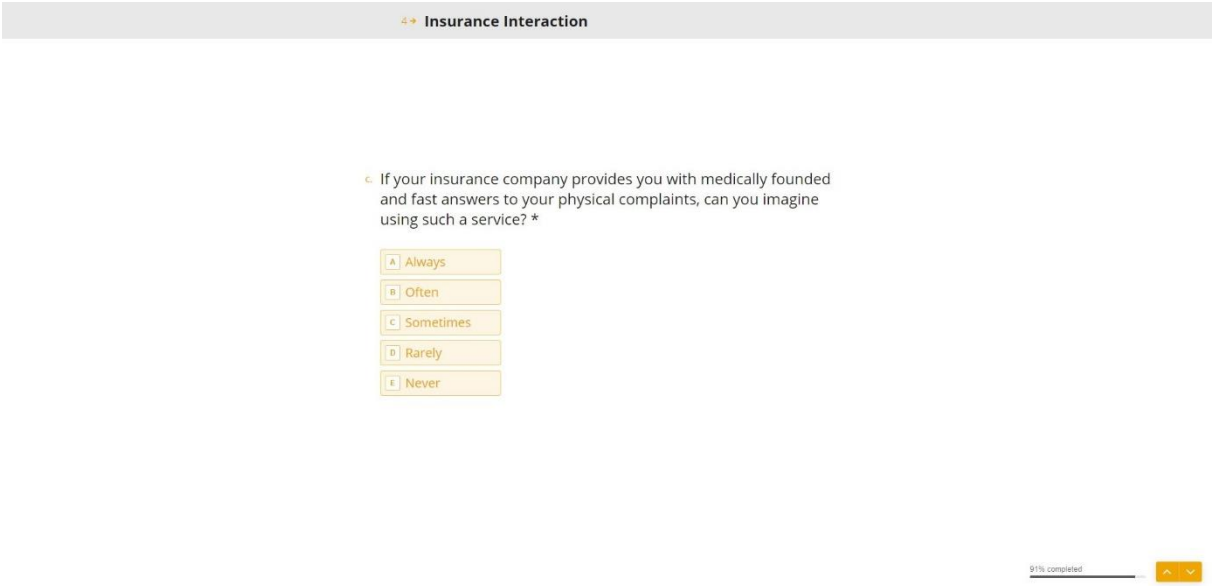
4a	Item	*Average*	*%*	*Abs.*
	Are you open to the idea of buying products & services from insurance companies outside your home country, for example from the US or China?			
	Definitely not (1)	2.20	30.5	51
	Probably not (2)		37.1	62
	Possibly (3)		19.8	33
	Probably (4)		6.6	11
	Definitely (5)		6.0	10

4b



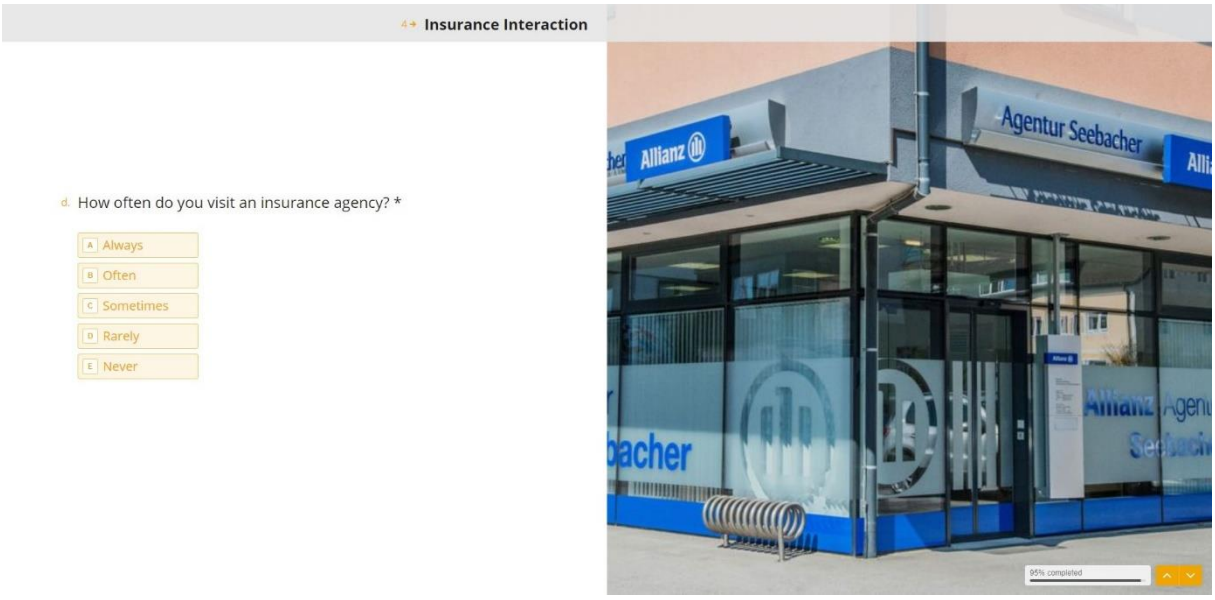
4b	Item	*%*	*Abs.*
Which source do you first seek for advice in case of pain or symptoms of illness?			
	Friends and Familiy	50.3	84
	Physician	29.9	50
	Google	16.2	27
	Insurance	0.0	0
	Specific online resource	1.8	3
	Medical books	0.6	1
	Own answer	1.2	2

4c



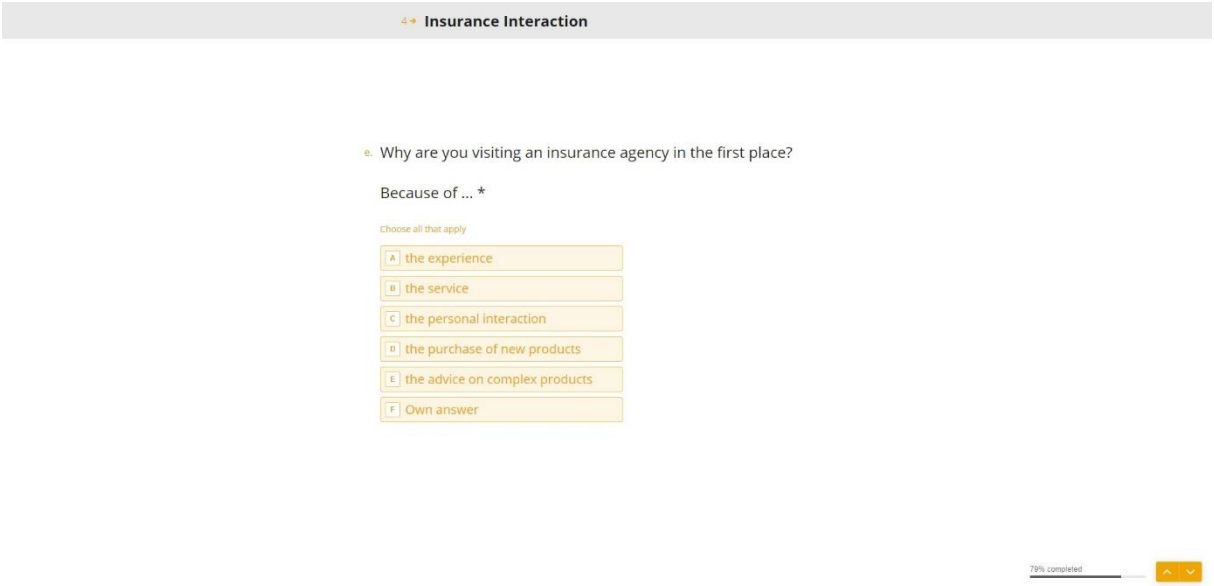
4c	Item	*%*	*Abs.*
	If your insurance company provides you with medically founded and fast answers to your physical complaints, can you imagine using such a service?		
	Never (1)	7.2	12
	Rarley (2)	8.4	14
	Sometimes (3)	26.9	45
	Often (4)	40.7	68
	Always (5)	16.8	28

4d



4d	Item	*%*	*Abs.*
How often do you visit an insurance agency?			
	Never (1)	68.5	115
	Rarley (2)	27.5	46
	Sometimes (3)	1.8	3
	Often (4)	1.2	2
	Always (5)	0.6	1

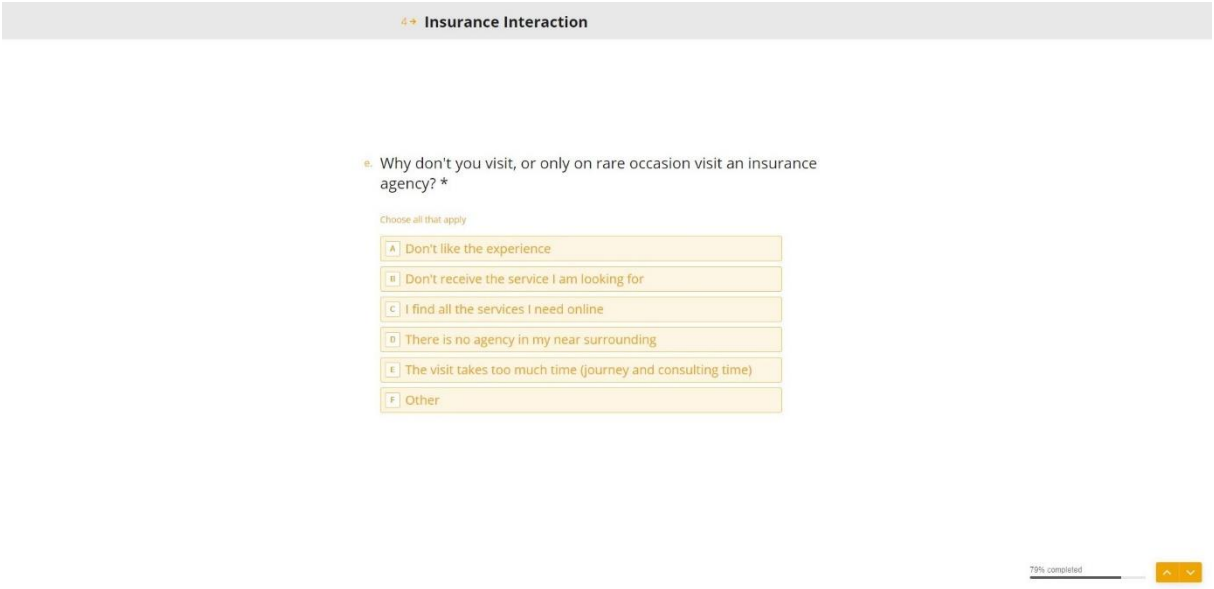
4e_1



4e_1 Item	%
Why do you visit an insurance agency? (choose all that apply)	
Because of…	
the experience	33.3
the service	66.7
the personal interaction	33.3
the purchase of new products	0.0
the advice on complex products	0.0
Other	0.0

N = 3

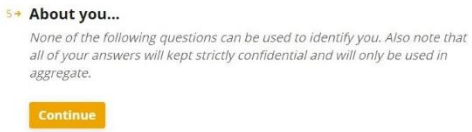
4e_2



4e_2 Item	%
Why dont you visit an agency? (choose all that apply)	
Don't like the experience	6.1
Don't receive the service I am looking for	2.4
I find all the services I need online	56.7
There is no agency in my near surrounding	7.3
The visit takes too much time (journey and consulting time)	27.4
Other	26.2

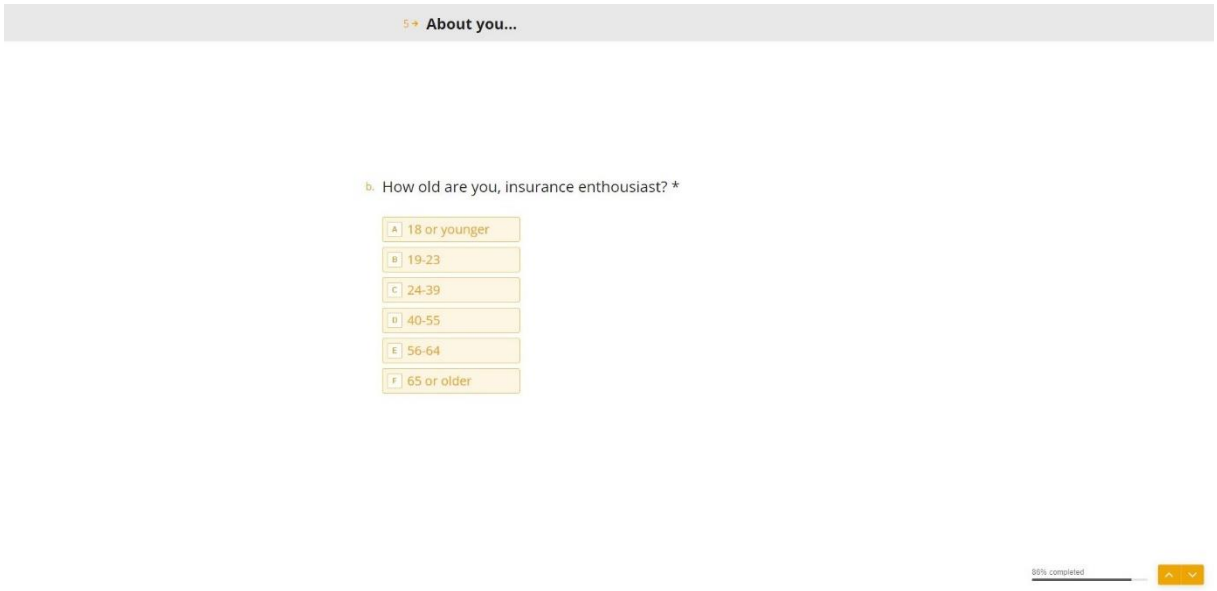
N = 164

5 About you

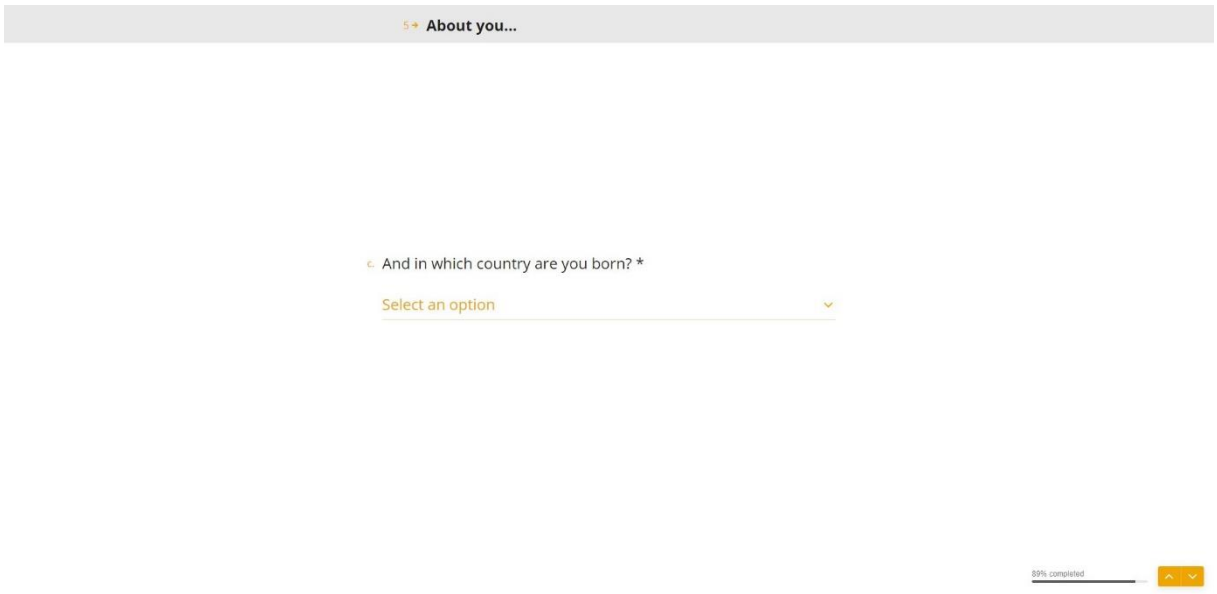


5a

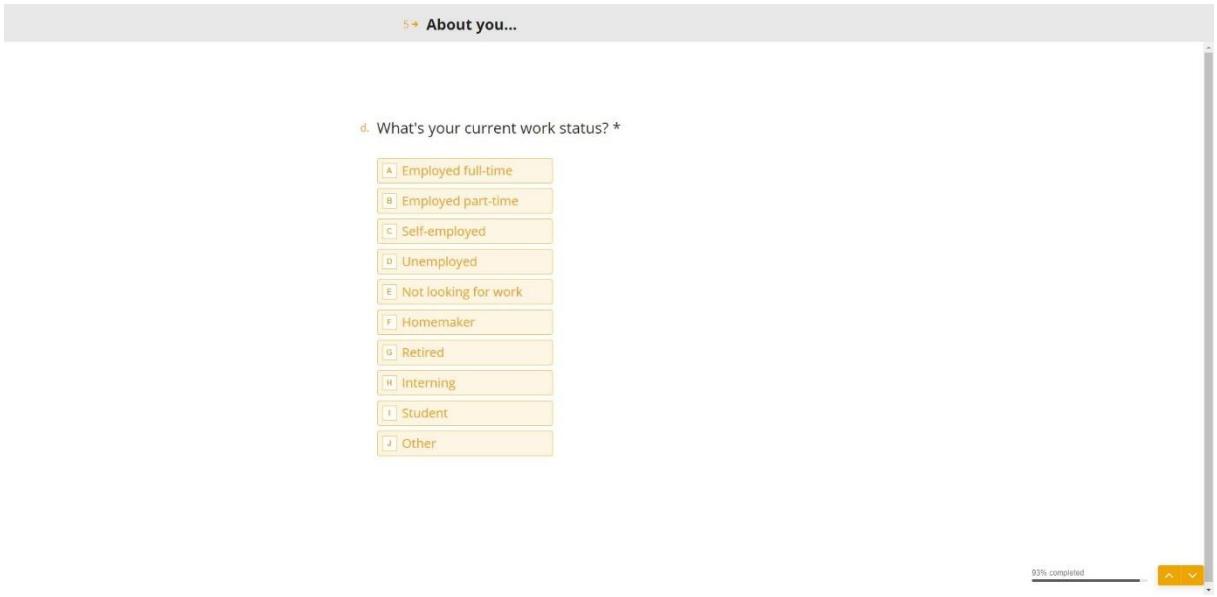
5b


5→ About you...
b. How old are you, insurance enthousiast? *
A 18 or younger
B 19-23
C 24-39
D 40-55
E 56-64
F 65 or older
86% completed

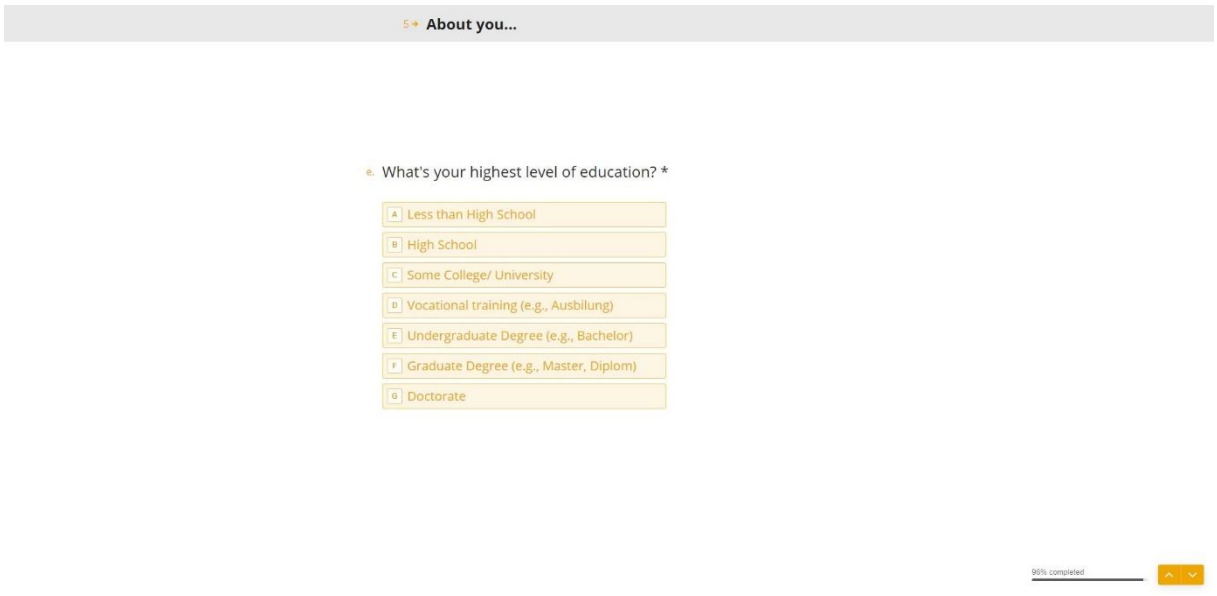
5c


5→ About you...
c. And in which country are you born? *
Select an option
89% completed

5d


5 About you...
d. What's your current work status? *
A Employed full-time
B Employed part-time
C Self-employed
D Unemployed
E Not looking for work
F Homemaker
G Retired
H Interning
I Student
J Other
93% completed

5e


5 About you...
e. What's your highest level of education? *
A Less than High School
B High School
C Some College/ University
D Vocational training (e.g., Ausbilung)
E Undergraduate Degree (e.g., Bachelor)
F Graduate Degree (e.g., Master, Diplom)
G Doctorate
96% completed