THE FUTURE OF HEALTH INSURANCE

How health insurance providers can meet consumer demands for individualized and predictive health management

Michael Carl | Kai Gondlach

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MANAGEMENT SUMMARY
The future of health insurance

This trend study compiles a picture of the future for health insurance providers based on empirical methods for trend research and innovation management. The traditional roles of the healthcare sector will be completely restructured in the emerging world of individualized medicine and adaptive insurance products. Technology is the largest driver here and will primarily be used by new market players. Within the next few years, insurance providers will no longer reactively respond to health problems, but will become proactive promoters of their customers' well-being.

"Intuitively, we humans always think in a linear way. However, new digital business models work exponentially, with a constantly accelerating speed of transformation. This is counterintuitive and leads to the fact that we think everything is in stasis or is changing only slowly."

Roman Rittweger, CEO, Ottonova

The pressure to transform faced by established players is growing; the overall business environment predicted here will differ significantly from today's in many aspects. Insurance providers who hope to have a leading market position in ten years' time will already have to start taking major steps now. Use the following checklist to review your company: If you can check every box today (or if it will be true within the next twelve months), your insurance company is heading in a promising direction, because you are meeting the **minimum requirements for the short term.** For expert feedback, please feel free to send us a copy of your finished checklist at michaelcarl@2bahead.com.

If you aim to begin laying the foundation for an innovation advantage in ten years' time, we also recommend looking closely at the Premium and Exclusive recommendations at the end of this study. We are happy to assist you with the development and transfer of these strategic recommendations to your company or with implementing your personal transformation strategy.

Checklist ____ of 12

- [ ] You know the individual health condition of all your customers and try to improve each customer's unique well-being with personalized prevention measures.
- [ ] You guide your customers to personally suitable service providers based on their place of residence, workplace, and medical history.
- [ ] Thanks to your cross-departmental omnichannel management, your customers receive the same brand perception at every touchpoint.
- [ ] You use big data analytics and adapt your solutions accordingly.
- [ ] You develop proprietary AI algorithms to analyze customer data.
- [ ] Your customers can access their personal data stored on your servers anytime – online or by mobile device.
- [ ] Your customers can decide what data they want to share, and with whom.
- [ ] You employ a Chief Digital Officer who has the authority and competence needed for the digital transformation of your insurance company.
- [ ] You develop and test new business models in the company's digital accelerator.
- [ ] You invest in your employees' digital education to prepare them for new job profiles.
- [ ] You proactively drive treatment and prevention topics in strategic alliances with competitors, research institutes, and startups as well as flagship projects with large companies, for example real-time data transfer, telemedicine, ambient assisted living, and diet optimization.
- [ ] You employ a Chief Medical Officer who evaluates medical developments and initiates flagship projects (e.g. genome sequencing, artificial organ replacement, gene therapy, cryonics).

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FOREWORD

Dear Reader,

Over 100 years ago, German chancellor Otto von Bismarck established a national social security system to shield the population from the full force of accidents, illness, disability, or old-age poverty. The late 19th century was dominated by political and economic insecurity – health was considered a rare privilege dependent on the whims of fate. A considerable proportion of the population did not live beyond nine years of age, and diseases such as the flu could ruin entire families. Introducing a supportive social security system laid the foundation for our current healthcare system which views illness as a controllable phenomenon, and offers relief in emergencies thanks to research and the network principle.

Today's world is characterized by the digital interconnection of all areas of work and life. Digitalization is leading to the development of unique dynamics regarding our ideas of the human body, health, healing, and optimization. Patients will have more and more information about their fitness and overall health condition without necessarily being otherwise better informed. At the same time, customer demands for individualized solutions, rapid diagnoses, and the precision of medical professionals will grow. This means data flow will increasingly determine the interaction of industry players while new players will enter healthcare markets and compete with traditional experts in the health sector: food companies, sporting goods manufacturers, IT companies, and providers of wellness and fitness apps.

The results of these developments include more individualized medical care and a new basic understanding of the healthcare sector which will be shaped more by the notion of optimizing the human body than repairing temporary deficits. And while practicing physicians may vehemently argue that their treatments have always been individualized –

digitalization will put the individual at the center of their personal health network like never before. "Suffering patients" will increasingly become customers with completely new demands regarding their healthcare providers' performance. And many new voices will join the choir: GPs' professional opinions will stand in direct competition with the interpretations of self-styled or media-hyped experts. Every player who understands customer needs and makes a genuine, transparent effort to improve their well-being will gain customer trust.

This means the situation will become outstandingly complex for health insurance providers. They will not only face growing challenges from within the industry and from the customer side: In an efficient and effective healthcare system – of which a strongly growing segment will be independently financed – it is also unclear how health insurance providers will best fulfill their responsibility in the future, how they will implement specialist and process know-how in the healthcare market, how they will remove tensions between increasing individualization on the one hand and a strong solidarity on principle on the other, and how they will deal with the opportunities and limitations of the growing amount of data in the healthcare market.

Health insurance providers will then – more than ever – fulfill a social and economic responsibility: Demographic change will lead to a lack of skilled workers, which means even the elderly will have to remain productive for longer. Health insurance companies can relieve the entire healthcare system through strategic healthcare policies. Generally, insurers enjoy a promising starting point from which to reach the center of the customer's health network and promote their well-being. This way, health insurance providers will become *health promoters.*

These new responsibilities will fundamentally place the traditional role concepts of insurers in question, and only those providers who proactively face the current challenges as opportunities will be able to transfer their market position into future healthcare markets.

A chief characteristic of digitalization is the exponential speed of development across all industries. The healthcare sector is also affected by this unusual speed of transformation which cannot be addressed through traditional, linear strategies. This trend study names the key drivers of the transformation of business and insurance, and compiles a likely picture of the future of health insurance companies in ten years based on the roadmaps and motives of core stakeholders. The study is supposed to be a guidebook for players in the healthcare industry to check their strategies according to the predicted picture of the future and adapt them if needed. Please view the included assessments and recommendations as impulses for checking your own company development and redefining your strategy. We would love to help you with the implementation of the strategic recommendations.

Due to our cooperation with AOK PLUS, we are able to present this trend study at no charge – it is free to be openly shared and reproduced. We would like to thank our study partner for the kind and constructive help they offered us every step of the way, help which enabled us researchers at the 2b AHEAD ThinkTank to address all relevant areas of the healthcare system in a neutral and unbiased way.

We wish you an interesting read, innovative ideas, a successful implementation of our recommendations into your business model, and most of all – a great future!

Michael Carl
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Senior Researcher
2b AHEAD ThinkTank

FOREWORD BY AOK PLUS

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Die **Gesundheitskasse**
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"The best way to predict the future is to invent it."
Alan C. Kay

Dear Reader,

Our living and working environments are undergoing massive change as new developments appear on the market – and in our everyday lives – with exponential speed. And the healthcare sector is no exception. On the contrary: It is especially here where new technologies and competitors are increasingly penetrating the market, bringing with them a constant flood of new solutions for changing customer needs.

The success of these will have to be measured using the question of whether they too will enable reliable across-the-board care care solutions in the future – as well as whether or not emerging challenges like radical demographic change can be overcome. At the same time, viable solutions must be able to offer relief and support to human beings within a complex healthcare system.

We cannot plan the future, but together with our partners in healthcare, we can proactively shape it for the good of our customers. This is why it is important to always look towards the future and to know the scenarios that may emerge. This is why we conducted the present trend study on the future of health insurance through 2030 In cooperation with the 2b AHEAD ThinkTank.

A large number of experts contributed their assessments to the project. The result is a potential picture of the future that we would love to share with you.

With this study, we invite you to think about the future and to join us in this discussion. What opportunities and risks will emerge as digital change progresses?

And what is truly desirable for the healthcare customer of tomorrow?

Dr. Stefan Knupfer
Cooperation Partner & Member of the Board
AOK PLUS - The health insurance provider for Saxony and Thuringia
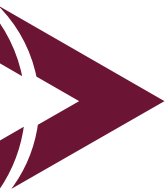
THE STUDY
Trend cycle analysis – Not megatrends

This is not a study on megatrends. Those who work with megatrends do so on the assumption that there are a limited number of drivers that affect all business areas equally. This is wrong. Trends exist only because industry developments are driven forward or blocked by those individuals who have the resources or authority to do so and to lead others in doing so.

Human behavior – and thus also investment decisions – always follows specific interests, desires, and compulsions. These vary by industry and by industry sector. We trend researchers are able to observe this behavior on the part of decision makers; we can try to understand it, we can analyze driving and blocking factors, and we are able to generate forecasts regarding where this behavior on the part of industry players will lead. In the sciences, we call this *qualitative research.* The following study is based on this approach. Unlike with other industry studies, you will find no lists of per-centages in the following pages. Futurists know that the future can neither be measured nor quantified – because it has not happened yet. For the most dead-on forecast possible regarding what will happen in your in-dustry in the years leading up to 2030, no representative survey of customers or so-called experts will help, no matter how large-scale it may be – because no

matter how many you might interview, they would like-wise be helpless to predict a future that has not yet oc-curred.

The only possible way to come close to a reality that is still in development is to speak with trendsetting companies and industry players who are driving the technologies and trends that we will all meet in the future through the decisions they are making today – because you can talk to them. Furthermore, you can try to understand their motives and compulsions. You can find out about their expectations and roadmaps for the years to come. Where their statements intersect, we can see those trends that are being pushed – or blocked – most forcefully. This provides the basis for the most realistic picture of the future of your industry that researchers could possibly offer you. You will find this picture on the following pages.

The trend research institute the 2b AHEAD ThinkTank specializes in the identification of driving and blocking factors, the analysis of opportunities and risks, and the development and implementation of business models for the future – all specifically tailored to the trend cycle of the individual company.

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This last feature is important because the players who have a decisive influence on the business of their organizations vary from company to company. Thus the trend drivers and blocking factors, as well as the opportunities and risks, also differ between companies – even within the same industry.

Those who handle their future responsibly will not run after the one-size-fits-all megatrends of supposed trend gurus, but will base their strategies on the goals and the roadmaps of the leading attackers and defenders in their markets. This is our mission. We would be thrilled to hear that this study has helped you succeed there, too.

INTRODUCTION
The future of health insurance

Historically, health insurance has long embodied security and healthcare meta-competence. Recent developments, however, point to turbulence in the traditional social insurance system despite public reserves well into the billions. Increased pressure from regulatory authorities, demographic change, and growing consumer demand will require nothing less than a total reinvention of the organizations and solutions of health insurance providers.

Today, customers generally view their health insurance providers merely as passive service providers who organize financial transactions in the event of illness or injury. The main differentiation between providers are the varying premiums and mechanisms for cost coverage. The product – and consequently providers – are at risk of becoming increasingly interchangeable. Yet health insurers are predestined to know more about the customer's health status than any other stakeholders – thanks to the obligatory smart card & Co. All consumer data is stored on the providers' systems – the process is still time-delayed, so its data comes too late to be used in a meaningful way for the real-time promotion of the customer's well-being. However, new players with high digital expertise are entering the market, using newly created data points to seize territory once covered exclusively by health insurance providers.

These attackers are creating new customer needs which they simultaneously fulfill, thus challenging the position of health insurance providers. And the number of new providers within the health network who are competing for customer attention beyond traditional structures is growing. But how can health insurance providers halt and reverse this development? How can providers incorporate the requirements of digitalization and convert them into customer-oriented, market-driven, and modern products while also offering valuable services?

How can health insurance companies react to this transformation? One part of the solution is adaptive insurance products. In the future, it will not only be possible to increasingly tailor adaptive insurance products to individual customer needs, but also to constantly and flexibly adapt these products to changing consumer expectations. Why will insurance providers develop adaptive products over the next few years? The answer is simple: Healthcare customers will expect them to – mainly because they will have had similar experiences in many other segments where new digital players also offer adaptive products. This study discusses the role of health insurance providers in the digital era and describes what they will most need to fulfill it.

First, we evaluate what the individualized medicine of the future will look like and what expectations healthcare customers will have for their insurance providers. We show how insurance providers will primarily become the health promoters of informed customers. What key changes in the healthcare sector will impact the core business of insurers (health)? Why will the needs of healthcare customers be different in ten years? Why is it possible for digitalization to transform such fundamental behavioral patterns and market principles?

Next we consider changes in the traditional industry players and roles. Healthcare customers will increasingly move to the center of their health networks, thereby inevitably transforming traditional role concepts. What will the duality of health and insurance become in the digital world?

What customer segments can be identified based on this? And how will medical professionals and insurance providers constructively deal with their new status as one player among many in the customer's health network?

The speed of transformation is rapid and continues to climb. This means insurance companies will have only limited time to adapt to the new market environment. The competition for healthcare customers is heating up – with growing intensity. The third trend area describes the foundations of the predictive health insurance solutions of the future.

In addition to the standard checklist in the Management Summary, at the end of this trend study you will find twelve strategic Premium and Exceptional recommendations. Successfully following these will enable you to reach a leading market position within the next ten years.

THE INDIVIDUALIZED MEDICINE OF THE FUTURE

How the focus of medicine will shift from treatment to optimization

In the future, technology will continue to drive health care with exponential speed, progressively turning patients into informed healthcare customers. The core business of health insurance providers will no longer be to heal sick patients, but to support healthy ones – from preventing diseases to optimizing health to increasing individual life expectancy.

By 2030, the healthcare industry will experience unprecedented change: Thanks to digitalization, the opportunities of medical research, diagnostics, therapy, rehabilitation, and prevention will grow exponentially. We are now able to double our knowledge about how the human body works, and about as its strengths and weaknesses, approximately every four years. In turn, this will pose unprecedented challenges not only for medical students, but also for experienced health professionals and eventually the entire healthcare industry.

The capacity of computer chips has been growing exponentially for over 60 years while prices per megahertz drop in parallel. This trend will continue over the next ten years and will gain new momentum once the first quantum computers enter the market. And all of this will happen while the digital interconnection of all areas of life continues to progress.

Technology providers will equip more and more everyday objects with sensors for a direct or indirect connection to the growing Internet of Things, which will then become the Internet of Everything. In 2030, consumers living in Germany, for example, will on average use more than 100 smart sensors in their everyday lives – largely unconsciously, of course. After smartphones and smart watches, there will be connected household appliances, clothes, vehicles, and public transport of all kinds. Everyday objects that are not connected to the internet will vanish from customers' perception by the middle of the coming decade. This way not only online shops will be available 24/7, but also healthcare-related apps and tracking devices. Due to the increasing miniaturization of sensors, these tracking devices will permanently circulate in our blood stream as early as in a few years' time, analyzing the user's health condition in real time at nanoscale. The possibilities of the new generation of wearables will range from the evaluation of emotions to genetic analysis and genome sequencing.

From healthcare market to customer health network

Health care will no longer exclusively take place in doctors' offices, clinics, or nursing homes – it will be available everywhere, an omnipresent consumer product. This development will put medical history, diagnosis, and expert advice by healthcare professionals within constant reach and in competition with traditional players. On top of this, competing providers will line the shelves of supermarkets and drugstores with readily available and personalized health-enhancing supplements outside of the pharmacy; sportswear and fashion companies will offer smart clothing and wearables; telecommunications providers will naturally come to view themselves as serious players in the healthcare industry due to the masses of health-related data on their servers. Entire health networks will be formed with the customer at the center; the hubs of these net-works will be occupied both by traditional players from the healthcare industry and by newcomers. These personal health networks will be dynamic and will continually adapt to the demands of health care.
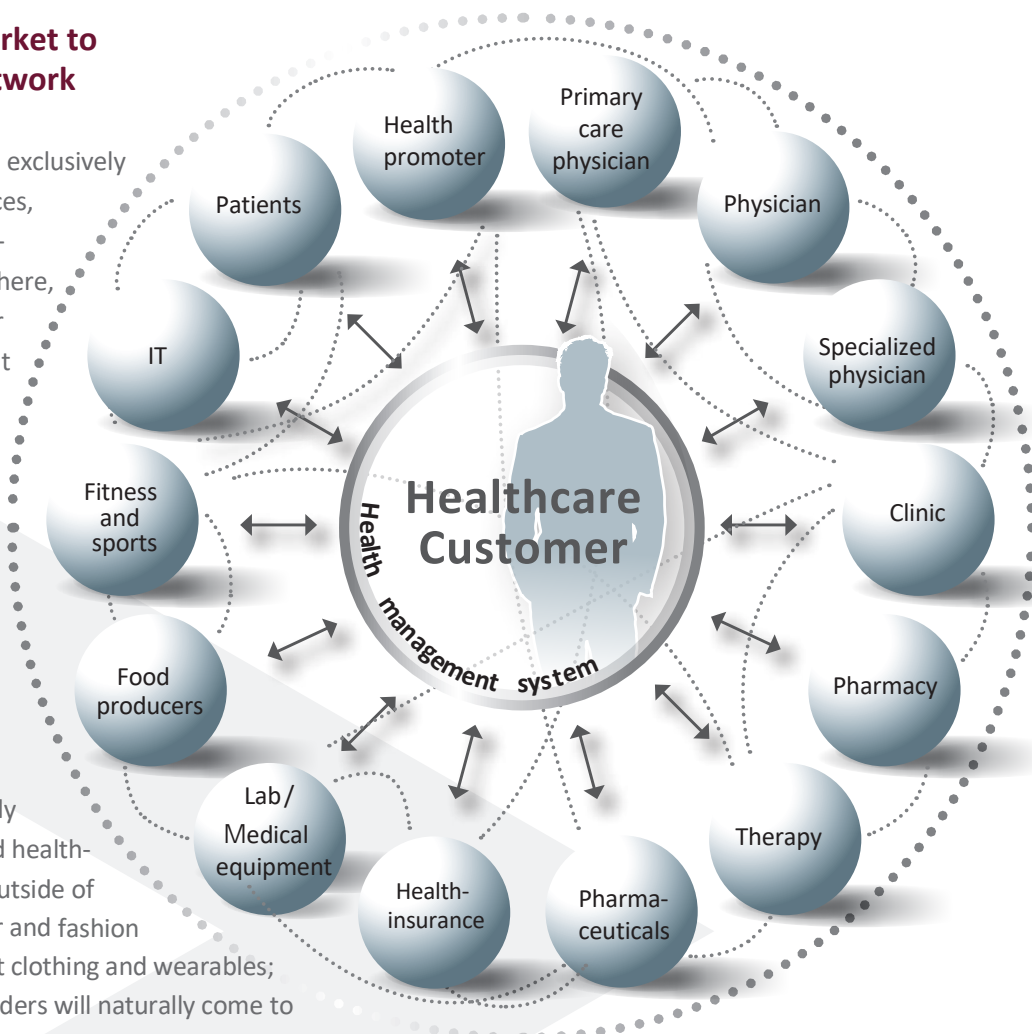
"I'm fully convinced that health platforms will become generally accepted over the next few years. The customer is at the center, surrounded by the doctors, pharmacists, dentists, and hospitals as service providers, as well as private and public insurance companies. This means there are many players involved, and it makes sense to connect them on a common platform. Various initiatives are currently being launched, and the best will prevail."

Karl-Heinz Naumann, COO, Ottonova

From insurer knowledge monopolization to the informed health customer

By connecting greater numbers of stationary and mobile devices through smart sensor technology, providers will be able to collect more customer data. Medicine has quickly shown that diagnostic quality increases significantly in relation to growing amounts of patient data.

The result is an increasingly more precise, personalized management of patients or policy holders, in short: healthcare customers. Digital assistants will calculate an individual health index based on the customer's daily mental and physical situation. Personal well-being – which is extremely subjective – will become quantifiable and allow for better opportunities to eliminate mental and physical problems.

"Patients will become customers whether we like it or not."

Reto Schegg, CEO, healthbank innovation AG

Another direct result of this remapping of human health will be the disappearance of the binary assumption that patients are either healthy or sick. Healthcare customers will maintain a measurable relationship with their health, because their digital assistant will provide them with a precise assessment of their well-being. These informed healthcare customers will very consciously choose the most competent medical professional for their situation, the appropriate insurance provider, and a trustworthy data manager from their health network. At the same time, consumers will no longer accept that the interplay of various providers should mean increased effort on their part.

The concept of informed healthcare customers does not fit the image of conventional Western medicine – industry players are beginning to miss this drastic metamorphosis of roles. However, this offers countless approaches for new, predominately data-based business models. The provider from the health network who is able to occupy the customer interface first will have the advantage over their competitors in the coming years.

From problem focus to targeted prevention

The conventional procedures of health insurance providers and generalized, unbiased, and essentially generic health-promoting measures will soon be replaced by empirically grounded, personalized recommendations for targeted prevention.
While today's health insurance providers attempt to

reduce the major cost drivers such as hospital treatments, medication, and medical therapies with massive prevention programs and investments, this shotgun approach will no longer be feasible in times of increasingly predictive diagnostics. In the future, health promoters will not wait until their customers are sick, but will continuously monitor their current health status and react before a foreseeable health problem develops.

In the past, health was more or less dependent on chance. If patients felt unwell, they made an appointment with their GP. If certain symptoms were present, the doctor referred them to a specialist or clinic with the right equipment to precisely examine these symptoms. Many (common) diseases were not picked up by the wide-meshed net of standard health care and were thus diagnosed too late. Various technological advances have completely changed this defective approach.

One development relies on the user's collection of behavioral data with the help of smart devices. This trend towards comprehensive health checks began with the first pedometers; their successors are smart watches and other digital equivalents from the app marketplace that provide recommendations for improving fitness or sleeping patterns. Apps like Runtastic, MyFitnessPal, Endomondo, Jawbone, Fitbit, Polar, or Withings remind users to embrace healthy habits, and combine behavioral data with database findings in order to compare this with known patterns that point to somatic connections.

Healthcare customers who share their data with providers within their health network will benefit from individualized services and an increase in well-being. While the decision making prerogative for the targeted use of data lies with healthcare customers here, the obligation for health promoters is to translate this data into added value. This includes the comparison of anonymous data with all consumer data as well as expert consultation, for example to detect patterns and develop corresponding personalized therapies.

This is the main reason why customers will be increasingly willing to share their data as the quality of healthcare solutions increases.

In turn, providers' approach to their customers will diametrically change. Today's insurance providers do not register in the customers' conscious awareness – except as legally authorized funders of healthcare services. In other words, traditional insurance providers manage the solving of temporary health problems after they have occurred. Health promoters of the future, however, will take action much earlier in the process, allowing them to take a more active and positive position at the core of the health network and in the customers' awareness.

"Today, insurance providers only take action at the end of the process chain, namely when customers receive an invoice from the clearing office which they then send to us. I want customers to see insurance providers as partners and contact points much earlier in the process."

Karl-Heinz Naumann, COO, Ottonova

At this point, digitalization is once again creating a shift in paradigms. The traditional operating system of the medical treatment chain will reverse itself. The principle of the old system: No case without suspicion of illness, no diagnosis without the specific therapy goal of a licensed practitioner (and certainly no prevention or therapy). In the new system, the treatment chain begins in the healthy body, proactively preventing diseases from occurring. At the first signs of illness, smart sensors will inform health promoters, who will then establish personalized measures – together with relevant service providers if needed.

Best cases: Genome sequencing and gene therapy

In 1999, the human genome was successfully sequenced for the first time, making it possible to uniquely identify personal genetic material. To date, the DNA of millions of individuals has been sequenced. This allows medical professionals to precisely identify genetic predispositions for diseases and use these for diagnosis. The price for the procedure has fallen from several million euros to about €100 and will be affordable for every healthcare customer by the middle of the next decade – or offered free of charge by health promoters.

The market for providers of genome sequencing is large and growing rapidly. Providers can identify diseases such as multiple sclerosis, migraines, obesity, Alzheimer's, and various kinds of cancer from the data (*23andme, MapMyGenome*), but also origin and descent (*iGENEA, tellmegen*), wellness and lifestyle, or the sex of an unborn child (*easyDNA*). *Face2Gen*e refines genome sequencing with phenotype analyses to further improve evaluation.

The company *iCarbonX* was founded by Dr. Jun Wang, who also established the Beijing Genome Institute and has made significant contributions to genome sequencing research. Wang and his colleagues combine genome sequencing with artificial intelligence in order to detect increasing correlations between the genome sequence of living individuals and future health deficits. They then translate this knowledge into (preventive) treatment options.

In addition, *CRISPR/Cas9* is used to (de)activate "defective" genome sequences or genome bases. If there is, for example, a proven correlation between an activated genome base and a disease outbreak, this exact genome base can be deactivated in the living organism – for example the base causing an HIV outbreak or the growth of cancer cells.

This idea of preventive health promotion goes hand-in-hand with a redefinition of the basic understanding of health. While we used to think that health was left to chance or providence, a mechanical understanding is now starting to emerge. Physical or mental illness is no longer seen as an inevitable turn of fate, but is used as an opportunity for targeted repair. The more we learn about the correlations of human behavior and disease, the more we gain a collective understanding of diseases as a result of human misbehavior. To exaggerate: If somebody dies of a common illness, this is due to malpractice by incompetent medical professionals.

Data will play a key role here. "Soft" data about everyday behavioral patterns and unconscious habits provides as much insight on the health status – the well-being – of healthcare customers as their "hard" data such as blood count, DNA, and metabolism. The more data healthcare customers share with their health promoter, the better the outlook for the prevention of diseases.

For health promoters, this will mean significant cost savings and added value in health research which will in turn give healthcare customers further incentives to share their data.

"I imagine it is very likely that healthcare customers will pay a reduced insurance premium by providing their genes for medical research. This will be a large market in the future. I call this the 'something-for-something insurance world' – similar to what is already happening with private experiences on Facebook."

Peter Ohnemus, President and CEO, Dacadoo AG

The health promoters of the future will work with a new group of healthcare customers who do not yet show any signs of health problems. The question of whether this customer group will be more cost-effective for providers is still open – however, it is certain that a large number of new and established providers will want to win the customers' trust.

Best cases: Health tracking

The app *Dacadoo* calculates the individual health index of users in real time based on their activity, stress levels, diet, and sleep patterns. The aim of the app is to provide users with personalized recommendations for a healthy lifestyle and increase motivation with gamification incentives as well as pairing with short- and long-term goals.

The nanotechnology of *IBM* ("lab-on-a-chip") as well as *Verily Life Sciences,* and *Calico*, both spin-off companies of the Google parent company *Alphabet*, aim to help identifying diseases at an earlier stage in combination with genome sequencing. For this purpose, very small pill-housed chips examine body fluids for biomarkers – these are relevant changes that point to diseases such as cancer, infections, or neurodegenerative disorders. In the next step, these technologies will be equipped with AI, for example the supercomputer IBM Watson, which was named the most precise cancer diagnostician

world-wide in 2013 and is continuously being developed to detect a wide range of diseases.

The digital health startup *MySugr* reduces everyday obstacles for diabetes patients. The insurance provider *Versicherungskammer Bayern* covers the costs of the package, which consists of an app, blood glucose meter, unlimited test strips, and a personalized smartphone diabetes coach. In July 2017, the Vienna-based startup was acquired by the pharmaceutical concern *Roche*.

Google is developing smart contact lenses. An integrated sensor measures glucose levels in the tear fluid every second. A miniature radio chip – smaller than human hair – then sends the score to a smartphone app: a helpful development for diabetics that will daily save them numerous unpleasant finger pricks.

"If people have a health index, first this will have a positive effect on their lifestyle. Second, if they use active or passive trackers, this will lead to 30% more activity on average. This 30% more activity is hugely important in today's society as inactivity leads to depression, type 2 diabetes, vascular diseases, and joint diseases due to obesity. In Germany, 65% of the entire healthcare budget is spent on chronic illnesses, which means: This is where great savings or great profit opportunities are possible."

Peter Ohnemus, President and CEO, Dacadoo AG

Care and medicine in rural areas

"We already know that medical coverage is much thinner in rural areas, in some cases with lower quality as well. Digital technologies can be very helpful here. Country doctors, who currently are hardly surviving, can for example massively upgrade their services with video consultation, improve the quality of care, and gain access to additional patient groups. And patients will get the opportunity to connect with specialists in Berlin, Cologne, Frankfurt – anywhere. If the ban on remote treatment is turned over as expected, this will open up great potential for improved medical care in rural areas."

Dr. Mirko Tillmann, COO, Central Krankenversicherung

Medical care in rural areas is one of the major challenges for healthcare systems in Western economies. Clinics and medical professionals are rare commodities. The stronger the population influx to large cities and urban centers and the corresponding reduction in rural population, the less attractive jobs far from metropolitan areas will be for highly qualified medical professionals. Well-intended regulatory care quotas will not change this, either. The pressure for innovative solutions is growing in parallel to the lack in available care.

Thanks to digitalization, significant improvements for this problem will emerge over the next few years. One major driver is the spread of the smart home. Medical progress and the interconnection of household appliances will turn private living environments into new health locations. Object recognition, image recognition, and observation-capable interfaces will guarantee that, in the future, everyday objects will observe the behavior of their users, combine this real world data with stationary information stored in the cloud, and produce unique and situation-appropriate prognoses regarding the current needs of the user through automated algorithms or business intelligence systems – always accurate down to the second. Smart living environments support the health of their inhabitants.[1]

Best cases: Smart homes

In the future, smart living environments will become technological guarding angels for their inhabitants by proactively monitoring them. Solutions from providers such as *SensFloor* are especially attractive for senior citizens: They prevent cases where a person lies on the floor unnoticed for several hours after falling via floor-installed motion sensors connected to safety solutions, activity and sleep monitoring, or leaking-water alarms. The interface to medical services or the police for emergency cases is naturally included in the price.

Together with his students, Professor Joe Colistra of the *University of Kansas School of Architecture* designs and develops smart homes that collect and analyze health data. Here the home becomes a personal caregiver. This is an alternative to assisted living for senior citizens in particular. The smart home informs the hospital if floor sensors detect that the inhabitant has fallen. Thanks to many other sensors, it will also know early on if the customer's health status has changed. Through predictive algorithms and the linking of data, the home will therefore become a personalized health guardian.

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[1] For a further read on the future of connected buildings, we recommend the 2b AHEAD ThinkTank trend study "The Safe Building of the Future" (2016), online at: https://www.future.consulting/en/research/studies/trend-study/article/the-safe-building-of-the-future/

"Smart homes will allow permanent precautions at a level that would otherwise not be available. People's homes will become the next health location."

Lars Hinrichs, Founder, Apartimentum & CEO, Cinco Capital

Additionally, connected buildings will increase the safety of their inhabitants in smart cities. In a smart city, burglaries or fires can be identified early while the neighborhood is informed and rescue teams are alerted at the same time. These comprehensive developments well beyond consumers' homes will become more important for today's insurance providers in a connected, digital world. Ultimately, these developments are closely linked to healthcare customers' well-being, which providers will want to optimize as their primary goal.

The potential of smart buildings obviously is not valid only for rural areas. However, these technological solutions which counteract the shortage of caregivers are especially valid for the care and support of dependent persons in economically underdeveloped areas. These solutions are summarized under the key phrase *ambient assisted living*. The emphasis in these projects is the permanent monitoring of healthcare customers' conditions. Devices collect data on air quality, health scores, emotional condition, and activity. Through smart homes, direct medical assistance will take on a new dimension. In addition to outpatient and inpatient care, your home – the smart home – will become a third health location. Smart homes will thus become part of the healthcare network surrounding the healthcare customer and will be connected to doctors and nurses. This enables medical staff to be alerted directly and to have access to patients' homes in case of an emergency.

"Although we are still miles away from perfect prosthetics, learning systems are being advanced by many excellent developers. In a few years every health insurance provider will naturally pay for mobile exoskeletons and the first brain-computer interfaces for patients."

Prof. Robert Riener, ETC Zurich

However, pressure – in particular on ambulatory care – is growing in light of demographic change on the one hand and the shortage of skilled labor on the other. Up to now, a third blocking factor has been the lacking acceptance of artificial caregivers in lieu of humans by persons in need of care and their families. Nonetheless, the growing demand will successively cancel out this obstacle within the next few years: Robot caregivers are better than no caregivers at all, especially given that it is well-proven that humans can develop emotional relationships with machines and virtual assistants. The more positive experiences are created in human / machine relationships, the more momentum this area will gain.

Best cases: Robotics

Pillo Robot is a digital assistant with a modern robot design which supports users in leading a healthy life via speech and face recognition. The robot delivers drugs, reminds users and their families by app to take the medications, and is connected to the user's entire environment. It answers health questions, orders medication, and contacts doctors if necessary.

The care robots *Robear* and *Terapio* support caregivers and clinicians with doing rounds, lifting patients, and especially with data management. In Japan in particular, where a shortage of one million caregivers is expected in 2025 due to demographic change, robots now help where they are most needed. The cuddly therapeutic seal *Paro* recognizes speech and touch and can react to its users. Paro has been used for many years to provide activity and therapy for elderly persons in particular.

Following successful establishment in the care sector, robots will be used increasingly in clinical and surgical areas. They are now merely assisting human doctors, but this will lead to the first autonomously acting robot physicians at the end of the 2020s. Here, momentum will grow in parallel with expansion of use; both will be driven mutually by customer expectations. For certain segments of healthcare customers, being treated by Dr. Robot will simply be expected.

"The spread of smartphones has increased acceptance for digital communication, also due to automated messages such as push notifications. Now digital communication has to be implemented better and more intensely, and added value needs to be communicated."

Ulla Kieserg, Executive IT Architect, IBM

However, the lack of care in rural areas can also be met by new forms of digital networking. In the German federal state of Mecklenburg-Western Pomerania, the number of available rescue services has been expanded through the project "Land|Rettung," which aims to establish a state-wide emergency care network. Individuals with medical knowledge – from doctors to paramedics to nurses and medical students – can all register in the network by app. When an emergency call comes in, first responders closest to the person in need are alarmed. Then an emergency doctor can be involved through telemedicine. In especially serious emergencies – for example cardiac arrest – this can save both time and lives.

"AAL applications require a certain installation effort; you can't just order it ready-to-use, plug it in, and start. You need an installer – in the worst case cables have to be installed, household appliances need to be adapted, and so on. This requires a number of mechanics, and this – at the latest – is where most individuals give up as they do not have access to professional providers nearby, let alone product presentations. There are many technological solutions, but no business models. However, I am convinced that AAL will be used much more intensely by individual institutions, for example retirement homes, which want to stand out from competitors through an increased use of technology."

Thomas Norgall, Spokesperson, Fraunhofer AAL

Telemedicine is another promising option for counteracting the care gap in rural areas. Driven by rapid technological progress – especially due to augmented reality devices and applications – this area will also experience a significant boost in the next few years. This means that one or more points in the environment of the connected healthcare customer establishes a direct connection to a medical professional who assesses the situation via remote diagnosis and

helps the patient to help themselves as needed – or sends professional support. Unlike overcrowded emergency rooms or doctors with fixed consultation hours, the service is available 24/7.

Best cases: Telemedicine

Patientus is developing a solution that is specifically tailored to medical communication, for example video conferences between doctors and patients. The promise is easy integration into the everyday life of doctors and patients and maximum data security, ease of use, and usability on all end devices, without any additional software and regardless of the hardware used.

"In a rehabilitation program with video and digital support there might also be features where patients could, for example, compete with a control group as well as using other aspects of social media for a virtual rehabilitation team. This way we combine the real world with the digital one – this also motivates patients and means much more than virtual high-scoring."

Ulla Kieserg, Executive IT Architect, IBM

From prevention to optimization

In a world of affordable, individualized, and readily available health monitoring, health care will not only be a matter of healing or preventing diseases: Health optimization will also become increasingly possible and desirable. Some healthcare customers will expect structures for the targeted improvement of their health. On the one hand, this could be the optimization of individual health indices or life expectancy. On the other, a combination of plastic surgery and body enhancement will emerge – such as optimized tissue or organs. Chronically ill patients need new, optimized livers, professional athletes want more efficient hearts, and body enhancers want to improve their brain performance using brain-computer interfaces or brainfood.

Why should health promoters abandon the traditional model of healing, and support their customers' health optimization instead? First, because there will be customer demand. And second, because competitors will offer this service, which poses the risk that customers will make a complete switch of providers.

Best cases: Body enhancement

The goal of body enhancement or body hacking is to optimize the body to achieve top performance at a targeted time. The startup *BrainEffect* develops and sells various energy bars that enable the body to perform at a high level, but also food supplements with a calming effect, because recovery periods help body and mind to deliver high performance when needed. *Toniqs* produces drinks that strengthen the immune system, promote brain performance, and keep the body fit. *Keimling* and *LifeLight* provide brainfood pills that optimize various body functions. *Biomin* produces performance-optimizing food for livestock.

"One role of health insurance providers will be to guide customers through the jungle of available technologies. I can imagine wild ideas such as body optimization with enhanced organs, but to keep things in perspective: We are currently not working on these solutions. What we do is establishing structures that will be able to provide and support these solutions in the future."

Roman Rittweger, CEO, Ottonova

Official mortality tables will thus become obsolete. Statistically calculated mean values do not factor in the abovementioned evolution of medicine. Health problems will be cured long before they occur, which will in turn lead to the extension of human life.

Best cases: Organ replacement

Thousands of deaths could be avoided every year if we had the right replacement organs available in time. In most cases, complex matching procedures, long waiting lists, and transport problems lead to death by waiting.

The *Fraunhofer Institute* and *Harvard University* are working on 3D-printed veins and blood vessels, the *Technical University of Berlin* and researchers at *St. Joseph's Hospital* in Phoenix, Arizona, are developing artificial heart valves, and the *U.S. Army* is currently testing 3D-printed skin. The Belgian company *Materialise* offers a comprehensive service for medical professionals to request models of human hearts – data can simply be entered in an online tool called *SurgiCase*.

The U.S. companies *Organovo* and *Aspect Biosystem* print living cells, for example liver cells. These have already been used for research purposes, device testing, and surgical preparations. For this purpose, the patient's genetic material is analyzed, and then the required organ is lab-cultivated using organic material. This way the recipient's body will not reject the organ. Skin, ears, and noses have been transplanted successfully for years, and internal organs such as kidneys, livers, and hearts will presumably follow in a few years' time.

The German startup *M3DP Medical Devices and Prototypes* has identified another application area for 3D-printed organs: applied research. The three founders with a background in engineering are making it possible for medical professionals to exactly plan, simulate, and practice surgeries in advance with the help of customized 3D-printed organ models.

Eternal life

The end result of the progressive optimization of our health condition? Individuals who are being born this decade will realistically live longer than 100 years. This assessment generally questions traditional long-term evaluations of conventional insurance providers – especially since 100-year-olds may only pay insurance premiums until retirement.

Even if we can only speculate on the probability and point in time when this prognosis will come true, the interplay of four influential drivers makes the dream of radically long life a tangible reality.

The first requirement is freely available genetic analysis. The second development concerns the cultivation of individual copies of internal organs (that can be superior to the source versions). The third requirement is a comprehensive understanding of the human aging process, and the fourth is the synchronization of the human mind with the virtual world (see info box "After 2030"). Numerous researchers are working on breakthroughs in all four areas. Players in the traditional system should look at the possible effects on their business environment sooner rather than later.

"The first human who will live to be 1,000 years old has probably already been born."

Aubrey de Grey, CSO, SENS Research Foundation & VP, AgeX Therapeutics

After 2030

The vision of longevity researchers goes even farther into the future and includes the healing of the aging process as well as cryopreservation – two highly controversial research fields with uncertain future prognoses. Nevertheless, this is an area that attracts renowned scientists and philanthropists and has made astounding progress time and again. For many years, researchers have been developing a detailed understanding of human aging and many now view it as a curable disease. Elizabeth Parrish, biochemist and CEO of *BioViva*, has developed a (telomerase) gene therapy with the goal of stopping the aging process. According to Parrish's statement, the treatment was successfully tested on her as "patient zero" in April 2016.

Cryonicists at the *Cryonics Institute* or the *Alcor Foundation* take into account that various causes of death will not be curable until the distant future, and freeze their customers at 190°C (–310°F). As soon as the cause of death is curable and the reanimation process is safe, customers are reanimated. One of the principles behind this process: Death is only a question of definition, and even certified brain death need not be an insurmountable barrier.

It will also take at least ten years until the digitalization of the brain will be within the scope of the imaginable. Dr. Randal Koene, Science Director of *Initiative 2045*, or Dr. Adam Gazzaley, Professor at the *University of California,* are working on a technological interface to the brain. Koene is planning a brain upload which will allow human personalities to live forever in a digital world. Gazzaley is digitalizing the learning process and has already reported initial successes.
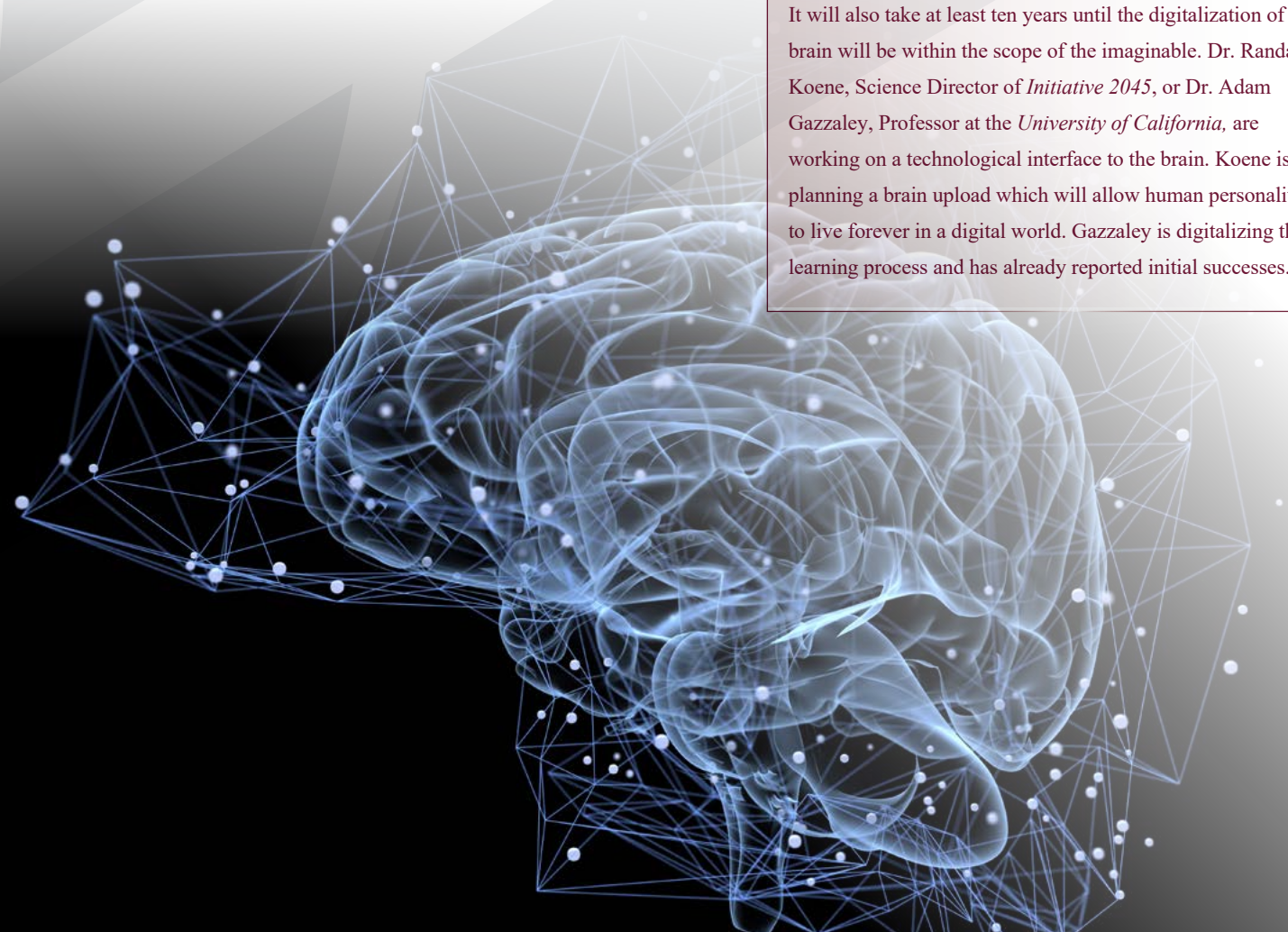
## TREND AREA 2: NEW PLAYERS AND ROLES

How customer needs will change the roles of doctors and insurance providers

The radical transformation of medicine will change the foundation of social security systems and will lead to new market dynamics. The accessibility of medical care will no longer depend on the customer's level of income, but also on their willingness to share personal data. In the digital age, medical professionals will become coaches and insurance providers will make good health possible for their clients.

From two classes to three dimensions

The German social security system, for example, is divided into public and private health insurance providers, which over the years has created the impression of a two-class medical system. In the past, the customers with the most financial means were the ones who received the most elaborate medical care. In other words, healthcare provision was divided into the rich, who were well cared-for, and the poor, who were not. In the future, however, accessibility to the best medical care will no longer necessarily be linked to available personal funds. The door-opener for personalized and preventive medicine will be access to personal health data, which will have greater influence on the quality of health care than income will.
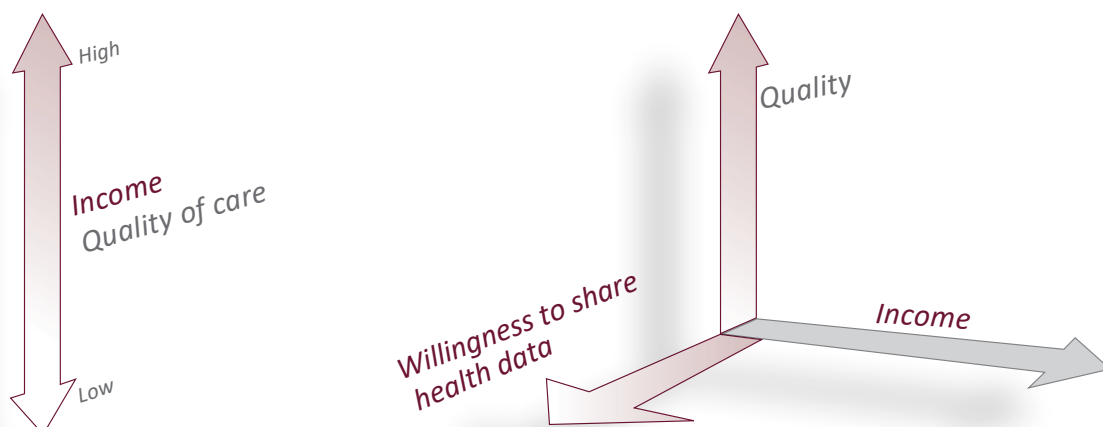
This is why another dimension with additional "classes" will be added to the new picture of the health market and will partly counteract the original dichotomy. A share of the present market will remain for customers, service providers, and insurers who continue to rely on conventional medicine and the binary principle of disease and healing. The rest will open up to a world of targeted prevention and health optimization as it gains access to modern predictive diagnosis and forms of therapy. However, optimization in particular will initially remain a privilege for the wealthy despite data sovereignty.

Naturally, this new market order will not become set in stone overnight: Instead, it will develop gradually. Regardless of precisely when the new customer group appears, it will totally demolish health insurers' existing foundations for calculating profit and loss. The key changes? "Optimizers" will produce costs for providers much earlier than before and will in all likelihood lead significantly longer lives. Whether optimization will lead to lower costs in the long term cannot currently be predicted.

The foundation of the present healthcare system is based on the principle of solidarity. This will remain the foundation for a socially acceptable balance in health care in the future, but also needs to be redefined. Private providers entering the market may cause an imbalance in the principle of solidarity, and it is the health insurance providers' responsibility to align developments in individualized medicine, privatized healthcare markets, and technological progress in an affordable and attractive way. Two oft-discussed options for political action are universal health care or capitation incentives; however, these approaches fail to address emerging developments. They represent an attempt to create solidarity and justice through enforced equality. This fundamentally contradicts actual developments and would nullify the competitive principle in standard care while causing an even more pronounced polarization surrounding additional benefits.

"Politics is still trying to figure out its role in digitalization. This is dangerous in the context of huge transformations (labor market / globalization): National politics could block progress through digitalization. A growing focus on national interests could become even more pronounced due to increased international terrorism, associated fears, and cybercrime. The existing fears of the people will lead to the case where politics will have to provide sociopolitical answers again and again. "
Otto Bitterli, Chairman of the Board of Directors, Sanitas Gruppe

From consumer groups to healthcare-customer segments

New requirements for the customer strategies of health insurance providers will emerge due to primarily tech-driven changes in the medical sector, transformed market conditions, and new customer expectations. Individualized medicine and new competitors with impressive digital backgrounds will lead the market away from bulk business to adaptive insurance products – i.e., to highly individualized rates that can also be adapted to users' changing situations. We have already described the shrinking **standard segment** and the growing **economy** and **premium segments** in previous studies. In less than five years' time, the traditional market pyramid will have ceased to exist in the insurance sector.[2]

In the economy segment, customers will look for the insurance company that provides the expected services at the best price. The spectrum will cover the entire range of possibilities, from basic services at low prices up to comprehensive all-inclusive coverage at the highest prices. The price-performance comparison will be based on a rational approach. Alongside the familiar price-performance comparison principle of the economy segment, a new underlying logic will emerge in the premium segment: Tomorrow's premium customers will not make their purchasing decisions based on any comparison of price and performance. They will instead use products, brands, and individuals to express their identities. Insurance companies or individual products may stand for environmental protection,

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2 For a further read on adaptive insurance products, we recommend 2b AHEAD's trend study "The Future of Insurance" (2016), online at: https://www.future.consulting/en/research/studies/trend-study/article/trend-study-the-future-of-insurance/

sustainability, fitness, innovation potential, intellectuality, luxury, wealth, design, art, a down-to-earth attitude, a strong sense of nationality, etc. There exist numerous possible identities that customers will want to identify with. The customer's goal will be to show other people, and even themselves, that they are "extraordinary." The rapidly shrinking standard segment will be occupied by customers who continue to delegate their decisions to the company or broker of their trust.
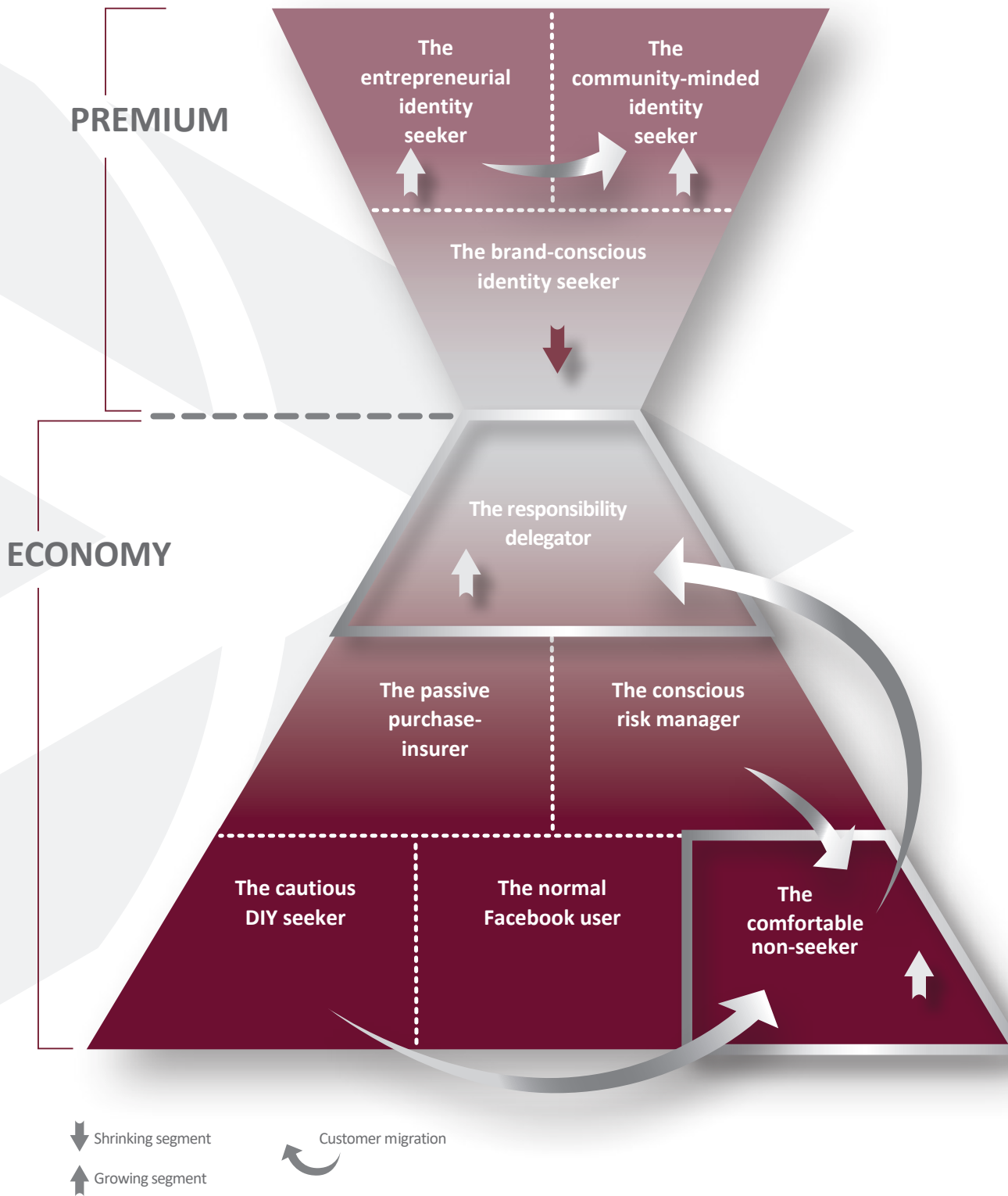
"Why should I switch to a digital insurance provider? For the same reason why I've been a fan of Apple for the last 20 years: I get accesss to innovations five years ahead of the market."

Roman Rittweger, CEO, Ottonova

When viewing the future markets of the insurance business, it is essential to remember that the areas named above are by no means monoliths. There will be six subsegments in the economy market. While these will share the same foundational underlying mechanism of value-for-money shopping, they will nevertheless differ significantly. The premium market of the future will comprise three subsegments. These will also share an underlying principle – identity management – but here as well, each segment will be very distinct from the others. The differences between customer segments can be described in customer-centered terms based on the customers' needs, their trust in technology or other human beings, their willingness to release personal data, and their proactivity level as consumers. Each customer segment, in turn, will require different kinds of products, processes, and communication from insurers.

2bAHEAD
tomorrowing your business

CUSTOMER SEGMENTATION

PREMIUM

The entrepreneurial identity seeker

The community-minded identity seeker

The brand-conscious identity seeker

ECONOMY

The responsibility delegator

The passive purchase-insurer

The conscious risk manager

The cautious DIY seeker

The normal Facebook user

The comfortable non-seeker

Shrinking segment

Growing segment

Customer migration

Two subsegments of the economy area will show strong growth over the next few years, and are therefore especially interesting for health insurance providers: the **comfortable non-seeker** and the **responsibility delegator**. We expect high customer demand for adaptive insurance products particularly in these segments. Customers will opt for products that meet their needs and expectations, be they from their current provider or a competitor. Competition will be extremely high in both customer segments, as these segments are not only interesting for established health insurance providers, but also for startups and possibly technology providers such as Google, Apple, Deutsche Telekom, and the like.

"Various players can enter the market for health insurance. I think the big players will lead the way, most likely the companies that already occupy customer interfaces on a large scale. It doesn't matter whether it will be Swisscom, Deutsche Post, Migros, Google, or another company. These companies 'only' have to acquire knowledge about insurance products – and invest capital of course. In my opinion, it will only be a matter of time until these companies enter the insurance market."

Otto Bitterli, Chairman of the Board of Directors, Sanitas Gruppe

The customer needs and consumer behaviors of the comfortable non-seeker and the responsibility delegator are similar. These customers will choose adaptive insurance products based on a price-performance comparison. The individualized fit and the situational adaptivity of the product will be paramount here. In other words, customers will choose products based on performance. The price will also be important here, but not decisive. The result will be that today's comparison portals will significantly lose attractiveness, as these are strongly focused on comparing the prices of (insurance) providers who offer very similar services. When comparing adaptive products, however, customers will want to find insurance products that can best deliver the expected performance at an acceptable price. Thus, the essential market dynamic will reverse to become a performance-price ratio.

To receive a precisely tailored product, customers will be willing to allow their behavior to be tracked, and to integrate the provider's electronic risk assistant into their digital assistant system. The customers' great trust in technology is based on the fact that they will view the risk assistants' suggestions for changes to adaptive products or to their own behavior as relevant. Digital assistant systems will continuously fulfill customer expectations, and will do so even better than human consultants can.

Over the course of their lifetimes, comfortable non-seekers will often migrate to the segment of the responsibility delegator. Higher levels of income, less available time, and greater responsibility for family and children are the reasons why these customers will hand over responsibility for their complex risk profile to human agents. At the same time, however, they will not want to forego the benefits of technology. These customers will integrate the consultant's electronic risk assistant into their own digital assistant systems and release their customer data to the agent and the agent's technological solutions. Up to a certain budget constraint predefined by the customer, the consultant will make decisions about the adaptation of products. Where necessary, the consultant will contact the customer with a recommendation for action.

The segments mentioned above will grow significantly over the next ten years. In ten years' time, digital natives now between the ages of 20 and 25 will be especially attractive for insurance providers. A large percentage of these digital natives have grown up with and trust technology, communicate with companies in a digital manner, and are happy to share their data in exchange for added value. By 2026, they will be middle-aged and will enjoy a comfortable level of income. Given the current and emerging demographic situations, they will recognize the importance of insurance coverage – providers will not need to convince them of its necessity. In addition, they will have the financial means to expand their insurance protection beyond basic coverage – in a market defined by a shortage of skilled labor, incomes will develop in favor of well-qualified employees.

They will expect a digital business model from their insurance provider. From their human consultant, they will expect to be addressed as equals – especially when it comes to technologically supported products and services. In particular young high-earners will show affinity for new data models and will expect this from their insurance companies. Employees with lower incomes who prefer an analog approach will remain with traditional providers.

Health insurance companies that begin treating potential customers of the coming years as their customers today will achieve an advantage during the next few years. Young people often lack interest in insurance products, the expertise to evaluate their relevance, and the financial means to take out insurance. This lack of expertise is one of the causes for mistrust in providers. In the past, lack of knowledge led to a brand-based orientation or the delegation of responsibility to human agents. Today, this leads to disinterest and mistrust in brands and human representatives. With increasing age, these non-customers will become potential customers. Providers of adaptive insurance products can leverage this opportunity by showing non-customers the relevance of risk coverage and risk minimization and options for prevention and optimization now and establishing a relationship with them. This relationship can later be monetized.

Insurance providers who offer adaptive insurance products will provide their non-customers with a freemium model. Insurance companies will also employ prevention to protect customers from unwanted events and will offer them consultation regarding their individual health profile if customers integrate the provider's electronic risk assistant into their digital assistant system. The degree of precision offered by this prevention will depend on what data the customer shares with the provider. If the customer uses this service, the provider will understand the customer's needs and behaviors and will thus be able to offer them individualized solutions for upcoming events such as their first apartment, graduation, their first job, etc. This way the provider will gain an advantage over competitors as they will always be able to offer

customers the first and most individualized solution based on shared customer data. With this service, providers will also have the ability to show customers that they can fulfill their expectations regarding individualized fit and the recognition of risk-relevant situations even before the customer purchases an adaptive insurance product. The freemium model will function without the need for human consultants except in rare cases. This means today's commission fees will disappear – this gap will finance the freemium model. By fulfilling customer expectations, recommendations and information that are both individually and situationally tailored will lead to increased trust in providers of adaptive insurance products.

From doctor to coach

"Digitalization will shift the core competence of doctors. The role of doctors will change from an 'omniscient person' to a trustworthy health associate. The collection and analysis of data will increasingly be handled using technology. Medical professionals will then become health consultants. New technologies can support doctors in their everyday work, but will not replace them."

Dr. Johannes Jacubeit, CEO, LifeTime

Individualized medicine will inevitably lead to a situation in which healthcare customers will enjoy data sovereignty and will expect to be treated differently by service providers. Without this paradigm shift in data management, few healthcare customers will take the step towards individualized medicine. For medical professionals, individualized medicine means informing their patients about statistical analysis better and in an understandable way. The age of the physician's unconditional, unquestionable monopoly of medical history and diagnosis are over – it will soon be replaced by various applications of smart sensor technology and by new providers who will analyze the data created here and translate it into treatment options. Data analysis and risk evaluation will become the key challenge for healthcare providers; however, this will no longer be tied to the person of the physician.

"How can I tell a person suffering from extreme hay fever from birch pollen in spring that temperatures will rise over the next five days, causing a high count of birch pollen with wind from the wrong direction? Generally, this is a very grim outlook for allergy sufferers, so I need to tell them to take their medication. But I don't want to make them ill just by providing the information. I have to deliver the message in a way that provides factual information on the one hand, but also presents treatment options on the other. This appropriate pre sentation of information is extremely important – and is not easy."

Ulla Kieserg, Executive IT Architect, IBM

It has long been possible to compare medical professionals on digital platforms, thus placing them in direct competition with each other. Healthcare customers, who are increasingly better informed, transparently rate doctor's visits on the internet, awarding grades for waiting rooms, length, and the quality of appointments. This has created new dynamics within the so-far highly regulated medical world. These changes include new expectations from healthcare customers which will lead to new ways of interacting with doctors. Due to increased transparency, the market is motivating doctors to improve their services and meet customer needs with new quality. In contrast to the threat of being reduced to mere dispensers for prescriptions and referrals, new roles are emerging for medical professionals.

"The role of medical professionals will shift from knowledge carriers to brokers."

Reto Schegg, CEO, healthbank innovation AG

A new, promising path for doctors is to actively help in shaping the transformation of health care and viewing patient health comprehensively rather than becoming replaceable service providers. Thanks to individualized medicine – in particular access to customers' personal health data – entirely new opportunities and stages of consultation will emerge.

This data will serve as an expansion of doctors' analytical capacities, helping to specify diagnoses and adjust priorities. Healthcare customers will not only expect support in times of illness, but throughout all phases of life. As consultants and life coaches, healthcare professionals can thus fulfill their original role as supporters, consultants, and knowledge providers again.[3]

Best case: Social media for medical professionals

Half of doctors in hospitals today are already using smartphones to photograph and document wounds. This, however, does not comply with European data protection guidelines. The app *imito* allows for the clinical photo documentation of wounds in line with data protection laws. Clinicians can use these photos as reminders, for education and research purposes, or when asking other physicians for advice. For this reason, imito has implemented a collaborative feature for hospital teams. Medical professionals can use the platform to exchange experiences and give mutual support. The photos are directly added to the electronic patient file, immediately informing other clinicians about the patient's health and treatment status. This both facilitates the teamwork of doctors and nurses and makes it more efficient.

From insurer to enabler

The future will be characterized by increased numbers of stakeholders in customers' health networks and by more exchange between these providers. Doctors will be in contact with pharmacists, pharmacists will work together with labs, and dentists with GPs. Eventually, these providers will all be connected to the healthcare customer. In other words, each individual healthcare customer will be surrounded by a customized health network that can only be centrally managed by one provider. To date, health insurance providers have been the gatekeeper of health-related data. However, this role is increasingly being challenged by new digital players offering convenient, proactive means of communication.

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[3] For further reading on the future of individualized medicine as well as a differentiated presentation of the competitive situation, we recommend 2b AHEAD's trend study "The Personalized Medicine of the Future" (2015), online at: https://www.future.consulting/en/research/studies/trend-study/article/the-personalized-medicine-of-the-future/

In the previous system, the main responsibility of (public) health insurance providers has been to organize the funding of the healthcare system itself. In the new system, insurance providers are responsible for enabling healthcare customers to improve their well-being. Insurers will mainly take over the management of health-related data, organize the network of service providers in the healthcare market, and boost all structures needed to do so.

Today's inflexible professional directories will become a proactive, personalized recommendation management system for the most appropriate provider. Depending on the healthcare customer's situation and needs, this can be a recommendation for the best-qualified specialist, the financing of diagnostic devices, or the organization of home remodeling for ambient assisted living. Targeted investment in customer education will be another lever for cost reduction, as better-educated individuals enjoy a statistically lower risk of disease. Even investing in infrastructure projects, such as improving traffic safety, can be beneficial in the long run – in sum: everything possible when it comes to promoting the healthcare customers' well-being.

"Digital support gives insurance providers entirely new possibilities for providing customers with care management and offering better-quality support with fewer employees. This will change the perception and role of healthcare insurance companies and also move their responsibilities more towards care management, meaning the health care of their insured customers."

Ulla Kieserg, Executive IT Architect, IBM

Best case: Digital insurance

Oscar is an American startup that is the first to offer a 100% digital health insurance through its app. App service begins even at physician selection: The user describes their symptoms, then the app asks them if an on-call physician should be contacted immediately and gives an overview of available local doctors. Even arranging appointments is handled – for interested customers – via the app. The app takes care of appointment requests, physician selection, and patient management.

In mid 2017, *Ottonova* entered the German market with a similar model as a digital private health insurer. Thanks to its largely digital processing – from the initial contract all the way to billing – they are able to offer comparatively inexpensive rates. *Ottonova* also attracts customers with its personal electronic patient file that offers both the advantages arising from an increased leverage of network interfaces as well as high time and cost efficiency.

PREDICTIVE HEALTH PROMOTION

How insurance providers will react to changes in the health market

Today's health insurance providers will become predictive health promoters. They will not simply bear the costs of existing health problems, but their efforts will also largely be automated, data-based, real-time, and predictive. Providers will develop strategies for intelligently analyzing the data shared with them and translating this data into adaptive services for their healthcare customers. The foundation for this will be a cross-channel, real-time communication system with omnichannel management and high-level automation of internal processes.

Insurance providers in the general insurance sector are already facing off against new players. With the help of predictive enterprise software, highly automated processes, and connected communication channels, these new stakeholders are attacking the traditional position held for centuries by established providers. While the health insurance sector is significantly more regulated than, for example, property insurance, and largely consists of public organizations that are only partially profit-driven, foresight is firmly rooted in the self-perception of insurance providers as well.

Healthcare customers and their well-being will be the chief concern of tomorrow's health insurance providers. The emphasis will no longer be on healing or prevention, but optimization and health promotion. The most valuable resource for health promotion is customer data. In the future, the sharing of data will be in the customers' interest as well – senior citizens in particular will benefit from sharing their data. These people often suffer from more than one disease – they are multimorbid. Today's data protection laws prevent unauthorized data exchange between various players in the healthcare network – even when this can save lives – thus inhibiting opportunities for the more efficient care of elderly persons. Even simply identifying interferences in medication through the use of data would prevent numerous severe health problems.

"The most common cause of death in Germany is presumably data protection."

Prof. Arkadiusz Miernik, University Medical Center Freiburg

From heaps of data to data-driven organizations

"Health insurance providers have to be able to utilize their heaps of data now and get a comprehensive view of their customers. At the same time they will have to look at the entire cycle of individual situations in order to provide services, products, benefits, and additional products tailored to the customer in real time. If the customer has an accident today, the system will automatically identify the best form of therapy, available therapy slots, and the cost-benefit ratio of various options."

Rhett Scheel, Technical Account Manager, SAS

"A key pillar for the success of modern health insurance providers is the use of available data. Models can be developed based on advanced analytics and artificial intelligence to provide customers with perfectly tailored solutions and services – for example individualized prevention programs. Process and administrative cost can also be significantly reduced, for instance through process automation and by combating fraud. Another area is health research – by using available data and analytical methods, drug interactions can for example be identified."

René Hartmann, Account Manager Public Health Care, SAS

The starting point could not be better for insurance companies. Massive data streams are generated through doctor's visits, customer contact, and message points. Health insurance providers already know when their customers have gone to see the doctor, what drugs they have been prescribed, and what treatment methods have been used. In the future this existing data will be supplemented by new data types gathered from connected devices and healthcare apps.
Thanks to wearables and connected living and mobility environments, health insurance providers will know how often customers exercise, what they eat, and where they are at a given time. This larger pool of data will not only form the basis of a comprehensive picture of the health status of customers, but can also be used for predictive health insurance. A key characteristic of tomorrow's health insurance providers will be the active management of this data and the proactive generation of added value for healthcare customers. Providers will give recommendations to healthcare customers for improving their well-being before consumers know this is necessary. Healthcare providers will interpret vital signs and diagnoses by medical professionals in an understandable way and consult consumers in every phase of life. And they will drive the use of individualized therapy.

The problem is the handling of healthcare-customer data. On the one hand, customers will have sovereignty over their data and determine whom they share it with in order to create added value for their personal health. Customers' living environments will collect data and share it with relevant service providers. Health promoters will organize healthcare interfaces and decide where they will be open for solutions from their own insurance organizations or from third parties. On the other hand, health promoters will generally depend on data sharing in order to ensure personalized care.

Electronic health files

The basic requirement for predictive health promotion is a digital register of all customer healthcare data that potentially interfaces to every player of the customer's healthcare network. The current state of electronic medical records cannot be used for this, because its scope is massively limited and because it was designed starting from the wrong end.
The data of healthcare customers does not belong in the hands of insurance companies or the welfare state.
It belongs in the customers' hands.

"Germany really is poorly positioned in areas such as telematics infrastructure or electronic medical records, which have in cases been pilot projects for almost 15 years now. Everyone is pretending we are at the cutting edge of progress – in reality half of Europe is laughing behind our backs. Security concerns and the restricting mix of federalism and self-management are massively inhibiting progress in this country. Patients' concerns are really not the problem; especially younger consumers are very open to data-driven services. The players' true fear is not the transparent patient, but transparent doctors, because this kind of connection will obviously also create a certain transparency concerning the quality of medical services."

Thomas Norgall, Spokesperson, Fraunhofer AAL

Another essential requirement is the safe storage and transfer of data to those entities that conduct the analysis for healthcare customers. In a few years' time, solutions that have historically been proprietary will be equipped with learning AI algorithms that will analyze data at the first instance and prepare it for further handling by other healthcare providers. At this point the fight for control of the customer interface will have fully hit the health insurance sector as well. Those providers who offer the most intelligent, comfortable, and safest solution will have the advantage over competitors.

The new privacy by design

The 5 rules of the new privacy by design

#1 Make data accessible

#2 Only use data for customer benefit

#3 "Reset all data" button

#4 "Download all data" button

#5 No unwanted commercial use!

There is now a general understanding in the healthcare industry that diagnostic quality can be significantly increased through the amount of data used. In conventional Western medicine, this development began decades ago with the advent of blood samples and X-ray images, and other imaging and analysis procedures have been added successively – soon the new data collection processes described in Trend Area 1 will be incorporated as well. Proponents of data protection are always rightly skeptical when it comes to releasing sensitive personal data. This is why it is even more important to have technologically safe solutions for data transfer in health care. After all, data can make the difference between life and death.

Best cases: Blockchain data management

Through the use of blockchain algorithms, *Healthbank* and *Patientory* offer secure, regulation-compliant platforms for gathering and managing health-related data. These offer varying functionalities to meet the range of customer needs, including data sharing with health-industry providers, relatives, research institutes, or lifestyle-app services.

Blockchain technology makes it possible to conduct digital bartering transactions without a middleman. All transaction information storage is decentralized, which both increases transparency and ensures that system information is unalterable.

The most well-known examples are the cryptocurrency *Bitcoin* and smart contracts for insurance based on the *Ethereum* blockchain. The next generation of blockchain technology will form the foundations for the real-time interconnectivity of the Internet of Things. The first specifications are the Iota Token and the DHG Chain.

The blockchain principle has cost-relevant implications for the reliability of billed services thanks to the fact that only services that have actually been commissioned will make the digital register. Additionally, healthcare customers will be able to grant access rights in a precisely targeted way or for a limited time – and later they will be able to verify whether all relevant information has actually been retrieved and implemented in the diagnosis.

The first rule for the handling of health data is a clean system for data management. Although the data will be saved in the cloud or fog, it can only be managed by healthcare customers or authorized persons. If providers are authorized to use the data, it can only be processed to increase the well-being of healthcare customers within the contractually agreed boundaries. Beyond that, customers should always be able to delete their data history – or download it to archive it themselves or share with third parties. Last, but by no means least, is the taboo of unauthorized disclosure to third parties for commercial (and potentially unwelcome) purposes.

Best case: The health cloud

IBM Bluemix is a cloud platform as a service. Developers can access more than 130 cloud services to efficiently develop mobile apps and web applications. Interfaces to IBM Watson, one of the most well-known systems for cognitive computing, are also available in the cloud. By using the cloud and cognitive technologies, new solutions can be implemented for health insurance customers. The insurance provider *Versicherungskammer Bayern* uses Watson to optimize complaint management. The AI analyzes the essence of customer complaints and automatically provides solutions.

From customer dialogue to omnichannel management

The foundation for any data-driven business model is comprehensive, company-wide communication based on omnichannel management. This means much more than an opportunity for health customers to enter into a dialogue with their provider on various channels. This implies that each data point is connected through all communication channels in real time and every position in the company has knowledge of new data once customer contact has been made.

This data is then analyzed by cognitive AIs in order to constantly provide employees of the insurance company with recommendations for further consultation.

The expectations and behavioral habits of every healthcare customer are at the center of communication. Surrounding each customer is a network of contact interfaces to health promoters who interface in real time to constantly provide qualified reactions to customer desires – even if the customer has not articulated them yet. Also, customers will have the same brand perception at every touchpoint.

"Omnichannel management is a 'must have,' not a 'nice to have.' If you call your insurance company, you expect them to know who you are and what insurance policies you hold. In other markets this is a given."

Jürgen Stoffel, Managing Director IT, Hannover Re [5]

The requirements for omnichannel management go far beyond the modernization of insurance companies' IT systems. Omnichannel management provides a new foundation for traditional organizational structures divided into decentralized units. Instead of isolated operating areas such as customer dialogue, underwriting, sales, or product development, omnichannel management requires a cross-departmental fluid organization which enables operators to always communicate any customer data efficiently and without loss to relevant segments, always with with the aim of creating added value for customers.

[5] Taken from 2b Ahead's trend study "The Future of Insurance" (2016), online at: https://www.future.consulting/en/research/studies/trend-study/article/trend-study-the-future-of-insurance/

This has two purposes: the automated, individualized, and situational adaptation of policy conditions and the creation of personalized additional solutions for the predictive promotion of the customer's well-being.

"Customer communication is one of the most important areas, meaning all interfaces of insurance companies to their customers from all contact points, so that the next contact point has all information available on this customer that can be essential during this contact: conversations, email exchanges, whatever communication has been happening. The goal is to have a comprehensive picture of the customer and to consult them in the best possible way."

Rhett Scheel, Technical Account Manager, SAS

The electronic health assistant that users of adaptive insurance products have integrated into their digital assistant systems will be the most important channel of communication with their insurance providers. Users in the economy segment will be the **comfortable non-seeker** and the **responsibility delegator** in particular. Here, customers will have the ability to choose from a wide selection of providers for electronic health assistants. Their decision will depend on how easy the communication with their provider is. In many cases, the health assistant will be the customer's first touchpoint with an adaptive insurance product. The customer's loyalty will still be very low at this point, and they will change software if unhappy. Customers will share their data with the provider through an interface. This is where insurers will already have to start communicating with customers in each user's preferred manner. Companies will have to provide information and solutions in a digital way, while remaining approachable for the customer on every channel. Every employee at every touchpoint will know who is reaching out and why. Customers are always addressed in an individualized and targeted way.

Electronic health assistants allow customers to extensively manage data themselves. These assistants of the future go far beyond the self-services of today's established health insurance providers. They will give healthcare customers full control over their data and automatically answer their questions. The assistants will autonomously contact service providers if this is appropriate according to the data on hand, as well as authorized by the customer. Of course, they will also continuously be updated by health promoters to offer the latest and most secure functionality at all times.

In the near future, health insurance providers will no longer work with linear purchase and support processes and infrequent adjustments in insurance coverage to changing life circumstances. Over the next few years, customers will become the center of a network of healthcare stakeholders. The individual player's goal will be to protect customers from risks, prevent the occurrence of damages, and quickly and efficiently regulate damage claims. Apart from established insurance providers, other stakeholders will also attempt to occupy customer interfaces in this network. On the one hand, players who generate added value for customers through the analysis of their data and offer relevant structures and services will be particularly attractive. On the other hand, customers will trust those providers who use their knowledge of the customer for the customers' own benefit at all contact points. Players who fail to fulfill these customer expectations will be irrelevant to the customer of the future – new players with digital competence and agility will exert high pressure on established insurance companies.

From complex organizations to digital companies

Individualized medicine and predictive insurance products will challenge established principles and procedures. For many years, the relationship between claims settlement and prevention has only gradually changed on the part of established insurance companies. Automation will lead to the fact that settlement effort will massively lose its share of the day-to-day business. At the same time, the need for settlement will sink while the need for preventive measures will rise and will make up an increasingly larger part of the business of health insurance. And the third, new column – health optimization – will only account for a smaller part of business until 2030, but will rapidly gain importance afterwards.

"Health care is a mecca for digitalization. In the past, many processes did not grow in a customer-oriented way in terms of financing and differing responsibilities. They formed around regulations. This is why there are a vast number of distortions that are not understood by customers and patients. Digitalization enables players in the healthcare sector to create new and simpler processes according to customer needs. The focus is not only on completely redesigning insurance products, but also on stronger customer support within the care chain – to engage with customers – and creating all necessary structures for that. 'Ecosystems' could be the key here. However, this goal is (still) far away, as there will be strong resistance from many sides."

Otto Bitterli, Chairman of the Board of Directors, Sanitas Gruppe

Process automation through AI

New technologies will open the door to large-scale automation and will reduce costs for insurance providers. In a few years, disbursement and underwriting processes will be handled entirely by artificial intelligence, and customer dialogue will largely be automated by trained chatbots (robo-advisory) that refer to human customer consultants at the express wish of customers or for specific questions.

"Technological breakthrough in AI has been achieved – companies that do not invest in the technologies of learning algorithms now will be struggling on the market in ten years."

Karl-Heinz Naumann, COO, Ottonova AG

Data storage will exclusively be located online in order to facilitate data disclosure to authorized stakeholders at all times. Blockchain-based systems will ensure the efficient protection of data. In addition, the systems will be equipped with a unique protective level for intelligent data analysis via specialized algorithms such as IBM Watson. Due to the enormous heaps of data that are fed into these systems by healthcare customers, conventional server systems will not be able to provide the satisfactory speed – quantum computers will be needed here. These computers are based on an exponential computing speed which is difficult for human beings to fully grasp. This advantage can particularly be used to solve specific problems or create massive security barriers.

"The health industry consists of many stakeholders. Patients, doctors, health insurance providers, hospitals, rehabilitation clinics, and many other players form a large network where countless processes take place, large amounts of data are exchanged, and where especially important future topics such as robotics, machine learning, artificial intelligence, and sensor technology are now emerging. Here an important aspect is the optimal use of these technologies for efficiency, cost-reduction, and rapid reaction. Insurance customers – meaning the patients whose health is, after all, the key issue at hand – have to be ideally supported as we are in an environment of life or death where the speed and quality of actions are vital."

Werner Rieche, CEO, Software AG
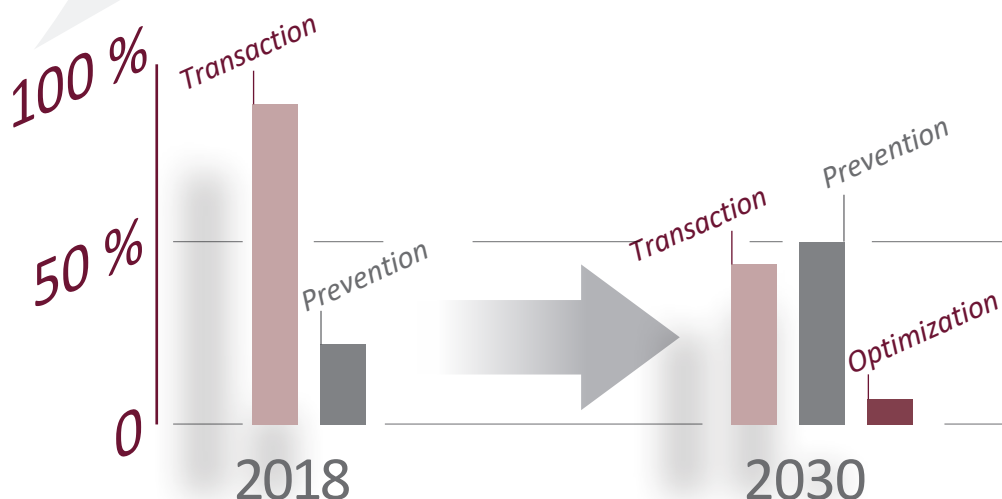
Changed job profiles and new staff structures

Most job profiles in insurance companies will fundamentally change over the next few years – many positions in case processing, general correspondence, customer dialogue, and underwriting will become obsolete. The job reality will be characterized by human / machine organisms. Necessary skills will be focused on individual cases and staff will especially need to be able to cater to these individual cases and take a coordinating role for healthcare customers. In general, the proportion of job profiles with specialized IT qualifications will be inverted.

On the one hand, this will require extensive training programs, and on the other, HR management will face the challenge of entering the cross-sector competition for the best computer scientists alongside industrial and technology companies.

"Today, we have people and systems that check invoices, treat all customers equally, and control if 'tarifs' (Tarmed, DRG) are correct. There are currently many positions in our company that handle transactions. Many tasks have already been transferred from humans to systems that use automated processing. Now we are at the beginning of the next level: the development of data-driven, intelligent machines that can offer personalized added value to individual customers. And this will trigger a truly major transformation process. There are many open questions regarding the number of necessary employees, the skills that have to be developed over time, how we can achieve the step from egalitarianism in the welfare state to increased individualization, and what future roles supervisory authorities will play."

Otto Bitterli, Chairman of the Board of Directors, Sanitas Gruppe

"Due to the use of cutting-edge technologies (e.g., artificial intelligence) we will need fewer members of staff in transaction-oriented process areas in the future. We need to embrace this. This provides large opportunities to apply our employees as 'health coordinators,' especially in service areas, and offer our customers effective health and prevention programs. In addition, we will be able to invest more time and quality into the demanding checks for medical necessity. This transformation will set high demands for our executives as well as the training of our employees. This is why early and professional support of the transformation process is essential."

Dr. Mirko Tillmann, COO, Central Krankenversicherung

STRATEGIC RECOMMENDATIONS

How to make your company future-proof

This trend study compiles a picture of the future of health insurance providers based on empirical methods for trend research and innovation management. The traditional roles of the healthcare sector will be completely restructured in the world of individualized medicine and adaptive insurance products. In the future, healthcare customers will expect only individualized contact from their providers and will trust those insurers who manage their data transparently towards the aim of proactive health promotion. Technological progress will provide numerous instruments enabling new and established insurers to stand out from their competitors through internal transformation and new measures for care and communication.

The transformation pressure on established players is growing, as the predicted situation will to some extent differ significantly from today. Insurance providers who want to have a leading market position in ten years' time already have to prepare major steps now.
The checklist in the Management Summary includes S**tandard recommendations necessary for the short term** which represent state-of-the-art minimum requirements for progressive insurance providers today. On the following two pages, we provide you with **seven effective** P**remium recommendations for the medium term** and **five** E**xceptional recommendations for long-term success**.

We would be happy to assist you with the development and transfer of these strategic recommendations to your company and with implementing your personal transformation strategy.
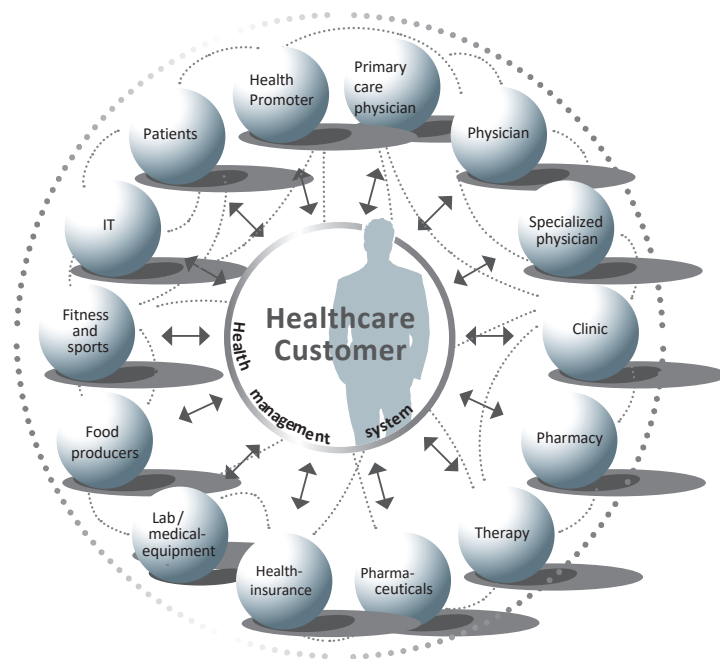
Premium recommendations (medium-term)

1. Establish a parallel firm in which you build the health insurance company of the future from scratch. Start with a small team and gradually transfer your members of staff into the new company. This new organization will replace your current one ten years from now.

2. Recalculate your healthcare customers' premiums – make them individualized, flexible for different situations, and based on the customer's willingness to share data.

3. Give your customers data sovereignty. Protect your data, contracts, and transactions with the help of smart contracts (blockchain) from manipulation, unauthorized access, and fraud.

4. Automate your customer service (robo-advisory) and all administrative and underwriting processes. Train you current employees to become coaches.

5. Offer your customers and their family members individualized and automated e-learning solutions – better general education promotes health.

6. Develop a profitable business model for telemedicine. One approach could be to analyze the capacity of service providers in real time and provide them with the necessary equipment to implement medical history and diagnosis with the help of video streaming. Healthcare customers can log into your platform if needed and will be connected with the appropriate available service providers. Provide your healthcare customers with self-diagnosis and/or augmented reality devices if necessary. In addition, start a pilot project offering self-driving transportation services to service providers.

7. Develop a profitable business model for ambient assisted living. One approach could be to connect all necessary providers of healthcare professionals with electricians and smart home suppliers. Healthcare customers will bear the costs in installments or via leasing models if desired; another share will be financed through funds and state grants.

⭐ Exceptional recommendations (long-term)

8. Put yourself in the position to tell your customers their health scores in real time and offer them personalized solutions for prevention and optimization.

9. Equip your customers with as many sensors as possible. Collect activity and environmental data in order to receive a comprehensive picture of their lives and specify their personal health score. Use this data for prevention and the optimization of your customers' well-being.

10. Be the Amazon of health insurance providers: Organize suppliers of health-promoting and optimizing foods (and other products) on a digital platform. Your customers will buy the products and receive better recommendations as well as more affordable premiums if they share more data. Suppliers pay a sales commission which helps to finance the system.

11. Start a pilot project with quantum computers as soon as possible to enable the analysis of huge amounts of data sooner than any of your competitors, and safeguard your systems from potential threats.

12. Be the first insurance provider to cover the transplantation of 3D-printed organs – curatively and preventively. This also includes transplantations for performance optimization and the prolongation of life where desired.

CLOSING WORDS BY AOK PLUS

Thanks to the manifold factors that will influence its development, we cannot with certainty predict precisely what healthcare provision will look like in the future. However, one thing is sure, and is revealed by this study:

Digital transformation will by no means skip over the healthcare industry. Rather: It holds enormous potential to powerfully turn the industry, with all of its established value-added chains and processes, upside down. Today's ways of thinking and the existing traditional relationships – and even communication – between doctors, patients, and health insurers will undergo significant changes. Healthcare provision is no exception: In the future, entirely new ways of (and providers for) treating patients – or let us rather say keeping them healthy – will appear.

The sharing of health data accelerates progress in medicine

Unstructured data. for example, can be systematically analyzed and combined through the use of AI and big data. This means that illnesses can be recognized more quickly and potential risks can be identified before they even materialize. These new technologies have the potential to save millions of lives. By sharing our own health data, every single one of us can play a part in making society healthier.

The protection of sensitive medical data, of course, cannot thereby be compromised. Those who have once been seriously ill know the experience of being willing to do anything to become healthy again. Conversely, the conclusion is obvious: Not wanting to share one's data to improve treatment methods is a privilege of the healthy. The key challenge is to make it transparent to everyone how all can profit from sharing their personal data without neglecting high standards for the protection of this data. Precisely at this point can the insured themselves play the most important role. No one else can better decide who should have access to what data.

The difficult question is how consumers can find orientation and remain in control of their data in an increasingly complex and digital world. The task for insurers here is to take on responsibility for the insured and to support them as advisors while they make their way through the data jungle.

The solidarity principle will still be valid in the future

If society on the whole profits when data is shared, then we view this as a further development of the solidarity principle. As the famous German chancellor Willy Brandt said: "Precisely those who would preserve what is worth keeping must change what has become obsolete." What is worth keeping about the solidarity principle is that people will want to stand beside each other in the future as well. Both the spirit of those living today and the current debate about the social security system and its foundations reveal that this still holds true after 100 years. In order to remain valid in the future, however, even the solidarity principle must continue to develop in times of digital transformation. If the dimension of data sharing can be added to the solidarity principle, then this notion will be a pillar of our healthcare system in the future as well.

We want to reimagine prevention

We are facing a paradigm shift in health care: Instead of concentrating virtually all available energy and means into healing diseases, in the future our focus will lie on their prevention. For our company, we chose a name that focuses on providing health for one clear reason: We are already very active in the field of prevention, and we know that preventing illness has greater significance today than ever before.

People are living longer with each new generation while chronic illnesses and the demands of working life are simultaneously on the rise.

Many view illness as a fate that befalls one person while (possibly) leaving another untouched. However, even if not everything is in our hands, through our decisions we can influence how long – and more importantly how – we live: whether we are smokers or non-smokers, whether we regularly exercise or prefer a seat on the couch.

The number of people who want to actively manage their personal health continues to rise. Health is increasingly becoming a key resource. People want to control this resource – in an informed, proactive, and individualized way. They are not only prepared to participate in the optimization of their health, but want to take on responsibility for themselves. This encompasses both access to information as well as the opportunity, for example, to take part in shaping the treatment process on equal footing with medical professionals. Here digitalization acts as a catalyst and opens up possibilities that were inconceivable just a few years ago. The self-confident health customer does not only want this, but demands it. This bottom-up movement is bringing a new speed to developments in the healthcare market. Fitness trackers and apps are already widespread today. They offer an overview of personal bodily health and can thus motivate users, often in a fun way, to do more to stay healthy.

To date there have been only a few solutions from health insurance providers that honor self initiative and thus contribute to positively reinforcing it. As a health insurer, we have taken on precisely this responsibility. Supported by app, our customers today can already profit from the incentivization of various health-promoting measures and take their personal health into their own hands. Alongside classic preventive measures, physical fitness forms a central pillar of our digital bonus program.

Consumers need a **guide through the health care system**

If we succeed in combining the opportunities of digitalization with our many years of experience in the area of prevention, then we can proactively meet future challenges. We are in the best position to give shape to this paradigm shift from treatment to prevention. We accompany our customers from birth to death, we support them in all health-related questions, and we are there for them in every life situation. Thus we know what moves our customers – and not only in case of illness.

Today, insured persons often have a jagged, inconsistent care experience and are forced to accept the risk of unnecessary effort and poor information transfer between the players involved. From the perspective of our customers, one of the greatest potential opportunities lies in creating transparency about information and processes in the healthcare system. Thanks to our close contacts – such as with hospitals, doctors, care facilities, or even fitness studios – we benefit from the convergence of all data and information that can be used to determine the needs of our customers in their particular situations. With this knowledge, we are able to take on the role of a guide for our customers and give them orientation. A key prerequisite for this will be the creation of a centralized health network. In the future, we hope to be measured by our success in helping people of any age or social situation to do something for their health and stay healthy longer.

Dr. Stefan Knupfer
Study Partner & Member of the Board
AOK PLUS - The health insurance provider for Saxony and Thuringia

COOPERATION PARTNERS

2bAHEAD
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The 2b AHEAD ThinkTank is Europe's largest independent future institute. Scientists and strategy consultants are employed here. In real scientific trend studies, the 2b AHEAD ThinkTank analyzes the opportunities and risks presented to our customers by current trend developments in research specifically tailored to their businesses. The 2b AHEAD ThinkTank not only analyzes within the target industry, but across industry boundaries, incorporating all stakeholders that will shape the future of the respective business model. With its analysis, the 2b AHEAD ThinkTank helps its customers to understand who or what is driving their relevant trend environment, and for what reasons.

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AOK PLUS
Die **Gesundheitskasse**
für Sachsen und Thüringen.

AOK PLUS insures virtually every other person living in Saxony and Thuringia. As a major health provider, AOK PLUS works to build across-the-board medical care and sustainable health solutions in both states. Health promotion and illness prevention have helped define the AOK PLUS core brand for over 25 years.
In addition to a wide range of services, AOK PLUS provides personal and custom-tailored service on location with its more than 140 branch offices.

A staff of over 6,800 serves AOK PLUS' 3.2 million B2C customers and 150,000 B2B customers. This makes AOK PLUS the largest statutory health insurance provider in its region and the seventh largest in all of Germany.

Contact:

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AOK PLUS – The health insurance provider for Saxony and Thuringia

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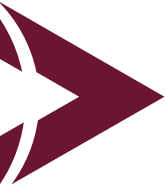
THE METHODS
The Delphi method and qualitative expert interviews

The present study is a qualitative, empirical study using the Delphi method. This method is a future-studies method that takes its name from the famed oracle of ancient times. It was developed during the middle of the last century in the US and is used for the preparation of forecasts. Because hardly any expert in these complex times is able to successfully observe several mutually influential fields of expertise at once, Delphi method studies draw on the assessments of several experts, each with their own specialist knowledge. The interviews are conducted using a two-stage process.

During the first phase, the experts are asked individually to give their personal assessments on specific topics during the course of guided expert interviews. In the second phase, in contrast, they are presented with the collective results of the first round. The experts are then asked to hold to their positions from the first phase, or to integrate the results of the first phase in a revised assessment of the subject matter.

The selection of the expert study participants is particularly important for this scientific approach to trend research. For this reason, a so-called "trend cycle" is compiled in a workshop format after an extensive desk research phase covering existing topic-related studies and publications. The trend cycle constitutes a list of all of those companies within and outside of a given industry whose resources are sufficient to ensure that the strategic decisions they make today will have a significant effect on the future of the target industry, either because other players are sure to follow their

example, or because they can successfully push their business models thanks to the influence they have over the market. One expert was chosen out of each relevant group of industry players who did not merely speak about their own company, but was also able to give an overview of their group. The pool of experts consisted of players from the insurance industry, technology providers, and attackers outside of the traditional insurance sector.

In both interview waves, the experts' investment decisions, business expectations, and statements on industry trends were analyzed and evaluated using guided expert interviews as a basis. A total of 21 experts were chosen. In the context of one-to-one interviews, the experts were confronted with various theses and asked to give their assessment of the relevant future developments. The statements given by the experts subsequently underwent a qualitative analysis and were divided into the following three trend areas: individualized medicine, players and roles, and predictive health insurance. The trend areas condense the essential statements of the expert participants concerning the future of health insurance.

To close the study, strategic options for stakeholders were derived from the trend areas. These recommendations are based on a synthesis of the exploration of the trend areas, the statements given by the experts, the future scenarios, and also the expert knowledge of the 2b AHEAD ThinkTank in innovation management strategies.

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THE EXPERTS
Investment decision makers, strategy leaders, and future experts
Our expert panel for this study includes:

Silke Agena
Senior IT Architect, IBM Deutschland

Silke Agena serves insurance providers in IBM's insurance division and boosts their innovation competence particularly with regard to cognitive systems. We spoke with her about the opportunities and limitations of the technology and the AI-supported evaluation of big data.

TrendCycle:
Technology & development / cognitive systems

Aubrey de Grey
Chief Science Officer, SENS Research Foundation & Vice President of New Technology Discovery, AgeX Therapeutics

Aubrey de Grey is a leading luminary in longevity research, and is known to tax the mental capacities of conventional medical professionals. We met him in Madrid, where we primarily discussed the horizons of the human lifespan and the path that leads beyond them.

TrendCycle:
Technology & development

Otto Bitterli
President of the Board, Sanitas Group

Otto Bitterli is President of the Board at Switzerland's Sanitas Group, a leader in the area of real-time services and proactive health insurance. For the present study, we primarily spoke with him about the topic of AI.

TrendCycle:
Competitor / health insurer

Rene Hartmann
Account Manager – Statutory Health Insurance Providers, SAS Institute GmbH

With René Hartmann, SAS' specialist for statutory health insurers, we primarily discussed analytical software, data usage and protection, and partnership models for health insurers.

TrendCycle:
Supplier / Analytical software

Dror Sam Brama
CEO, Logical Form & DNA.Bits

Dror Sam Brama is CEO and Founder of DNA.Bits, an Israeli startup for blockchain-supported genome sequencing. He evaluated the theses of the second interview wave with emphasis on a tech perspective.

TrendCycle:
Technology & development / blockchain

Manuel Heuer
Operational Director (COO), Dacadoo AG

Dacadoo COO Manuel Heuer evaluated the theses of the second interview wave using his expert knowledge in the areas of individual health monitoring and medical technology.

TrendCycle:
Technology & development / health monitoring & preventive medicine

Dr. Gabor Forgacs
Scientific Founder & Chief Science Officer, Modern Meadow, Inc. & Scientific Founder, Organovo; Professor of Biology & Physics

Dr. Gabor Forgacs developed the first prototypes for artificially cultivated organs. His work promises to make individualized human organ replacement possible within the next few years.

TrendCycle:
Technology & development

Lars Hinrichs
Founder of Apartimentum & CEO, Cinco Capital

With its Apartimentum – the smart home for rent – Cinco Capital is attacking the traditional rental market while also establishing itself as part of the healthcare network. Lars Hinrichs explained the health aspects of tomorrow's living market to us.

TrendCycle:
Attacker / smart homes

THE EXPERTS

Investment decision makers, strategy leaders, and future experts
Our expert panel for this study includes:

Dr. Johannes Jacubeit
Spokesperson for Fraunhofer-Allianz Ambient Assisted Living (AAL)

With LifeTime, Dr. Johannes Jacubeit is driving the digitalization of standard processes in clinics and private practices (for example) in order to make data exchange between patients and providers easier. We primarily asked him for his input about data models/data security and the future role of health insurance providers.

TrendCycle: Supplier; technology & development

Thomas Norgall
Founder & CEO, LifeTime / connected-health.eu GmbH

Ambient Assisted Living: A rescue for outpatient care? Thomas Norgall gave us deep insight into the drivers and blockers in the German healthcare system, which itself has yet to realize the seriousness of the situation.

TrendCycle: Technology & development / Ambient Assisted Living

Ulla Kieserg
IT Architect & Industry Unit Technical Leader, Insurance Division, IBM Deutschland GmbH

We spoke extensively with Ulla Kieserg about the new privacy by design and individualized solutions in e-health. She also provided considerable input about the opportunities and limits of the AI-based evaluation of customer data.

TrendCycle: Technology & development / AI-driven evaluation of big data

Peter Ohnemus
President & CEO, Dacadoo AG

Peter Ohnemus is the founder of the first mobile, digital platform for individualized health monitoring and care outside of the classic insurance industry. Dacadoo views itself as health promoter, supplier for established insurers, and as a pioneer in individualized medicine.

TrendCycle: Technology & development / health monitoring & care

Prof. Arkadiusz Miernik
Senior Physician & Section Director - UroTech, University Medical Center Freiburg

At the 2b AHEAD Future Congress, Prof. Arkadiusz Miernik discussed the future of the health market and the excessively high regulatory limits on data protection which are blocking the personalization of medicine.

TrendCycle: Service provider

Werner Rieche
Software AG Deutschland

With Werner Rieche we primarily discussed the advantages that health insurance companies can experience through automation and AI algorithms. In his view, helping to shape the healthcare market is a moral responsibility for software providers.

TrendCycle: Supplier / software for health insurance companies

Karl-Heinz Naumann
COO & CIO, Ottonova Holding AG

Our chief topic of discussion with Karl-Heinz Naumann was the advantages and disadvantages of modern omnichannel customer dialogue. He also made significant contributions to our understanding of automation and provider-to-provider communication.

TrendCycle: Attacker / digital health insurance

Dr. Robert Riener
Professor for Sensorimotor Systems & Department Director, Health Sciences and Technology, ETH Zurich; initiator of the Cybathlon

Dr. Riener is the founder of the Cybathlon and one of the chief pioneers in the areas of robotics, exoskeletons, prosthetics, and orthotics. We spoke with Dr. Riener about the opportunities offered by new technologies and the time frame in which they will likely appear.

TrendCycle: Technology & development / robotics

THE EXPERTS

Investment decision makers, strategy leaders, and future experts
Our expert panel for this study includes:

Dr. Roman Rittweger
CEO & Founder, Ottonova Holding AG

Dr. Roman Rittweger is the founder and head of Ottonova, a digital private health insurance provider with high innovation speed. He views the IT systems and mind-sets of established health insurance providers as equally obstructive for a modern healthcare system.

TrendCycle:
Attacker / digital
health insurance

Dr. Mirko Tillmann
Member of the Board & COO, Central Krankenversicherung AG

By providing an inside look at the workings of a private health insurance provider, Dr. Tillmann made a significant contribution to our study. Special topics of focus were: navigating the shift in roles for insurers, the individual customer journey, and how automation and AI can provide efficiency gains.

TrendCycle:
Competitor / private
health insurance

Rhett Scheel
Technical Account Manager & Account Advisor – GKV, SAS Institute GmbH

Mit Rhett Scheel, SAS' expert for statutory health insurance providers, we extensively discussed the opportunities and risks that arise through the sharing of sensitive personal data, the possibilities and limitations of modern-day analytical software, and partnership models for statutory health insurance providers.

TrendCycle:
Supplier / software,
automation

Dr. Jun Wang
CEO, iCarbonX

Dr. Jun Wang is a leading pioneer in the area of genome sequencing and Founder and Director of the Beijing Genome Institute. With iCarbonX, he brings the power of AI to personal genome analysis.

TrendCycle:
Technology &
development

Reto Schegg
Member of the Board & CEO, healthbank innovation AG; Founder & CEO, scheggpartner GmbH

Our interview with Reto Schegg took us deep into the topic of blockchain technology and applications based on smart contracts. Healthbank sees it as a goal to provide informed health customers with a platform where they can decide where – and with whom – they will share their personal health data..

TrendCycle:
Technology /
blockchain,
smart contracts

THE AUTHORS
Scientists, trend researchers, and strategy consultants

Michael Carl

Michael Carl is Managing Director Research & Consulting at the 2b AHEAD ThinkTank. He is responsible for the methods and content of the 2b AHEAD ThinkTank's future studies, oversees their implementation, and guides the development of specific strategic recommendations. He is also a sought-after keynote speaker on trend and future-related topics. After his studies in Theology in Germany and Great Britain, Michael was active in journalism working as an editor and moderator for various public and private radio broadcasters.

After several years as personal deputy to an ARD radio director, he moved to the corporate sphere. Initially Michael established and managed the strategy office of Berlin-Brandenburg Broadcasting, where he was responsible for major structural, strategic, and HR projects. He also acquired significant experience as an independent consultant for strategic and organizational development. Michael's passions are music and his literature blog.

Kai Arne Gondlach

Kai Arne Gondlach is Senior Researcher at the 2b AHEAD ThinkTank.
He is responsible for planning and conducting 2b AHEAD's trend studies as well as developing new study methods. Alongside his scientific work at the institute, Kai inspires his audiences as a keynote speaker by using uncomfortable prognoses to take them out of their comfort zones. He also works in change projects with innovative strategies and concepts for the ThinkTank's customers. Before joining 2b AHEAD, Kai studied Sociology, Political Science, and Future Studies in Potsdam and Berlin.

After graduating high school, he worked as an independent web developer and PC consultant for many years. Kai also worked in consulting firms and on several projects for a major German mobility provider's corporate organization and strategy before becoming Innovation & Marketing Manager for a Berlin publishing startup. In his private life, Kai is a devoted musician – he sings and plays both guitar and piano. He also enjoys squash and loves discovering the world as a backpacker or by bike.

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GLOSSARY

adaptive products
Product feature which describes products or services that are both individualized and situational, and adapt to the respective needs of the user even after purchase.

assistance systems, digital/electronic
Software (e.g., smartphone apps) for customer advice and support which gives recommendations based on data analysis. Services providers and third parties can – among other things – offer customers individual products. The precursors of this system are today's comparison portals.

big data
Denotes enormous heaps of data which are too large to be evaluated by human effort alone. This data results mainly from the evaluation of internet use, but also from other devices such as cameras, microphones, etc. In order to process this mass of data, new technologies and analysis systems are necessary.

blockchain
Blockchain technology makes it possible to transact digital exchanges without a middleman. All transaction-related information is stored in a decentralized system, which increases transparency, and also means that information in the system can no longer be altered. The most common examples are the cryptocurrency Bitcoin and smart contracts for insurance policies with Ethereum.

body enhancement
Refers to any kind of improvement, either physical or mental, of the capabilities of the human body and its external appearance.

brainfood
Foods intended to improve mental performance or reduce stress.

brainwave-recognition
Technology for the recognition and interpretation of human emotions, thoughts, and intentions.

cloud/fog
An IT model where data is not saved on in-house hardware, but on the internet, and is thus accessible at anytime, anywhere, for any authorized person.

cognitive computing
Cognitive computer systems develop the ability to understand humans, to learn from them, and to independently make decisions based on learning algorithms and artificial intelligence.

contact point/ customer interface
Potential situations or locations where customers can be approached directly and personally (consulting discussion, store, website visit), as well as intermediary persons who can bring the company and the customer into contact.

customer journey
This term refers to the totality of all points of contact between customer and brand, in direct communication with the company or in indirect communication about the company or product, either before, during, or after the sale.

cryonics
Cryonics describes a procedure that conserves bodies or body parts by freezing them. The goal of cryonics is to revitalize persons long after death once the cause of death has become curable.

genome sequencing
All genetic information of living beings is stored in individual genomes. Genome sequencing provides insights into personal disease risks and reveals correlations between illness and behavior.

human / machine organism
Point of contact and interaction between humans and devices, often with the use of technological support from sensors or displays, etc.

Internet of Things/ Internet of Everything
The Internet of Things refers to the increasing networking of all objects in everyday life and business. Every object will have an IP address.

M2M
Machine interaction refers to the flow of information and to automated communication between terminals; e.g., containers, shelves, products, vehicles, etc., which allows an increasing level of autonomous processes in production and logistics.

Moore's law
A law which states that the computing power of computer chips, calculated according to the number of silicon transistors on the chip, will double approximately every 18 months at a constant price. Moore's law has proven valid since the 1950s.

new privacy by design
The more data is collected and analyzed, the more important scalable, user-controlled data security will become. The new privacy by design defines the conceptual foundations and requirements for this.

omnichannel-management
A continuation of the multichannel or cross-channel approach. It entails the coordination and control of all activities of all company divisions according to the strategy of creating a unified one-to-one experience for the customer across all communication and touch points and without media interruption.

predictive analytics / smart forecasting
Predictive analysis refers to an approach which combines various statistical methods – such as data mining and fact finding – in order to generate forecasts. This technology enables, for example, early recognition of customer needs and thus the ability to offer a product that has already been individualized to meet these needs. The approach is dependent on customer interest and consent.

smart home / smart building
Buildings will become intelligent through the use of technology. While the term smart home refers to private homes, rented apartments, or condominiums, the term smart building comprises intelligent functional structures such as public buildings, hotels, or company buildings.

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