Symphony Solutions

Digital transformation in healthcare:

how cloud computing helps tackle urgent social needs

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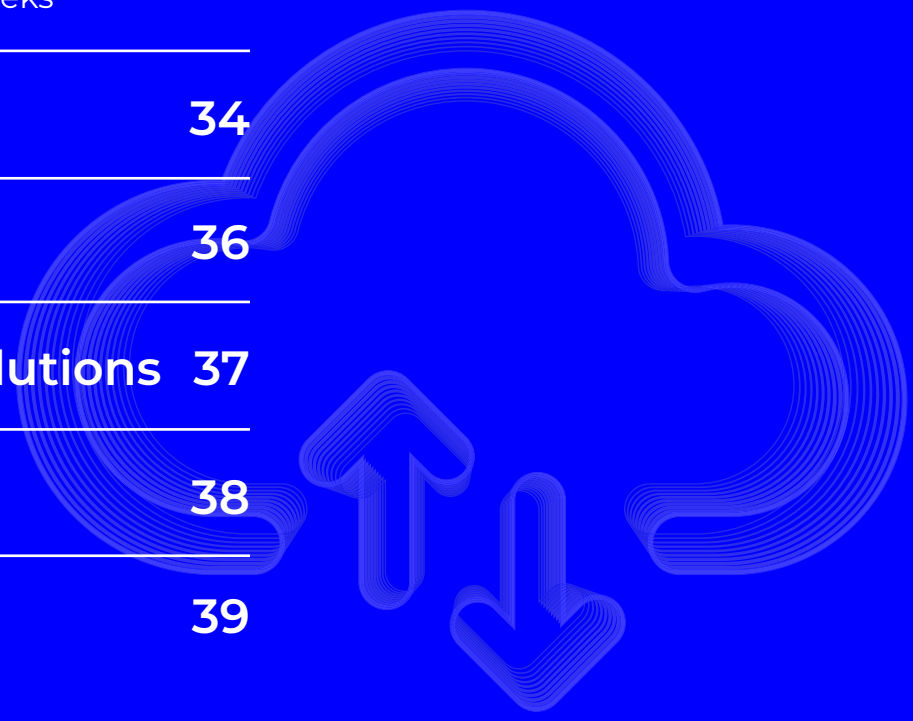


PREFACE

Digital transformation has always been a sore topic for businesses across all industries. Though companies and their executives generally acknowledge the need to adapt to the digital age, only a few truly understand what it entails. Becoming a digital business is not only about picking the latest and trendiest technology, it's a complex process that also requires a structural and cultural shift.

But before actually taking a plunge and investing in change, business hopes technologies will give them answers to some of questions worrying them the most. These include:

How investments to the technology can help them overcoming business challenges?

Where should they start their digital transformation from and what quick wins can be expected from putting any efforts into the technology?

How can they ensure compliance with medical regulation that evolves very fast especially in the fields affected by COVID?

How can they guarantee the security of medical data of patients while doing integration of all systems together and migrating toolset including EHR to the clouds?

Is it worth investing in digital transformation at all? What reasonable outcomes and budgets are required?

For healthcare these past few years have been as challenging as for any other industry if not more, for being at the forefront of fighting the pandemic has shown the need to change and improve quickly.

In this white paper we will try and answer some of the questions worrying health executives today from the point of one of the main technologies that drives the industry in 2022 — cloud computing. We will discuss the state of healthcare today, the main problems digital transformation is trying to solve, and what stands in the way. And will cover how cloud computing is helping in the face of urgent social needs by facilitating the development of vaccines or helping elevate healthcare by moving it online.

And as a final example, we talk about our own success story – how with the help of the AWS cloud platform we were able to deliver a COVID-19 testing platform in the record 2 weeks.

Healthcare industry at a glance

organizations experience better security in the cloud than on-premise IT environments

72%

consumers understand their health needs and goals

80%

of patients are likely to schedule another virtual visit even after COVID-19

60%

consumers feel comfortable sharing their personal health data over virtual health technology

85%

of physicians believe that radical interoperability and data-sharing will become standard practice.

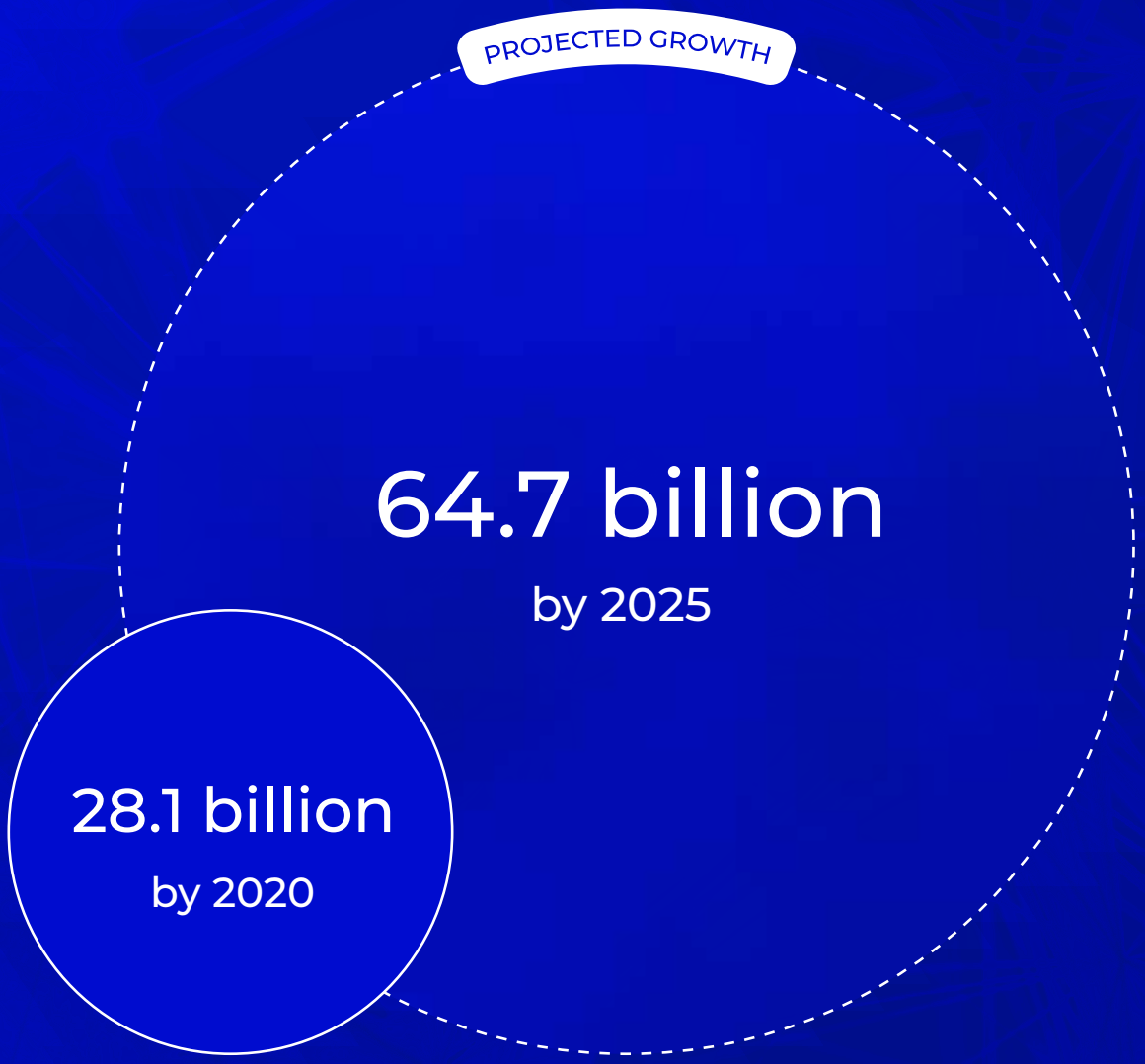
Sources:
1 Healthcare Consumer Response to COVID-19, April 2020
2 Healthcare Consumer Response to COVID-19, April 2020; Future of Health Physician Survey, January 2020
3 Deloitte Global health care outlook
4 HEALTHCARE CLOUD COMPUTING MARKET
Analysis & Global Forecasts to 2025 by www.marketsandmarkets.com/

Top 3 challenges to digital transformation:[3]

1. bureaucracy in health care
2. the cost of technologies
3. finding the right technologies.

The market share of healthcare cloud computing

18.1% CAGR during the forecast period[4]



HOW TECHNOLOGY PUTS ‘CARE’ IN THE HEALTHCARE

The Healthcare industry has experienced an immense amount of pressure from the COVID-19. In a relatively short period that the pandemic has been raging, it has forced the industry to change in various ways, rethink what’s important, or better say who – a patient. And for better or worse, it has turned out to be the driver of much-needed change for healthcare.

The innovation and digitalization that have been stalled for years are now unfolding at an unprecedented speed. Technologies are making themselves useful in all aspects, from helping develop long-awaited vaccines, making medical care accessible and of equal quality to everyone via telehealth, and protecting both patients and clinicians in these uncertain times. In 2022 healthcare is living up to its name and showing that it cares about patients, and technologies made their contribution to this positive shift.

1.1

WHAT DO PATIENTS NEED IN 2022?

To understand how the industry has changed, it's important to see how its end-users – patients and their needs have evolved.

of consumers understand their health needs and goals

Today, patients are at the center and the main reason the industry is evolving, and its products and services are improving. 72% of consumers understand their health needs and goals, according to Deloitte findings. Their readiness to be actively involved and in control of their well-being is what's driving and accelerating innovation in the healthcare sector. Their active position is shaping the industry today, elevating services and building new, patient-centric healthcare. Another important factor that dictates how the industry shapes are social needs, which in 2022 is largely still the pandemic. It drives the digitalization of patient-clinician interactions by moving them online, on an on-demand basis and with a seamless experience.

Post-pandemic patients are more empowered and confident. They know what they want and take an active part in bettering their well-being. Patients today want convenience and transparency, especially when it comes to their treatment and its costs. They are using technologies to monitor their health and then make health-related decisions based on the data they track.

80%
of patients

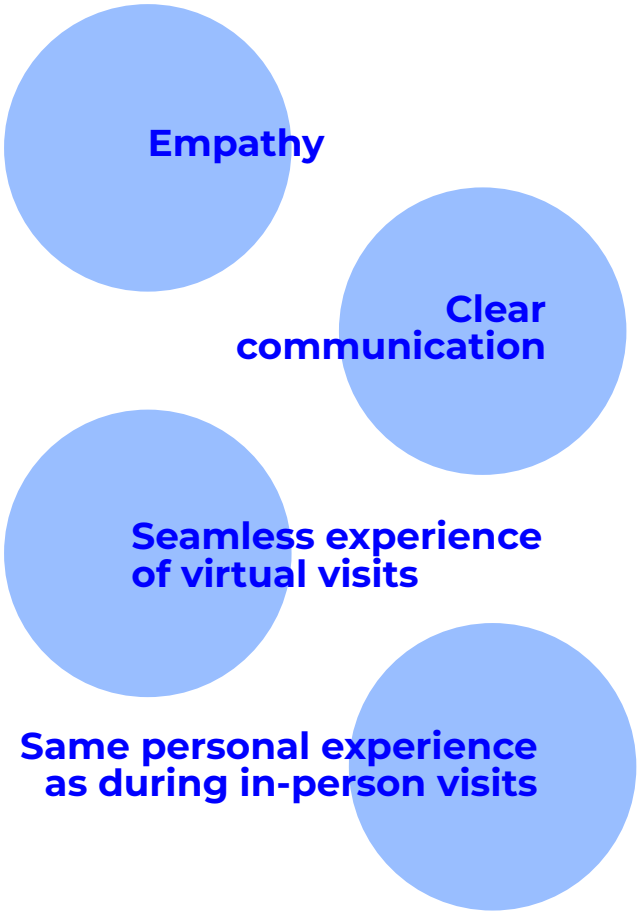
are likely to schedule another virtual visit even after COVID-19

The use of virtual visits continues to grow as well. The adoption is not news. But if before the pandemic, the growth was though steady but still somewhat moderate, since the pandemic's onset it jumped to 28% in April 2020 and continues to grow. On average, 80 % of patients are likely to schedule another virtual visit even after COVID-19, Deloitte reports.

So what do these new, well-informed patients want? First off, they are after the simple and clear experience. Adopting new technologies is often confusing, dealing with scheduling virtual calls, handling various, often puzzling interfaces, is just stressful. What patients want, especially if we are talking about the older generation, is the same experience as they have when FaceTiming their grandchildren.

In terms of the services, patients expect doctors to care, listen to them instead of rush, and provide clear communication. Virtual services have to offer the same personal experience as in-person visits.

WHAT PATIENTS WANT



PATIENTS WANT THE SAME EXPERIENCE AS THEY HAVE WHEN FACETIMING THEIR GRANDCHILDREN

1.2

THE STATE OF HEALTHCARE AND HOW COVID-19 HAS IMPACTED IT

Today the main attention of healthcare is moving towards both health and well-being. More focus and resources are being put on the beginning of a patient journey. Healthy lifestyles, emotional wellness are being promoted. The spotlight is shifting from acute care to preventive care with more resources being poured into early diagnosis and illness prevention.

THE FOCUS IS SHIFTING FROM ACUTE CARE TO PREVENTIVE CARE

But of course, the shape of healthcare today is largely impacted by the COVID-19. Some of the innovations it has introduced are likely to remain as they are proving to be working and improving the services offered to patients.

HERE'S HOW THE PANDEMIC HAS CHANGED HEALTHCARE:

Widespread adoption of virtual care is one of the trends that was massively boosted by the pandemic and that will only be developing and growing. The reason is simple – it is making healthcare more accessible, convenient, and cost-effective.

Putting the stress on the accessibility. While there's still a lack of not only 5G but even 3G or 4G in Africa and some parts of Latin America, there are some positive shifts. An equal level of healthcare services and access to top specialists are now possible in remote areas, all due to telehealth and virtual care.

Creating a patient-centered experience is another recent improvement. The tendency is shifting from standard protocols to personalized treatments. The importance of experience is so great that 92% of healthcare executives are naming delivering of highly personalized experience as a top priority for their organization.

Although the transformation of services is not quick or easy, healthcare providers need to understand that changing and adopting technologies are necessary steps, if they want to survive past the pandemic.

HEALTHCARE PROVIDERS NEED TO UNDERSTAND THAT CHANGING AND ADOPTING TECHNOLOGIES ARE NECESSARY STEPS, IF THEY WANT TO SURVIVE PAST THE PANDEMIC

1.3

DIGITAL TRANSFORMATION IN HEALTHCARE: MAIN PLAYERS

As we've already established, COVID-19 gave an enormous boost to the digital transformation of the industry. It has exposed the gaps in healthcare. Of course, many of them were evident before but due to the pandemic what was in the works for years had to be delivered in mere months or even weeks.

So powered by cloud computing, personalized data and analytics tools, organizations are transitioning to smart, digital health. They widely use virtual and telehealth and artificial intelligence to offer personalized, patient-centered services. Other frequently used technologies are electronic health records (EHRs), e-prescribing, data interoperability, and the Internet of Medical Things.

As to the pace of innovation, the survey conducted in Europe in 2020 revealed that 26.1% of respondents reported that due to the pandemic their health organizations had increased to a great extent the adoption of digital technologies. The highest number is in Norway, where 45% of health providers have increased their adoption of health technologies. At the same time 28.4% note that there had been no change. The answer to why might be hidden in the challenges that are blocking innovation, named by the respodents.

Top 3 challenges to digital transformation:

- bureaucracy in health care
- the cost of technologies
- finding the right technologies.

THREE MAIN TECHNOLOGIES THAT ARE TURNING AROUND HEALTHCARE ARE CLOUD COMPUTING, AI, AND VIRTUAL CARE

Three main technologies that are turning around healthcare, making it human-centric, and bringing patients and doctors closer are cloud computing, artificial intelligence (AI), and virtual care delivery.

CLOUD COMPUTING

Cloud computing is seen as a way to improve the IT infrastructure of healthcare systems, reduce costs (as it efficiently uses the resources), analyze data and turn it into meaningful information. Health organizations are increasingly moving from the centralized approach, where they need to buy and maintain their own datacenters, to a virtualized style that allows them to pay only for the resources they are using (storage, applications, infrastructure).

TODAY ABOUT 20-30% OF WORK IS DONE VIA THE CLOUD

The adoption of the cloud has been quite gradual over the last years. But when the pandemic hit, things started to speed up. According to a recent survey, today about 20-30% of work is done via the cloud. The initial plan was to gradually increase the number to 80% over 10 years. But with the growing number of staff working from home, the need to provide telehealth, and more, the new plan is to achieve 80% mark in 3 years.

First off, most health organizations are likely to focus on migrating EHRs, setting up remote care and remote work, producing a scalable virtual desktop. Deloitte's Global Healthcare Outlook predicts that the next stage would be enabling remote call centers, integrating video conferencing and remote care with EHRs, and then configuring the right tools, software, and technology to deliver and manage an IT infrastructure needed for the future of healthcare.

HOSPITALS AND HEALTH ORGANIZATIONS OBSERVE SIGNIFICANT BENEFITS OF MOVING TO THE CLOUD

Where cloud is concerned, one of the biggest issues for healthcare is cyber security and protection of highly sensitive personal data. To begin with, organizations will have to change how they approach security and handle patient data in the first place. Luckily, top cloud providers are there to share the responsibility of protecting customer data and operations.

Overall, hospitals and health organizations observe significant benefits of moving to the cloud. They get to build a more flexible IT infrastructure that will mean better management of costs, better ability to govern their data, and improved insights into that data.

ARTIFICIAL INTELLIGENCE

Another technology that is gaining popularity in healthcare is AI. If previously it was used to automate manual processes, today it is capable of solving much more complex problems. For instance, Artificial Intelligence can be used to improve diagnosis and treatment processes by using large amounts of structured and unstructured data across hospitals and medical systems. These real-time, data-driven insights can help doctors with making the right decisions when it comes to diagnosis or patient treatment.

ARTIFICIAL INTELLIGENCE CAN BE USED TO IMPROVE DIAGNOSIS AND TREATMENT PROCESSES

With AI-driven solutions hospitals can optimize their performance, increase productivity, and effectively use time and finances. It can also elevate the patient experience by making it more personalized with virtual assistants.

One of the real-time examples of AI applications in healthcare is AccuHealth company from Chile, which is using AI-powered remote patient monitoring to identify high-risk patients and those in need of immediate help.

Adoption of AI for healthcare organizations can result in not only more efficient work but also lead to sufficient cost reductions and gaining a competitive edge by offering a better quality of services.

VIRTUAL CARE

Before the pandemic, healthcare organizations were hesitant with the mass adoption of telehealth. In fact, it was 3-4 years away. But as the virus spread and interactions became limited, what was once nice to have in the future, became a necessity. This refers to a variety of virtual care services, such as telehealth, telepharmacy, etc.

One of the main concerns that were stopping the adoption was remote visits won't offer the same level of services, humanity, and in-person communication for patients. But it turned out quite the other way around. The technology was bringing patients and doctors together. Due to COVID-19, 71% of Americans were reluctant to schedule in-person doctor's appointments, while more were inclined to opt for a telehealth visit.

THE AVERAGE TELEHEALTH VISIT IS 13-15 MINUTES

It has also improved the overall efficiency of these visits. An average appointment at the doctors would take about 2 hours, of which only 20 minutes were spent interacting with the doctor. At the same time, the average telehealth visit is 13-15 minutes. And despite being shorter, patients report that the quality of their visits has improved. According to one study, during a 10-week period, only 1 in 825 telehealth appointments was cancelled during COVID-19.

IN A 10-WEEK PERIOD, ONLY 1 IN 825 TELEHEALTH APPOINTMENTS WAS CANCELLED DURING COVID-19

Overall, consumers are satisfied with their virtual visits and are willing to schedule another one. On top of that, virtual care can help reduce delivery costs for both sides. And even after the pandemic, it will be a norm and a standard and convenient way of patient-clinician interactions.

An essential building block of this new care is data interoperability. It allows different information systems, devices, and applications to access, exchange, integrate, and cooperatively use data in a coordinated, standardized manner on various levels from organizations to a region or nation-wide. When applied correctly, it can generate valuable insights, optimize patients' health and increase the efficiency of the care delivery. On top of that, it can reduce the cost of care and increase revenue with improved patient experience.

Without a doubt, the pandemic changed and affected the healthcare industry and quite irrevocably. It has changed patients who now want to be active participants in bettering their health. At the same time, they expect a certain level of services from healthcare providers – less standardized protocols and a more personal approach. Technologies are capable of building the new healthcare that actually cares. One of the main warriors of this digital change is cloud computing that is an essential part of any digital transformation.

5 ADVANTAGES OF CLOUD COMPUTING IN HEALTHCARE

The application of cloud computing in healthcare has been gaining a lot of traction recently. Whether it's a part of the organization's strategic vision of adopting digital transformation or a pressing need due to the changing environment. But if applied correctly, the role of cloud computing in the healthcare department can be quite prominent.

The applications are much easier to handle when they are based on serverless architecture. Paying a third party instead of investing in your own on-premises infrastructure sufficiently lowers the IT costs. At the same time, it allows scalability and at a greater price, since the company won't need to pay for the capacity they are not using and can easily scale up or down, as needed. Another competitive advantage of the cloud – speed of innovation (I.e., building prototypes or new product features faster).

52% OF ORGANIZATIONS EXPERIENCE BETTER SECURITY IN THE CLOUD THAN ON-PREMISE IT ENVIRONMENTS

But most importantly, what makes the cloud especially appealing today, its security. Compared, to on-premises, the cloud is considered to be a more secure option. A new McAfee report reveals that 52% of organizations experience better security in the cloud than on-premise IT environments. While Gartner predicts that in the event of a security issue, 95% of them will be a customer's fault. Thus, making the cloud also the safest choice.

2.1

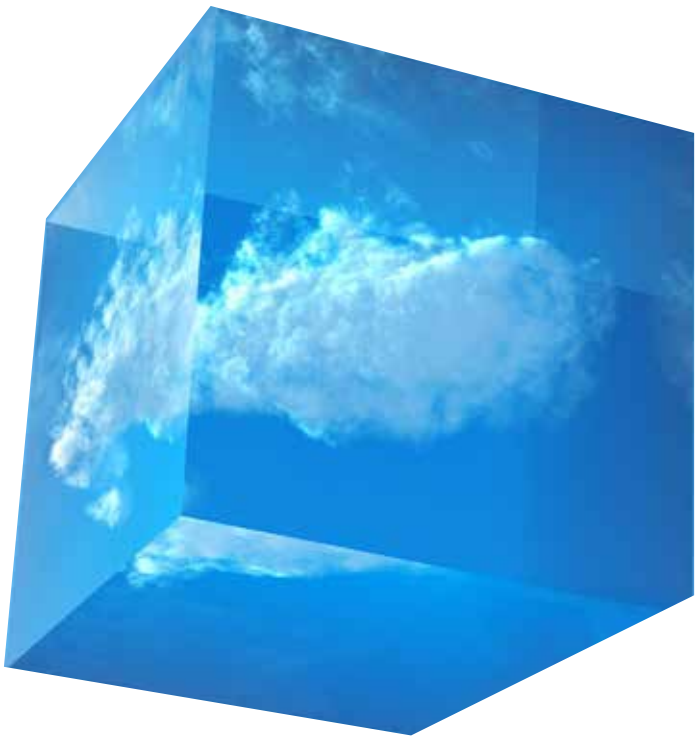
THE DRIVER OF DIGITAL TRANSFORMATION

With all that cloud has to offer, it is no surprise that it's at the forefront of digital transformation. And the global COVID-19 pandemic has even further accelerated customer demand for cloud services.

By the end of 2019, many tech experts had already been placing their bets on the cloud to lead the tech trends in the following year. But no one could have predicted back then just how impactful it would become in 2020.

The agility and scalability that the cloud has to offer, came especially in handy when organizations across various industries were faced with the new reality. In the first quarter of 2020 cloud spending has reached $29 billion, which is 37% higher than over the same period in the previous year. And, of course, was nowhere near slowing down, as the unexpected mass demand for virtual work had to be backed by secure, reliable, scalable, and naturally, cost-efficient off-premises services. While on the whole, the IT spending in 2020 was on the decline, the business was blooming more than ever for the cloud providers with a 19% projected growth, according to Gartner, among a total decline in other sectors of IT spending.

Of course, even before the pandemic, the strategic shift to more flexible pay-as-you-go solutions was on the table for many companies, the COVID-19 crisis only further facilitated this shift.



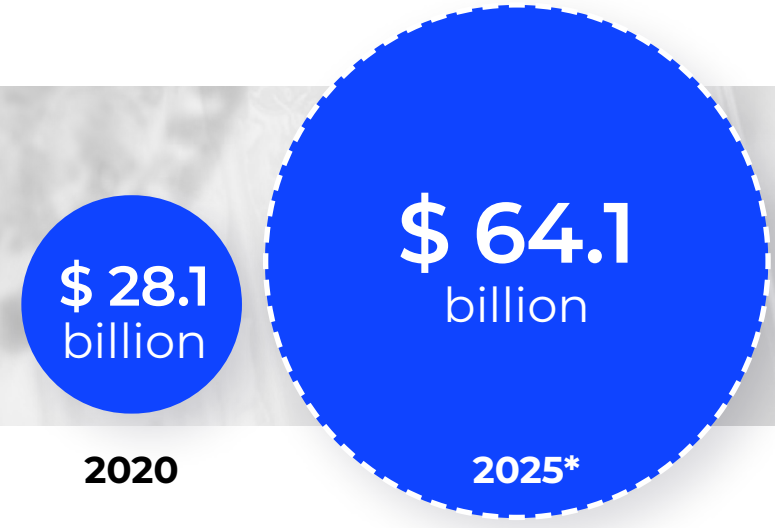
2.2

CLOUD COMPUTING TO MAKE HEALTHCARE SMARTER

This brings us back to the healthcare industry. Big Data analytics, IoT, wearables, and cloud computing are among the top technologies to influence its market.

Like with many others, the application of cloud computing in healthcare is driving a positive change in numerous ways. Whether it's to reduce costs and to be able to focus on mission-critical activities by opting for off-premises infrastructure or to tap into highly flexible and customizable services by leveraging cloud storage and computing capabilities.

MARKET SHARE OF HEALTHCARE CLOUD COMPUTING



Source:
Healthcare Cloud Computing Market Analysis & Global Forecasts to 2025 by www.marketsandmarkets.com

*project grown by 2025

According to a recent report, the market of healthcare cloud computing is projected to grow from $28.1 billion in 2020 to $64.7 billion by 2025, at 18.1% annually during the forecast period. This growth of cloud in healthcare can be attributed to numerous factors, such as digitalization, technical upgrading, improving the services and care process. But, of course, like with many other industries in 2022, the mass cloud adoption is largely dictated by the COVID-19 crisis and the new reality.

Such features as seamless data storage and backup, as well as the ability to scale up or down, are especially valuable in these uncertain times. But perhaps one of the most valuable assets of cloud technology is in online medical consultations. Social distancing dictates its rules and patients with mild symptoms or trivial medical issues are advised against visiting hospitals and instead to opt for remote consultations via phone calls or video conferencing. This will also likely increase the medical cloud computing market.

96% OF HEALTHCARE ORGANIZATIONS ADMIT THAT THEIR INFRASTRUCTURE IS NOT FULLY PREPARED FOR THE EVOLUTION OF THEIR ELECTRONIC MEDICAL RECORDS (EMR)

But perhaps, not all healthcare sectors are equally ready for mass cloud adoption. A new study, "FutureCare: Cloud, Big Data, Mobile, and Social Optimize the EMR", reveals that while many providers plan to adopt these technologies in the next two years, at the moment about 96% of healthcare organizations admit that their infrastructure is not fully prepared for the evolution of their Electronic Medical Records (EMR). But on the brighter note, the adoption has been put into motion, with two-thirds of healthcare providers already using the cloud. The majority are running their EMR applications in private clouds (49%), followed by hybrid and public cloud models (35%). The application of cloud computing can help optimize EMR and improve patient care coordination. But this is only one of the many benefits of the integration of cloud services in the healthcare sector.

2.2

5 ADVANTAGES OF CLOUD COMPUTING IN HEALTHCARE

1. IT'S A COST-EFFICIENT SOLUTION FOR STORING LARGE VOLUMES OF DATA

The volumes of digital data that healthcare providers are generating are growing each year. These include Electronic Medical Records, lab tests, prescriptions, insurance claims. Cloud computing services can help effectively manage these large volumes of data. In this instance, choosing on-premise storage, might not be a sound solution. It requires sufficient investments in IT infrastructure as the data load increases. Whilst cloud providers offer elastic storage services to store your growing data. Equally important, cloud-based analytical tools are capable of making more use of data and turn it into actionable insights.

2. IT HELPS DELIVER TIME-CRITICAL MEDICAL SERVICES ON THE MARKET FASTER

2020 has been an unprecedented year in many respects. Time was a critical factor in battling the pandemic and building new hospitals, delivering the vaccine on the market, or arranging a safe way of mass testing. Cloud computing is something to be relied on to facilitate delivering important tech solutions on the market faster. For instance, when SpoedtestCorona, a chain of testing centers offering rapid screening tests for COVID-19, was working on providing safe and affordable testing in the Netherlands, they were faced with a challenge to deliver a cross-platform web application on a tight schedule.

BY CHOOSING AMAZON WEB SERVICES AS A CLOUD PROVIDER, THEY WERE ABLE TO DEPLOY THE APP IN THE RECORD 2-WEEK DEADLINE

The app was going to minimize human interaction and make testing safe for both patients and medical personnel. By choosing Amazon Web Services as a cloud provider, they were able to deploy the app in the record 2-week deadline, as well as meet high compliance requirements associated with handling personal and medical data.

3. IT MAKES MEDICAL SERVICES WIDELY ACCESSIBLE VIA TELEHEALTH

Telehealth is the use of telecommunications technologies to access healthcare services remotely, enhance and manage healthcare delivery and support.

The limitations to wider access to quality healthcare are still of economic reason. People in developing parts of the world cannot afford good quality healthcare. But this could change with wider adoption of telehealth.

Cloud solutions have numerous ways of positively impacting telehealth. The instantly scalable capabilities of the cloud come in handy in unprecedented situations, such as say a global pandemic. Cloud offers much better service with the same total cost and can cover wider markets which have not been served before.

Presently, cloud-based telehealth is playing a crucial role in trying to keep the patient load under control by proving medical assistance to patients with mild or medium symptoms at a distance, instead of hospitals. And thus, once again reducing crowds in hospitals and infection rates.

4. IT ENHANCES THE PATIENT EXPERIENCE

With the help of cloud, doctors and hospitals now have the power to increase patient engagement and give them anywhere anytime access to their medical data, test results, and even doctor's notes. This gives patients more power and control, as well as makes them more educated about their medical conditions.

Additionally, it offers a new level of safety for patients and keeps them from being overprescribed or avoid unnecessary testing, as doctors can access the history of medical records and use embedded analytical tools to see trends and insights in a convenient way instead of searching in papers or files.

5. IT IMPROVES COLLABORATION

And finally, the implementation of cloud solutions sufficiently boost collaboration. By storing Electronic Medical Records in the cloud, patients no longer need to have separate medical records at each doctor they visit. Instead, doctors can share information, see the results of previous interactions with other specialists and even share information with each other. This not only saves time for both patients and their doctors but also facilitates more accurate diagnosis and treatment.

On security, privacy, and other risks of cloud computing in healthcare

With all the benefits that the cloud has to offer to healthcare, there are still some concerns. The biggest being security and privacy. Patient information is considered highly sensitive and there's a belief that it is safer when stored on-premises compared to the cloud where it is susceptible to cyber-attacks. Additionally, patients are also concerned about the security of the data they share. Which all boils down to the necessity to maintain high-security standards.

Another major concern – vendor stability, and how reliable they are in the long run. If a vendor goes out of business or stops offering a particular service, this puts important data at risk of being lost.

The level of IT skills necessary to adopt cloud solutions is also on everyone's mind. The lack of skilled IT professions is often cited as one of the barriers to cloud adoption.

Luckily, these issues can be solved by carefully examining and choosing cloud vendors as well as skilled cloud native development service providers that have solid experience and good track records of implementing cloud solutions in the healthcare industry.

The application of cloud computing in healthcare can positively impact the industry in numerous ways. From cutting down costs or reducing the time spent to offering organizations much-needed flexibility, scalability, and empowering collaboration between healthcare researchers. The latest reports on the topic show that adopting cloud solutions is something clearly on the table for medical organizations with the main obstacles being either security concerns or lack of internal technical resources. Both issues can be easily overcome by choosing the right cloud development partners.

SOCIAL IMPACT OF CLOUD COMPUTING IN HEALTHCARE

As the mass adoption of cloud computing becomes more widespread, whether it is visible or not, the cloud becomes a prominent part of our lives. In ways that might not be noticeable to an ordinary eye, cloud computing is improving our day-to-day life in numerous ways.

In healthcare, where more than profits are at stake, cloud-native technologies are helping to save lives during the pandemic. In this chapter, we will cover the best ways of leveraging cloud computing in the healthcare sector, especially when faced with urgent social needs and strict deadlines.

3.1

ENABLING RAPID DEVELOPMENT OF COVID-19 VACCINES

CLOUD COMPUTING HAS HELPED MODERNA WITH THE RAPID DEVELOPMENT OF THE COVID-19 VACCINE. RELATIVELY SMALL COMPARED TO PHARMACEUTICAL GIANTS, MODERNA WAS AMONG THE FIRST TO DEVELOP AND GET THEIR VACCINE APPROVED FOR EMERGENCY USE.

By building and scaling its operations on the cloud, they were able to deliver its first batch for phase one trial in only 42 days after the initial sequencing of the virus. Today Moderna is fully cloud-based. Their scientists don't need to go to the lab to pipette their messenger RNA and proteins. They can simply visit a web portal located on AWS cloud. To accomplish a rapid vaccine development, their scientists invented proprietary cloud-based technologies and methods to create mRNA constructs that cells recognize as if they were produced in the body. This allowed Moderna to experiment rapidly and easily shift between vaccines without having to invest in new technology or infrastructure.

Along with the vaccine, they were also working on scaling their manufacturing and supply chain to be ready for massive distribution. Everything is fully digitalized, paperless, and sits on the AWS.

Moderna's example shows the effective use of cloud computing in business, especially when the business and society are pressed for time. Levering AWS capabilities helped them to produce and mass develop COVID-19 vaccine, reduce costs, allowed flexibility of operations, and gave business resilience, and innovation.

3.2

EQUAL QUALITY OF HEALTHCARE WITH TELEHEALTH

Powered by cloud computing, telehealth is elevating the quality of healthcare by making the same high level of services accessible both in big megapolises and rural towns.

Salt Lake City-based Intermountain Healthcare has been actively adopting telehealth even before the pandemic times. Now, thanks to the technologies they can offer the same treatment protocols to both their patients offline and online. This means there's no difference if the patient is admitted to their hospital in Salt Lake City or some small local hospital in rural parts of the United States - their caregivers will follow the same steps and offer the same drugs.

Intermountain's telehealth program was connected to the 36.5% reduction of mortality in one year, which means approximately 125 saved lives. One study of 481 people with an increased likelihood of colorectal cancer revealed that 35.4% of those who had a risk assessment via telehealth with a certified genetic counselor completed a colonoscopy within nine months, compared to 15.7% in the control group.

The case of Salt Lake City hospital and its virtual hospital proves that telehealth is working and saving lives. And during the pandemic, it is making medical care safer. Patients don't need to go to hospitals and face the risk of increased exposure to the virus. At the same time, patients who tested positive for Covid don't risk infecting other people, especially doctors and caregivers. They are sent home with a technology kit that monitors how they are doing and via telehealth doctors monitor vital signs. This way of treatment is less expensive for patients and frees up hospital beds much needed for sickest Covid patients.

3.3

MAKING COVID-19 TESTING AFFORDABLE AND ACCESSIBLE

Another case of effective use of cloud computing during the pandemic is SpoedtestCorona, a company building a fast COVID-19 testing solution in a cost-efficient and scalable way, safe in the knowledge that their patients' data is secured and protected.

The company's initial goal was to offer safe and affordable mass testing to help battle the pandemic. Their solution was built in a way to make testing safe for both sides – doctors and patients. By leveraging AWS cloud computing, the product was released to the market in a very short period of only 2 weeks.

Overcoming business challenges with AWS cloud computing

Main challeges

- Short time to market
- Scaling
- Strict security demand for the governmental projects

One of the biggest challenges to handle was a very short time to market. There was a need for a quick possibility to scale, and, government's security demands to consider, because of the cases of data leaks of some other companies.

THE KEY FACTORS THAT CONTRIBUTED TO THE SUCCESS WERE:

- **Pricing.** The company aimed to give the best service for the most competitive price. Soon after SpoedtestCorona entered the market, competitors dropped their price.

- **Cooperation with Van der Valk.** An opportunity to start testing streets at Van der Valk meant having a good ambassador there as well as scaling up the locations.

- **Making a positive impact.** In the state of a global pandemic, contributing to the general situation was an important factor. That's why SpoedtestCorona also offered free tests for non-profit organizations.

- **Proactive approach.** The founder, Jeroen de Jong sent out letters to Ministry not expecting their reply. But with luck, eventually, it came to the right person which resulted in cooperation with the Dutch Government.

- **Flexibility.** In a crisis mode, you can't act differently because you will miss out on opportunities. A lot of investment was put into the platform and processes to make the success happen.

- **Safety.** Having all the data in cloud allows to move out limited in quantity, highly skilled doctors from test facilities to convenient and safe places. This improves scaling and resilience of the business.

By making the right technology choices, SpoedtestCorona enabled remote access to the testing facility and made COVID-19 testing safe for both parties.

CONCLUSION

In the face of an urgent social need, especially when the wellbeing of humans is at stake, which is often the case in the healthcare industry, you need to react quickly. In this respect, cloud-native development will have your back and can not only bring innovation and rethink some standard approaches but also help you achieve your goals faster, in a cost-efficient and scalable way, safe in the knowledge that your patients' data is secured and protected.

CASE STUDY

USING AWS CLOUD PLATFORM TO BUILD MVP FOR COVID-19 TESTING APP IN 2 WEEKS

BACKGROUND

Global COVID-19 pandemic has challenged medical systems across the world with an urgent need for quick testing with immediate results. When the pandemic started, the average, available on the market tests were taking 48+ hours. This indicated an obvious need for testing facilities that are accessible, affordable, and allow people to get results in a matter of minutes, not days. The rapid testing method would not only work for the sake of the comfort of an individual who wants to get tested and go on with their life but also allows eliminating the risk of asymptomatic COVID-19 carriers spreading further the virus, endangering people around them without even as much as suspecting it.

SpoedtestCorona project kicked off at the beginning of October 2020. Back then the main issue in the Netherlands with the rapid testing was that it was too expensive and cost around 150-250 euros. The first thing to do was investigate the market to see if the testing could be made more affordable. Then the company partnered with Symphony Solutions to introduce technologies, and make some parts of the experience of getting tested digital and more automated.

CLIENT

SpoedtestCorona is a professional organization with mobile and onsite test centers of various scale, offering individual and corporate rapid screening tests for COVID-19 in the Netherlands. The service provides extremely reliable 15-minute rapid tests, as well as PCR tests with the results available within 24 hours

CHALLENGE

SpoedtestCorona partnered with Symphony Solutions to make rapid testing for COVID-19 possible by bringing cross-platform web application on the market in two weeks.

application also had to be highly scalable taking into account the need to serve corporate customers with thousands of employees to be processed.

The initial challenge was to come up with a solution very quickly. By its design, SpoedtestCorona was created to help combat the global pandemic, so the team had to respond to the urgent client's need to roll out the system as fast as possible.

Another challenge was supplying an ability to react and adapt to a very dynamic market and pandemic situation. And to respond quickly to these changes and priorities.

Main technical challenges:

- Time to market
- Dealing with the frequency of change
- Security and Privacy

The list of tasks that had to be completed within the client's tight two-week deadline included building a cloud solution to allow people to register for testing, see the list of available test centers, make a payment, receive emails; also, an admin portal for managing bookings, locations, user accounts, uploading results, while keeping the high level of compliance and data security. The application also had to be highly scalable taking into account the need to serve corporate customers with thousands of employees to be processed.

The last issue to consider – GDPR, as the client is dealing with the data of EU citizens, with data connected to their health which is a subject of strict regulations. That's why making sure that the system to be designed and components to be used will deal with data properly, safely and securely, with built-in encryption. Also, to make sure that data will remain locked within the system and will not leak outside.

SOLUTION

To get the application delivered in a record short time, the team reduced the scope of work as much as possible. Since the idea was to build a custom solution, the focus was on the business process that had to be supported for SpoedtestCorona.

allowed to compromise on the scope at the very beginning and deliver essential functionality by the time it was needed.

Using this approach, the team was capable to achieve about 40 releases which had been done in the last half a year. With about half made in the first months.

Adopted approach

- Business process decomposition
- UX/Service design
- PoC and Fail fast
- MVP, small releases, short feedback loop

The business process was decomposed into user stories, focused on the user experience and service design. Another solution was to build PoCs quickly and follow the fail-fast approach where the devolvement team was producing extremely easy and fast to deliver prototypes tested and confirmed with the client and received feedback rather than generating ideas that would not work.

Moving forward, the team followed the lean and MVP approach where they were building only features that were vital for the business to run and collected feedback every day to focus the efforts on things that were needed most. This

To succeed where others have failed, it was equally important to make the right technology choices. That's why it was decided to go with the FaaS solution where you can borrow as much as possible of the functionality from the ready-to-use cloud-native services and use them as building blocks to build your own solution. This allowed developers to focus on business logic implementation rather than working on infrastructure and building boilerplate code which would support all the needs.

So instead, from the very beginning, the team was focused on the delivery of the business logic and all the

complexity for the classic tasks such as infrastructure provisioning, user authentication, multifactor authentication, sending email and SMS notifications, or making sure all the data is encrypted falls on the shoulders of the Cloud provider. The only thing left to do was put them together in the proper way.

Taking to account the two-week deadline for go-to-market, as well as high compliance requirements of handling personal and medical data, Amazon Web Services platform was chosen for building the application. Availability of many ready-to-use PaaS solutions enabled us to have the whole development and production infrastructure to be built and automated within two business days:

- **Amazon API Gateway** – was used to quickly enable secure and scalable interaction between different parts of the application;
- **AWS Lambda** was selected to replace the traditional backend solution. Ready-to-use serverless-based backend enabled us to skip building up and maintaining the application server. Everything was working right away.
- **AWS WAF Amazon CloudFront** – Firewall and CDN platforms to secure the application and cache the static content, according to the high needs of compliance and scalability;
- **Amazon S3 and DynamoDB** – as a secure and performing cloud storage and database;
- **Amazon EMR and QuickSight** - for gathering data from different sources, storing it in the cloud, and building flexible reports based on it;
- **AWS CloudFormation, Systems Manager and CloudWatch** - for quick, reliable and fully automated cloud infrastructure build-up, scaling, monitoring and management;
- The next step was bringing visibility to the web application so that our potential clients could actually find it. Symphony Solutions marketing team within 4 days conducting market research developed an omnichannel digital marketing strategy, prepared a promo campaign, and content plan for further execution;
- **Amazon EC2 and ECS** - for Microsoft Windows Server-based third-party applications required to realize ERP functionality;

- **Amazon DirectConnec**t - for building the secured perimeters with Healthcare third-parties for medical data exchange.

Symphony in-house expertise allowed to accomplish that and as AWS partners, the team was able to come up with the solution quickly with proper services used. This allowed saving a lot of time on preparing the first demo solution.

- Choosing the right tech stack had numerous benefits. From the business perspective this meant:

- Readiness to scale on the country level;

- Remote diagnosis functionality, which sufficiently cut costs for the end-user and meant that the company could process more tests;

From the technological perspective, the main benefits were:

- Pay as you go that required no upfront investment into infrastructure;

- Enterprise-grade security, performance and reliability built-in in the infrastructure;

- Compliance with the standards like GDPR, HIPPA/HITECH etc.

RESULTS

Spoedtestcorona now has a scalable cross-platform web application and an admin platform to streamline the COVID-19 testing process. The product has now been successful on the market for over a year and has achieved the following:

- The project was delivered within an extremely tight 2.5-week timeframe;
- The website attracted first clients within the first days of its launch;
- Over 1.5 million COVID-19 tests;
- 30 testing locations in the Netherlands and 25 mobile testing units;
- At the time of the product launch, cloud infrastructure cost only 20 USD per week
- Collaboration with Dutch government and Ministry of Education to help with the reopening of schools by testing teachers and students
- Testing centres of different scale – from small mobile units which can be implemented anywhere to big test centres
- SpoedtestCorona tested Eurovision, Dutch Grand Prix Formula 1, Europort, International Flower trade, and Amsterdam Dance Event.

For more success stories, read our cases >>

CLIENT FEEDBACK

A couple of words from our clients and their main users, doctors, on how they feel about our cooperation and their experience with the product we've helped come alive:

"With Symphony's agile approach to project management, and their solution to choose Amazon Web Services platform for building the application, we were able to launch the project in the shortest time possible with constant refinement of requirements. The team's commitment to the cause and ability to maintain the high quality of the product despite the harsh deadlines is truly noteworthy."

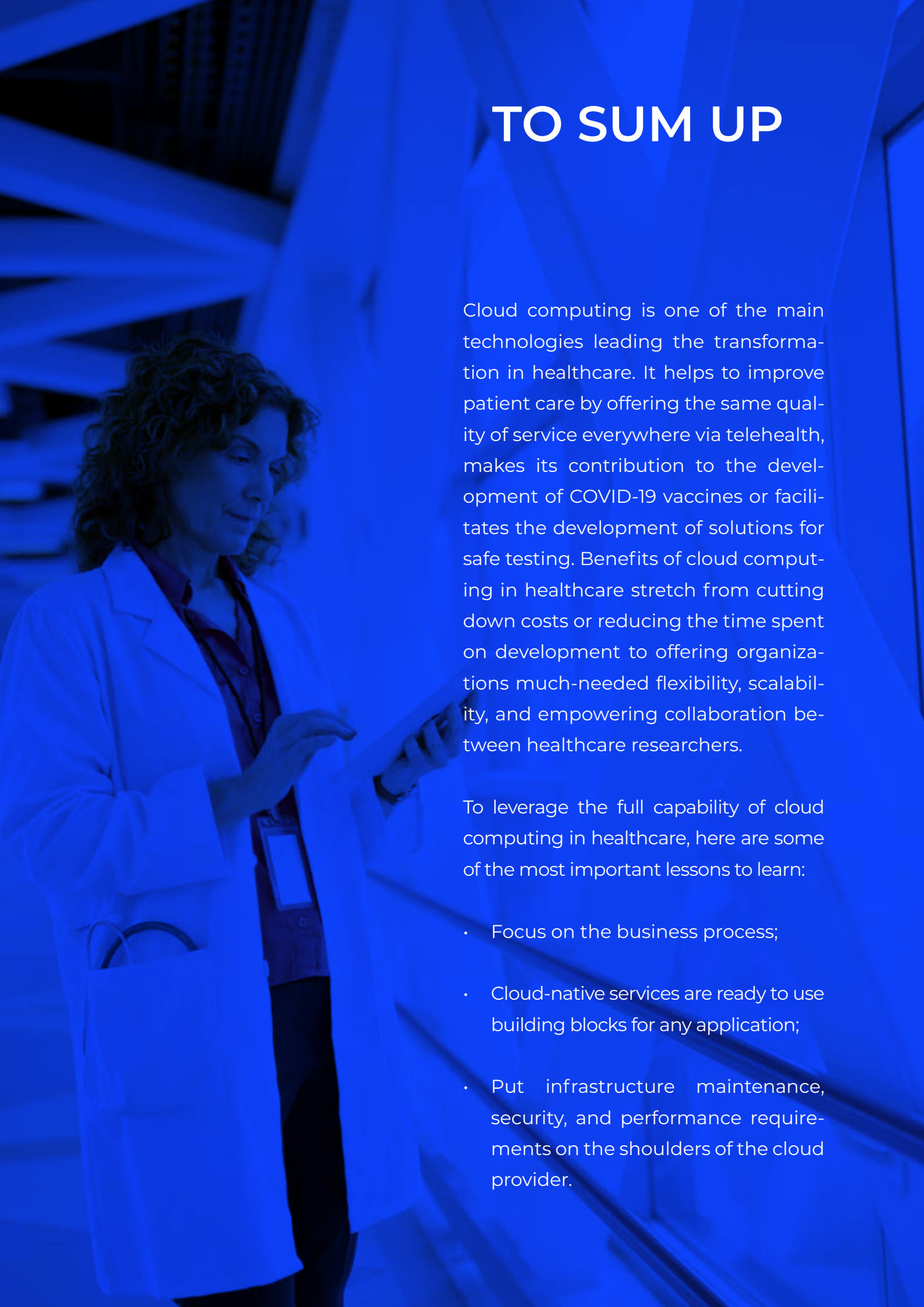
- Jeroen de Jong, founder and CEO of SpoedtestCorona Nederland

“I really believe that our cooperation with Symphony Solutions as a software supplier was one of the main factors that led to our success. When we became quite prominent on the market, we were approached by the Dutch government and Ministry of Education to help with the reopening of schools by testing teachers and students. Since then we’ve cooperated with the government at some of the biggest events in the Netherlands, such as Dutch Grand Prix Formula 1, Europort, International Flower trade. ”

- Bart Van Spitaels, co-founder and CTO of SpoedtestCorona Nederland

“As a doctor who has seen what is going on in ICU, I think it’s important to keep on testing to contain the pandemic. The testing process that was set up by SpoedtestCorona allows for a very speedy test validation. Timeline-wise, we are doing a very good job. With the software, making appointments for patients has become a lot easier, that’s for sure. And for the doctors it has made the validation process as safe as possible. Only the handling of being tested is done at the location and all the other activities are removed from the testing facility and are done at the HQ. To be able to validate the tests remotely means that there is no need for doctors to get exposed to the SARS-CoV-2. And this approach to Covid testing is what is making SpoedtestCorona quite unique on the market, as most companies are doing the validation onsite. I think we are one of the few that do things differently by making everyone’s safety a priority.”

- Renée Timmerman, doctor at SpoedtestCorona



TO SUM UP

Cloud computing is one of the main technologies leading the transformation in healthcare. It helps to improve patient care by offering the same quality of service everywhere via telehealth, makes its contribution to the development of COVID-19 vaccines or facilitates the development of solutions for safe testing. Benefits of cloud computing in healthcare stretch from cutting down costs or reducing the time spent on development to offering organizations much-needed flexibility, scalability, and empowering collaboration between healthcare researchers.

To leverage the full capability of cloud computing in healthcare, here are some of the most important lessons to learn:

- Focus on the business process;
- Cloud-native services are ready to use building blocks for any application;
- Put infrastructure maintenance, security, and performance requirements on the shoulders of the cloud provider.

ABOUT
SYMPHONY SOLUTIONS

Symphony Solutions is a Cloud and Agile Transformation company, headquartered in the Netherlands. The company provides custom software development for their 35 worldwide clients in Europe and North America.

We offer agile cloud application development, modernization, DevOps, management services among many other solutions. Symphony's cloud expertise spans across healthcare, gaming and betting, Life Science, e-learning, Consumer Digital Experience and retail industries.

In 2021 Symphony Solutions was announced the winner of Health Tech Digital Awards 2021 for the Best COVID-19 Solution for Community Care with the project SpoedtestCorona Application for Rapid COVID Testing.

LET'S TALK FURTHER

Symphony Solutions is an award-winning provider of healthcare solutions. Our cloud experts are in touch with all the latest tech trends and help deliver healthcare solutions to our partners.

Contact us to discuss how you can leverage cloud native development to make your healthcare product work better for both you and your patients.

symphony-solutions.com/contact-us

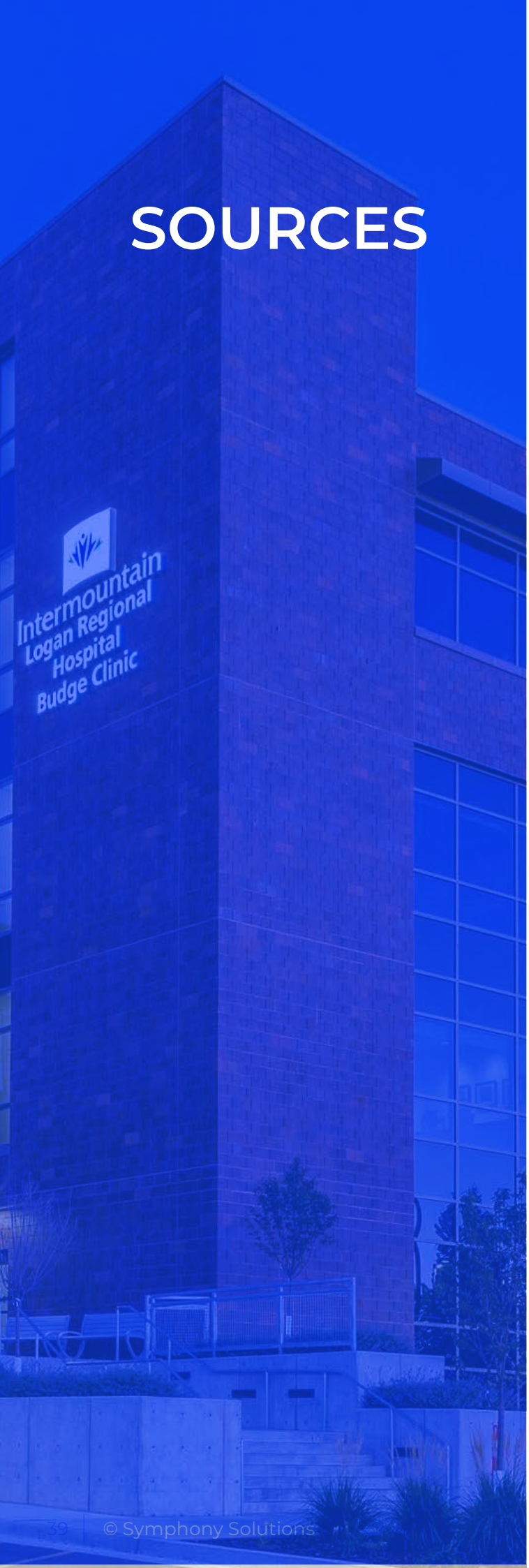
GET YOUR FREE CONSULTATION

NIKITA MOKRYNSKYI

Vice President Delivery at Symphony Solutions

A recognized cloud transformation expert, fully focused on AWS, GCP and Azure services and strategic partnerships. Nikita has first-hand experience in the development, launch and strategic promotion of software solutions for healthcare.

Profile →



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