COVID-19:
An Opportunity for Healthcare in Austria

HEALTH
HUB
VIENNA

HEALTH HUB VIENNA

This work is written by Health Hub Vienna. It is an initiative promoting the implementation of our common goal:

„TRANSFORMATION OF THE HEALTHCARE SYSTEM through innovation and entrepreneurship."

Health Hub Vienna is a platform for open innovation in healthcare. Pharmaceutical companies, medical device manufacturers, tech companies, private and public insurance companies, healthcare suppliers and start-ups all work together to develop new, holistic and patient-centric solutions.

UNIQA
AstraZeneca
INiTS Innovation into Business
NOVARTIS
Boehringer Ingelheim
SANOFI
EGIS
DIGITAL CITY .WIEN
dwh simulation service technical solution
EIMSED European Institute for Medical & Scientific Education
LIFE SCIENCE INVEST
LISAvienna life science austria
MEDX xelerator
VERDINO
Vienna BioCenter
VIVC
acmit AUSTRIAN CENTER FOR MEDICAL INNOVATION AND TECHNOLOGY
AIT AUSTRIAN INSTITUTE OF TECHNOLOGY
BOKU University of Natural Resources and Life Sciences, Vienna
dexhelpp
FH CAMPUS WIEN
imc FH KREMS UNIVERSITY OF APPLIED SCIENCES AUSTRIA
fh st.pölten
FH TECHNIKUM WIEN
HEALTH. DIGITALCITY.WIEN thinking digital health forward
KARL LANDSTEINER PRIVATUNIVERSITÄT FÜR GESUNDHEITSWISSENSCHAFTEN
MEDIZINISCHE UNIVERSITÄT WIEN
TU WIEN TECHNISCHE UNIVERSITÄT WIEN Vienna University of Technology
universität wien
vetmeduni vienna

ABSTRACT

The COVID-19 pandemic prompted an unprecedented acceleration of digital change within the Austrian healthcare system. Stakeholders have been offered a glimpse into the possibilities, benefits and pitfalls of the implementation of digital health solutions which had largely previously been blocked due to conflicting interests. We have conducted a series of interviews, asking various stakeholders how the pandemic has changed their digital health practices, and asked them to identify challenges and use-cases where digital health solutions can integrate into the patient journey with the most impact. This paper outlines the ways in which the COVID-19 crisis has impacted the role of digital health solutions in Austrian healthcare. 9 areas are explored: telemedicine; health data; E-prescription; digital triage; operational solutions; patient empowerment; chronic care and oncology; mental health; and remote care. Then, the role of startups, the landscape of legal and regulatory frameworks, and technical infrastructure are addressed and key suggestions for a national effort towards a digital health innovation strategy are highlighted. Ultimately, the paper calls for the dedicated action of decision-makers to maintain the progress made within this period so that what many see as a decade of growth will not be lost.

First Author

Yelvilaa Bodomo, Writer, Health Hub Vienna

Contributing Authors

Eszter Kormann, PhD, Operations Manager at Health Hub Vienna

Sabria Lagoun, M.Sc., Program Manager at Health Hub Vienna

Irene Fialka, PhD, CEO, INiTS

Graphic design

Lucas Mayerhofer, B.Sc. , Health Hub Vienna

INTERVIEWED EXPERTS

This paper draws from the insightful contributions of diverse stakeholders gained through qualitative interviews during the period of July-September 2020

Gerald Bachinger,	Patient Advocate, NÖ Patienten- und Pflegeanwaltschaft
Marie-Isabelle Batthyány,	CEO, XR Synergies
Andrea Braga,	Vice president, TELEMED Austria (Austrian Association for Telemedicine)
Martin Brunninger,	Director General, Austrian Federation of Social Insurances
Felix Faltin,	Principal, digital health cluster, Speedinvest
Kathy Farndon,	Non-executive Director, University Hospitals of Derby and Burton NHS Foundation Trust
Philipp Freitag,	Managing Director Austria, Online Doctor
Michaela Fritz,	Vice rector for research and innovation, Medical University of Vienna
Martin Fuchs,	General Manager, Premiquamed
Stefan Gara,	Health Spokesman Neos, City of Vienna
Martin Gleitsmann,	Expert and Strategist for Health Social and Labour Market, Gleitsmann e.U.
Thomas Holzgruber,	Director, Ärztekammer Wien
Sven Jungmann,	Chief Medical Officer, Founderslane
Anton Kittelberger,	CEO/Founder, MySugr
Peter Lehner,	Chairman, SVS
Werner Leodolter,	CIO, KAGes
Philipp Lindinger,	Director, AUSTROMED
Claudia Maizen,	Orthopedic, NHS
Siegfried Meryn,	Univ. Prof. Dr. internal medicine physician
Christina Nageler,	Director, IGEPHA
Raymond Nistor,	Head Clinical Operations, QMD Services GMBH
Herwig Ostermann,	General Manager, GÖ GMbH Austrian public health institute
Cornelius Palm,	Co-Founder & CEO, Happyr Health
Tamás Petrovics,	Co-Founder & CEO, Xund
Maria Rauch-Kallat,	Former Minister of Health, Federal Ministry of Health
Bettina Resl,	Country Head Public Affairs, Patient Advocacy & Communication, Sanofi
Edeltraud Stiftinger,	Managing Director, aws
Daniel Svacina,	Head of Care, Volkshilfe Wien
Irene Szimak,	Board member, SOS Kinderdorf
Thomas Wochele	Medical Director, Caritas

INTER-VIEW

INTRO

OVERVIEW OF THE HEALTHCARE SYSTEM IN AUSTRIA

A rough overview of the stakeholder landscape

FUNDING

- **Private equity**
  Angel investors (aaia), Venture Capital (Speedinvest, Apex Ventures, Calm/Storm, ISTCube, Uniqa ventures...)
- **aws**
  Austrian federal investment bank. Invests yearly EUR 2Bn for innovative business.
- **FFG**
  Available funding for applied innovation projects

INDUSTRY & INSURANCE

- **Industry**
  Pharmaceutical industry (FOPI, Pharmig), Medical technology, IT, Consulting
- **Private Insurances**
  Patients can complement with a private insurance to get extra services (e.g. private room) or as a first intention if they don't fall under public social security schemes e.g. overseas tourists

SUPPORT

- **Business agency**
  Provides funding, advice and networking for Austrian and International Businesses
- **Chamber of commerce**
  Local (WKW, WKS...) or national (WKO), various health focuses
- **Networks**
  LISA (life science), w-HIT (women in health IT)

EDUCATION

- **Medical**
  Medical universtities
- **Digital health education**
  Digital health education is more promninent in Fachhochschulen (technical colleges)

STARTUPS

- **Window of opportunity**
  COVID has accelerated the implementation of digital health startup solutions in Austria

HEALTH HUB VIENNA

Is a platform for open innovation in healthcare.
Health Hub Vienna activities include understanding healthcare's unmet needs, having in-depth understanding of digital health opportunities and hurdles, as well as facilitating multi-stakeholder collaboration (start-ups, pharmaceutical industry, device manufacturers, insurance companies, legal experts, public sector, non-profits, doctors, patients, nurses, and all other HCP and delivery partners.

PATIENTS

- **Patient advocates**
  At a regional level, appointed also in hospital
- **Der BVSHOE**
  "Federation of self-help patient groups"

HEALTH CARE PROVIDERS

- **Chamber for health professionals**
  Chamber of physicians, chamber of pharmacists
- **Hospitals**
  Hospitals and consultations with doctors can be publicly paid, or private (where HCPs can charge beyond reimbursed amount)
- **Other**
  Other care functions such as ambulances, elderly care can be executed by non-profit groups (Caritas, Volkshilfe, or the Red Cross)
- **Other health**
  Physiotherapy, Psychology, Dentistry, can be reimbursed in certain cases

DIGITAL INFRASTRUCTURE

- **ELGA**
  Electronic Health Records company whose owners are state, regions and social security
- **IT-SV**
  coordinate the IT activities of the Austrian social security system

PUBLIC PLAYERS & DECISSION MAKERS

- **Goverment**
  Ministery of health gives impulse, vote with parliament, usually coalition model
- **Regional powers**
  maternity and infant care, youth welfare, hospital related laws have to be implemented by the provinces.
- **Dachverband**
  National federation of all social insurances
- **Social Securities**
  ÖGK (main one, 7.2 million insured), AUVA (accidents and work-related mental/physical health), BVAEB (public servants), SVS (self-employed, freelancers), PVA
- **Cities**
  City (Vienna) -> Gesundheitsverbund (organizes all hospitals in VIE including AKH)

INSIGHTS

- **Gesundheit Österreich**
  National research and planning institute for the health system and central body for health promotion.
- **Research labs on public / digital health**
  AIT, MedUnis, Ludwig Boltzmann institute etc.

INTRODUCTION

COVID-19, 2020

In the wake of the COVID-19 pandemic, healthcare in Austria and around the world has seen rapid changes in a short span of time. The crisis has demanded immediate amendments to healthcare procedures in order to adapt to precautionary measures and keep the damaging impacts of the coronavirus to a minimum. Digital health technologies have been at the forefront of managing the spread and the effects of the disease.

Initial lock-down measures enforced in March 2020 mandated that the population remain indoors except in a few circumstances and patients were no longer permitted to walk directly into doctor's practices. People were forced to adapt quickly. The emergency loosening of strict regulations via digital solutions allowed for alternate ways of accessing healthcare and medication, such as e-prescription, and also sharply increased the use of telehealth services from the outset. Through this, healthcare professionals and members of the population have become acquainted with new standards such as video communications for the time being. As measures change, we are asked to update our strategies continuously.

The recent period has revealed the undeniable necessity for digital health solutions in healthcare practices worldwide. In Austria, the swift implementation of digital solutions has shocked advocates who had been relentlessly campaigning to establish these digital health standards for years, without considerable success. Although the deeply painful and life-altering effects of the pandemic cannot be understated, the response to COVID-19 has created a testing ground and provided a valuable glimpse into the possibilities of a concrete adoption of digital health solutions into our healthcare system. We are now also becoming aware of how to address the pitfalls and challenges that arise. There is a strong consensus that a decade of growth has occurred in just the past six months and stakeholders believe that it is important to preserve this progress and actively establish a new normal as we find our way out of the crisis.

"We were quite astonished during this early phase of the crisis that things happened which, prior to the corona crisis, we had thought would take 2 or 3 years of implementation work"

ao. Univ.-Prof. Dr. Herwig Ostermann
CEO Gesundheit Österreich GmbH

DIGITIZATION IN AUSTRIA HEALTHCARE

Building upon an already robust healthcare system, digital solutions are a key element as Austria strives to strengthen Value-Based Health Care and increase healthy life years in the long term. (Martin Gleitsmann) The Digital Roadmap outlined in 2016 by the Austrian government lays out a vision for the digitization of various sectors in Austria by 2025. Regarding health, "In 2025, patients will benefit from a health care system that makes first-class medical care and nursing available and affordable to all. The use of digital tools will support patients' own health literacy, thus enabling them to enjoy better health. Personalized medicines and treatments will ensure that patients recover as quickly as possible." On their website, Digital Roadmap Austria[1] states the measures in its strategy for health, care and social affairs.

ELGA , the Austria-wide initiative for unified electronic patient records has been in use since 2014 and is growing in reach and capabilities. The system offers an array of digital health applications and is well-connected to the financing system. EHealthcare systems were pioneered in order to shift the focus from the institution-based to a patient-centered data handling. This has many advantages including boosting efficacy and reducing the cost of care. One crucial factor for a patient-focused system is whether medical data is available for all the practitioners involved. A significant improvement has been observed in the use of ELGA in terms of the accessibility of patient data by medical practitioners and by the patients themselves (e.g. through "Handysignatur", a mobile-based 2-factor authentication) improved significantly in the past couple of years.

- *Implement and continue to develop the electronic health record scheme (ELGA) in the intramural and extramural sectors nationwide*
- *Design an electronic vaccination record, electronic mother-and-child medical card and electronic prescription (ePrescription)*
- *Set up contact and advice centres for the whole population, e.g. in the form of an electronically supported initial contact and advisory service (TEWEB)*
- *Develop a patient summary that contains key medical data on the patient, such as blood group, allergies and drug intolerances, and can be viewed in other countries subject to the patient's consent*
- *Encourage the widespread use of assistance systems to help elderly people and people with special needs*
- *Prepare a framework for electronic health services in areas such as telemedicine*

Measures from: DIGITAL ROADMAP AUSTRIA

However, some find there is still room for improvement. On one hand, some doctors and practitioners find that it is not safe enough in terms of data protection and that processes are too complicated. Secondly, advocates for innovation in digital health find that a system like ELGA cannot support innovative startup solutions. Finally, adding data by caregivers and by the patients themselves is still very limited to this day, and the user-friendliness of navigating one own's data in the software can be drastically improved. Other possibilities such as a government IT-Backbone system for healthcare have been suggested in place of ELGA. This concept is discussed further in the following sections.

&

Reading tips: ongoing pilots projects

Health Portal Styria (Gesundheitsportal Steiermark) development suggestions with elga "Augmented ELGA" as well as local pilot projects [2],

The city of vienna [3] announced their plans around e-prescription

Healthcare info service availability and usage of online appointments and ePrescriptions by doctors found that Austria was still lagging behind until this summer.[4] This is even more striking compared to the generally high level of trust in eHealthcare shown in a 2016 opinion poll. Liability issues are commonly named as a cause for mistrust in an AI-aided medical decision-making process. A recent large scale study using 2000 participants found that - even though prior research indicated that laypersons are not very accepting of AI-, most people were not strongly opposed to a doctor's acceptance of AI medical recommendations: study participants did not judge doctors who followed standard AI recommendation less favourably than doctors who rejected it.[5]

The lack of progress in favor of the status quo is recognized as a central barrier to Value Based Health Care across Europe: "All of these European pioneers share the same objective – to maximise outcomes that matter most to patients. Despite this entrepreneurial energy, significant barriers remain, including – and most specifically – the resistance to changing the traditional siloed culture within health care organisations " (VBHC Handbook). One clear benefit to digital healthcare solutions is to make healthcare generally more accessible for everyone- reducing the disparities and health inequalities (analysis by Deloitte)[6]. Implementing digitalisation quickly and efficiently has the power to dampen the increasing likelihood of health inequalities as the consequence of the upcoming economic recession.[4]

While a copy-paste approach is not the goal, let alone probable, there are several international examples which Austria could look to in order to improve its system and innovation uptake. Examples from Germany, the United Kingdom and Nordic countries can be taken in consideration. These practices could be partial role-models in constructing a landscape more welcoming for digital technologies that can shape a more value-centred and efficient healthcare future.

Digital health advocates had been making the case for legal and regulatory frameworks that could support the integration of digital solutions into the Austrian healthcare system previously. However, with a national government, 9 separate federal state health systems, a social security system consisting of 5 different institutions, a chamber of doctors and association of pharmacists, several stakeholders with veto-power the system proves to be complex. Thus it has been a challenge to make significant strides in and a lack of consensus is an often cited barrier to development and innovation in the Austrian healthcare ecosystem. Yet it has been revealed that in an emergency affecting population safety this consensus was temporarily possible.

THE WAY FORWARD

COVID has allowed all stakeholders a glimpse into the vast possibilities for digital health solutions within the country. These changes pose many benefits: increased opportunity and convenience for a majority of patients and healthcare providers, increased accuracy and efficiency in healthcare processes from diagnostics to remote care, and a population mindset shift towards higher patient self-empowerment, to name a few. This period has allowed healthcare professionals to embark on a process of addressing the pitfalls and challenges that arise in practice. Most importantly, we have seen that agreement on common interests was possible and able to break what once seemed an impenetrable wall of conflicting stakeholder priorities, resulting in substantial leaps towards the future.

This paper draws from the insightful contributions of diverse stakeholders gained through 30 qualitative interviews during the period of July-September 2020. Secondary sources were also used. The paper explores the impact of the COVID-19 crisis on the role of digital health solutions in Austrian healthcare in 9 main areas: telemedicine; health data; E-prescription; digital triage; operational solutions; patient empowerment; chronic care and oncology; mental health; and remote care. Subsequently, the paper highlights stakeholders' suggestions regarding the role of startups, the landscape of legal and regulatory frameworks, and technical infrastructure. Key proposals for a national effort towards a digital health innovation strategy are presented. Ultimately, the paper calls for the dedicated action of decision-makers to maintain progress and address obvious issues so that the growth seen within this period will not be lost.

"[Coming to a consensus] used to be cumbersome in the past - it's not going to be easy in the future either, but it will be easier.

We now know after the crisis that some of these steps clearly showed benefits [...] ***there's no way back!"***

DI Martin Brunninger, MEng, MSc
Director General, Austrian Federation of Social Insurances

SOLUTI-ONS

THE ROLE OF DIGITAL HEALTH SOLUTIONS

The chapters in this section outline developments in 9 areas of healthcare during the COVID-19 crisis.

TELEMEDICINE

The COVID-19 crisis prompted a worldwide upsurge in the use of telemedicine services and technologies. Telemedicine is an umbrella term that refers to every scenario when the patient and the provider are not in direct physical proximity and their interaction is enabled by the use of information and communication technologies. The term commonly refers to the use of safe videochat platforms to run medical consults - however, telemedicine encompasses a variety of hardware and software that allow remote access and monitoring of patients, without the necessary live interaction of both. A broad range of medical devices and softwares fall under this category. For example, vital and biomarker monitoring hardware can be used in the scope of a telemedical consultation (see e-stethoscope Lungpass [7], a Health Hub Vienna alumnus).

As the first coronavirus cases appeared in Austria, the country's pre-existing "health hotline", 1450, was designated as the first line of contact for those with suspected infections. Soon after, the issuing of medical notes by telephone and the reimbursement of tele-consultation services was made possible for healthcare providers. The Austrian population had to adapt to new and mostly digital ways of communicating with their health service providers to seek out acute and chronic care. In a short amount of time, people became acquainted with various types of telehealth processes including video conferencing, hotlines, and chatbot services.

POTENTIAL TELEMEDICINE

In which of these specific areas of application do you see potential in telemedicine - workload reduction, efficiency gains, better patient care, etc.? - for physicians in private practice?
Basis: all respondents, multiple responses

General practitioners recognize some positive effects of the COVID-19 crisis in digitalization[9]

Besides using "old-fashioned" tools like telephone or even WhatsApp[8] (in regards to which patients and doctors still doubted data security), doctors also implemented more sophisticated solutions that could convincingly show to comply with medical device regulations and GDPR.

The main benefits of telemedical solutions reported during this period were heightened convenience and reduced strain on health service providers as well as patients. Doctors gave largely positive feedback regarding the use of telemedicine and recognized the potential for increased efficiency in their work and care through telehealth solutions. Looking beyond the crisis, our interview partners spoke about the potential for treatment services with a mix of in-person and video/teleconsultation options, where first appointments could be held in person and follow-ups by video communication for cases which would suit this model.

Dr. Maizen, clinical lead for paediatric orthopaedics at Barts Health, explains that telehealth solutions provided great benefits for delivering healthcare to her patients, a majority of which belong to the shielding population. These patients with mobility and neuromuscular conditions who normally had to endure arduous journeys into central London saved time and discomfort through telemedicine solutions. The presence of multiple healthcare providers involved in the patient's treatment including Maizen's team in London, the patient's local team, the patient and their carer, was made possible through video consultations.

Some downfalls of telemedicine usage during the crisis were also explored. The telehealth solutions that were available during the lockdown period were recognized as insufficient for some chronic patients such as those with heart conditions. There is lingering concern regarding the collateral damage that the health system and the vulnerable patients, who were not able to access physical care, may face in the future. Additionally, it was noted from our clinical interviewees that patients must become more accustomed to giving precise and correct information during a teleconsultation as the doctor is not able to "feel" the patient as it would be possible during a physical medical encounter. It was suggested that this could be solved with improved health literacy and empowerment on the patient side as well as blended in-person and telemedical treatments depending on the case.
Our interview partners also voiced concerns about data security and safety and insisted that healthcare workers must adopt the same medical confidentiality provisions in work from home situations as they would in a clinic. This includes ensuring patients consent and that nothing be recorded, informing about the nature and length of data handling and data storing, as well as making sure that no one else in the household can accidentally hear the content of the consultations. Awareness and guidelines around these practices will be essential as the use of telemedical processes expands.

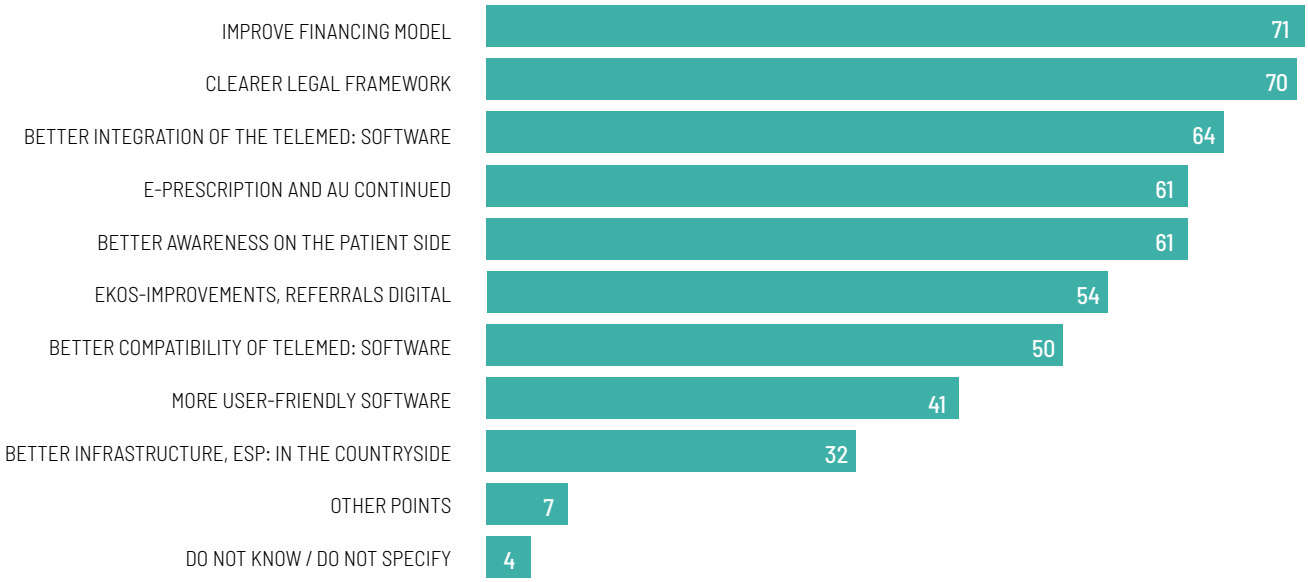
Despite the increased adoption of telemedicine experienced and reported during the COVID-19 crisis, the main barrier to the continued implementation of these services within Austria has been the lack of suitable frameworks and reimbursement models. In Austria to date, there is no uniform legal definition of telemedicine and this creates a level of uncertainty around its use which discourages many health service providers. A lot of uncertainty remains around financing, quality standards, data protection & ethical requirements. There are also considerations about labor laws and tax. It will be necessary to make sure standard practices around documentation and confidentiality apply the same to the implementation of the telemedical solutions. A survey conducted by the society for general and family medicine (Österreichischen Gesellschaft für Allgemein- und Familienmedizin - ÖGAM) the Austrian Health

Forum (AHF) in partnership with Partner Demox Research ended in May 2020: general practitioners report that improved financing models and clear legal frameworks are necessary in order to integrate telemedicine into standard care practices 9.

> *" The decision-makers are called upon to seize the opportunity now to create the conditions for telemedicine-supported, more resilient, and even higher-quality care through the pandemic - and of course for standard care after this and before the next crisis."*
>
> *Austrian Health Forum*

TELEMEDICINE IN THE MEDICAL REGULATORY SYSTEM

In your opinion, what changes are necessary to make telemedicine a part of standard care?
Basis: all respondents, multiple responses



SARS-CoV-2 und Telemedizin Mai 2020, © Demox Research

Some startup examples offering telemedical solutions

The wearable medical device, a smart T-shirt, developed by Chronolife[10], convinced Servier, a big French pharmaceutical company to enter into a collaboration. Together they launched the non-invasive telemonitoring solution[11] for the continuous monitoring of patients suffering from chronic diseases in July this year.

The contactless health check developed by the startup Medicspot, who bring the regular NHS (UK's national health service) health check closer to patients and into pharmacies (amongst other locations) and even supermarkets all across UK[12], were said to be impossible to be implemented due the clear restrictions in Austria of what pharmacies are allowed to offer as a service. Yet, there are possibilities also in Austria.

UNIQA, one of the biggest Austrian private insurance companies, started a collaboration with Wellabe, a German startup, to bring telehealth-checks into businesses more efficiently in the future.

Reported avenues for further development of telemedical solutions and in Austria include secure video conferencing options, the development of online outpatient clinics and user-friendly systems for consultations and appointment management. Some examples of startups offering such solutions are: KRY, Abi Global Health, Knokare, or Scarletred (to also name an Austrian startup).

HEALTH DATA

With a rise in the use of digital health solutions during the COVID-19 crisis, data security, data protection, and data handling prove to be central issues. The impact of the crisis prompted the emergency loosening of regulations pertaining data security. This allowed for easier access to health resources given the situation and temporary solutions such as the transfer of prescriptions through third-party apps like WhatsApp. Some acknowledged a prevalence of careless data handling, and health service providers were met with frustrations due to a lack of suitable infrastructure and compatibility with datatransfer. Despite the reported benefits of digital solutions, stakeholders agreed that it is imperative to have the proper frameworks in place.

Austrians agree to their health data being used

There is evidence that the pandemic may have prompted a mindset shift in the Austrian population regarding the use of health data. In contrast to countries such as Estonia and Israel, as well as Scandinavian models which employ more open health data models, the Austrian health system is decentralized and consists of more isolated data sets. From a cultural standpoint, the Austrian population has historically been less open to the use and storage of personal healthcare data.

> *"We do not have an integrated real-time database, and if you take data which is collected for reimbursement services, you see the patient only if the patient has died or was dismissed from the hospitals but i do not have any real time information with regard to hospital admissions. It's a bit of a technical issue, but far a more regulatory issue. And it's also linked to the culture. We know that countries in Scandinavia are more prone to this common and shared databases and we know with regard to some other countries like Austria, we have this decentralized and somehow isolated databases."*
>
> *ao. Univ.-Prof. Dr. Herwig Ostermann*
> *CEO Gesundheit Österreich GmbH*

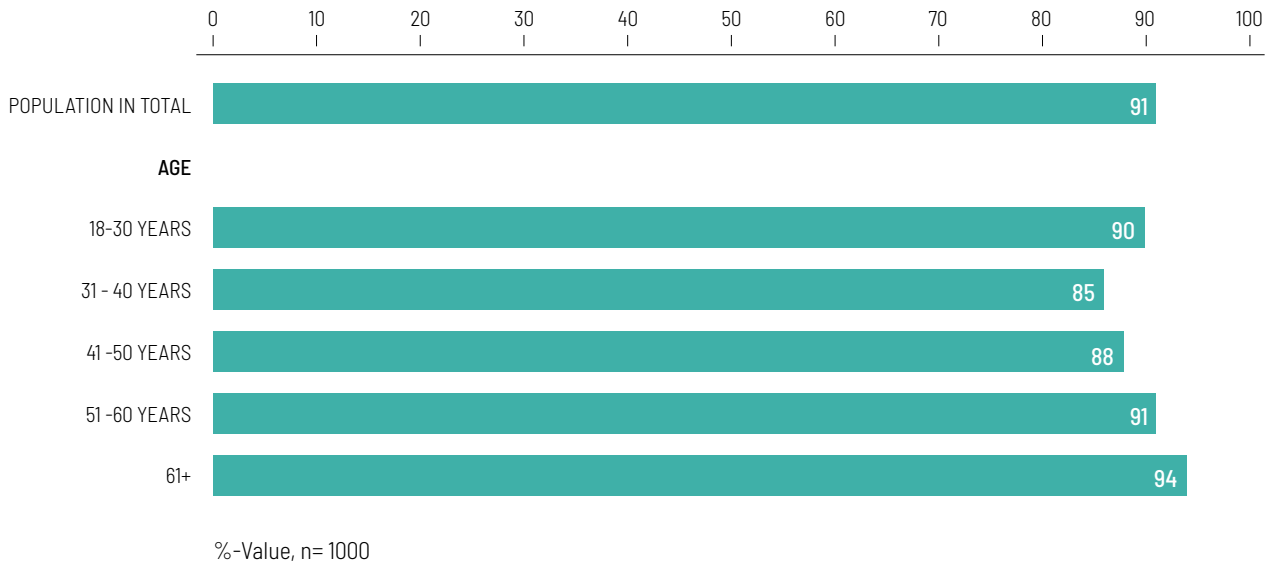
A survey from the Gallup Institute conducted between March and April 2020 revealed that 91% of the Austrian population reported acceptance of the use of health data by medical universities for COVID-19 research[13] Contrary to existing stereotypes, the older population from 61+ years of age demonstrated the highest willingness to share this data compared to all other age groups (97%). Already two weeks after the

lockdown, patient advocate Gerald Bachinger, backed by the national federation of patient self-help advocacy groups, called for a sharing of anonymized real-life evidence contained in ELGA databases with the public players[14]. This change in perception could be a turning point for further digital health developments and implementation in the country, and demonstrates a bottom-up approach and strong desire from the patient's side.

Acceptance of health data linkage for COVID-19 research

For research on the fight against coronavirus at Austrian medical universities and other relevant university institutes, all sources of health data available in Austria should be allowed to be linked together in strict compliance with the legal regulations.

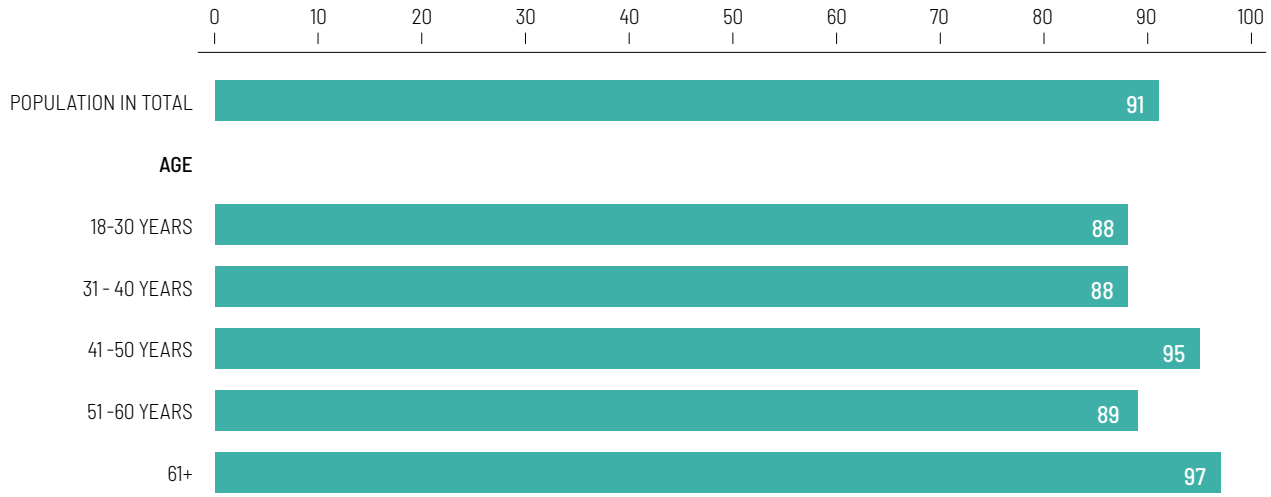
Question: We would now like to ask your opinion on what you think about these new research initiatives of the Austrian authorities and universities. Do you strongly agree, rather agree, rather disagree or absolutely disagree with these measures?



%-Value, n= 1000

Acceptance of the use of health data by the University of Medicine at COVID -19.

Medical universities in Austria should be allowed to use existing health data of people in Austria for research purposes to combat the coronavirus in anonymized* form in strict compliance with data protection and the legal basis.



%-Value, n= 1000

* Use of the term in an uncommonly understandable sense, i.e. „without the possibility of inference to a specific person".

"The crisis period revealed a strong need for faster flows and decision making in healthcare processes."

Univ.-Prof. Dr. Siegfried Meryn
Internal Medicine

" We call for a better compatibility for data transfer between doctors."

Hofrat Dr. Thomas Holzgruber
Director of the Vienna chamber of physicians

" Our challenge is to overcome data hurdles to improve efficiency for the delivery of care. This will benefit both patients and healthcare providers. Interventions and technology will become more cost effective."

DI Martin Brunninger, MEng, MSc
Director General, Austrian Federation of Social Insurances

Avenues for Development

During our interviews, the use case of e-vaccination (an initiative to digitalize the "Impfpass" paper-based booklet) has been mentioned, initially meeting some resistance from the chamber of physicians, who were reluctant on the extra hurdle it would involve on their side. As we were compiling our findings and interviews for this white paper, we asked ELGA about their roadmap, and they showed us one of their first in-house developed applications, a simple user-friendly scanning app allowing doctors to digitalize the administered vaccine dose in about 20 seconds. According to ELGA, who freshly demonstrated this technolog to the chamber of physicians, the initial resistance was transformed in enthusiasm.

Existing startups such as DocDok, GoClinic or Thryve can support healthcare providers in secure exchange of structured patient data, and seamlessly connect with existing data pools, as shown in their deployment in private hospitals. In an approach to augment data, Enpicom supports healthcare providers to read and analyze the immune systems reactions, in order to automatically monitor how immunotherapies influence the number and function of defense cells and therefore save precious time when battling cancer.

Yet, there is a common call for a secure IT-backbone that needs to be steered by a public organization to insure safety and security of patient data as well as indepence and sustainability. This critical task must not be given solely into the hands of startups, all interviewed partners agreed.

E-PRESCRIPTION

The implementation of an E-prescription service through ELGA had been on the agenda long before the crisis struck. This service allows for a patient to contact their general practitioner by telephone whereby the doctor is able to issue a prescription and transfer it digitally to a pharmacy via ELGA's E-Medication system. A pharmacist can then retrieve this information when the patient or their carer arrives to pick up the medication. A pilot project was set to run from April 2020 until May 2022 within two districts in the federal state of Carinthia and permanent implementation was forecasted for 2022. Due to the demands of the crisis, emergency measures allowed for the E-prescription to immediately be put into effect. This contributed to a significantly reduced number of clinic walk-ins to only about 10-20% of the normal turnout and minimized the possibilities of coming into contact with the virus.

There has been a high level of agreement amongst stakeholders that the authorization of the E-prescription has been a positive move forward. They have cited higher efficiency, time and money saved, reduced waiting times, and relief from bureaucratic workload. An overwhelming majority of our interview partners have been enthusiastic about its efficiency during the crisis and support its permanent implementation beyond the pandemic.

Though the enabling of the E-prescription received a largely positive response, there are still questions surrounding its permanent implementation beyond the crisis period. In March, the vice president of the chamber of physicians stated that despite a swift temporary implementation of the service, there was no systematic vision for the future in place. For the moment, it was about an "emergency protection for patients" (Dr. Steinhart Vice President Chamber of Physicians, on ORF). In May 2020, Christian Wurstbauer, 2nd Vice President of the "Apothekerkammer"

(chamber of pharmacy) mentioned that the current version of the E-prescription still required improvements to ensure higher efficiency and data security. The reason is that the "e-Rezept" was implemented using a digital framework called "E-medication" that indeed shows medications prescribed to the patient, but is lacking critical information such as how the patient is insured, or for which illness the medication is prescribed. This information is deemed critical by the pharmacists not only for their reimbursement workflows, but more importantly to ensure pharmacological safety for the patients (e.g. dosage fitting to the medical condition, or potential interactions between compounds).

HHV startups / network

Some startups could help covering other concerns accompanying the e-prescription question. One of them is: "do patients adhere to their medication, if they do not see the doctor on a regular basis?" This has been one of the big challenges for efficient care, already before the pandemic. The startups addressing this problem are numerous. A small selection shall be named:
http://www.citruslabs.io specifically helps to recruit patients into clinical trials and to retain them to speed up the entire cumbersome process. Also https://www.drugstars.com, https://www.vaica.com/ all offer solutions to motivate and help the patients to really take the medication they got (digitally or not) from the pharmacy or doctor.

DIGITAL TRIAGE SOLUTIONS

Digital triage solutions have been of utmost importance during the pandemic. In an effort to limit physical encounters, especially within clinics and hospitals, digital triage companies worked closely with healthcare providers. Their apps were also available and recommended to the Austrian population. In addition to the existing 1450 triage hotline which was expanded to handle the crisis, the role of digital triage solutions grew heavily as they proved to be necessary in mitigating the risk of spreading infections.

The benefits of digital triage tools were highlighted during the crisis. Startup solutions were employed concretely by hospitals and individuals during this period. These include Symptoma which offered a 96.43% accuracy for remote triage and self-triage, greatly reducing strain on health providers and busy hotlines. In several cases, this also enabled faster delivery of care.

Symptoma does not only help in estimating a patient's individual risk of being SARS-CoV-2-positive, but also developed a solution for easier and more accurate flagging of hundreds of rare diseases. Their App is available in many languages, supporting both patients and doctors. Hospitals of PremiQaMed developed a digital anamnesis toll together with Symptoma to reduce waiting time of patients. This pilot project was implemented before the first wave of the pandemic hit Europe.
As mentioned in the introduction, Scarlet Red (whose A.I. solution initially focuses on photo-based dermatology diagnostics) has quickly adapted its software to rapidly build COVID-19 specific triage solutions. There is a consensus in our interviewees that these solutions are readily available in Austria and will be essential within healthcare moving forward. They suggested that these systems should be developed and embedded into standard practice. In the rest of this white paper, we will explore possible opportunities and challenges for such implementation in the Austrian use-case.

Speaking of technologies, a lot is possible and has been developed and implemented already. Of course, there are other startups offering Symptom-checkers, eg. https://docplus.ru/, a Russian startup/scaleup, https://infermedica.com/ based in Poland. Both companies have scaled up significantly. They are well funded, collaborate with insurance companies in their respective countries and have hospitals implementing their digital solutions as customers. The barriers that prevent such existing and tested solutions to help the Austrian healthcare system to become more digital and more efficient are:

lack of certification and regulatory compliance - complying with regulatory issues in Russia or elsewhere does not allow companies to offer their solutions in Europe (regulations to be considered are e.g. Medical Device Regulation (MDR), GDPR, but also others such as Austria's "Medizinrecht" defining the rights of patients, the rights and obligations of doctors)

language barriers,

lack of trust,

lack of interest in Austria from the startup's side.

Although global players such as pharmaceutical companies perceive Austria as a good market to test acceptance of innovative products before entering Europe as a whole, in particular Germany, the organizational and regulatory setup remains a challenge for innovators to be attracted. This "reputation" of Austria as a small, difficult market to penetrate is mentioned by startups as one of the reasons that slows down their growth in Austria. This is also a leveraging point to tackle, see legal Frameworks below (12.).

In the context of the pandemic, further developments regarding remote triage and self-triage were still considered. The development of chatbot services that could accompany 1450 has also been suggested, due to the prevalent use of chat systems especially amongst young people. The privately held care provider Senecura implemented Scarlet Red's solutions already during the first COVID-19 wave, in May 2020. This successful pilot project was however, only implemented in the private hospital sector. As we conducted interviews, many of our interviewees saw the growing necessity for chatbot services that could accompany telephone services like 1450. References were made to a linked chat feature called "T-Web" that was discussed at the inception of 1450, but later abandoned. This crisis period highlighted an affinity towards chat services especially amongst the younger population and revealed the importance of supporting such solutions.

In the context of the pandemic, further developments regarding remote and self triage were still considered. The development of chatbot services that could accompany 1450 has also been suggested, due to the prevalent use of chat systems especially amongst young people. The privately held care provider Senecura implemented Scarlet Red's solutions already during the first COVID-19 wave. This successful pilot project was however only implemented in the private hospital sector. Many of our interviewees saw the growing necessity for chatbot services that could accompany telephone services like 1450. References were made to a linked chat feature called "T-Web" that was discussed at the inception of 1450, but later abandoned. This crisis period highlighted an affinity towards chat services especially amongst the younger population and revealed the importance of supporting those.

In addition to the above mentioned, more triage apps comply with the system: https://covive.ai/ was one of the first CE-certified apps to support patients free of charge to monitor symptoms. It was developed in a collaborative effort by the Austrian startup https://medicus.ai/ and https://www.bionext.lu/ based in Luxemburg. The speed of the two startups to fill this urgent gap was really astonishing.

OPERATIONAL SOLUTIONS FOR HEALTH SERVICE PROVIDERS

The COVID-19 crisis called for quick responses due to the shifting landscape within healthcare. Dr. Thomas Wochele, the lead doctor at Caritas described being tasked with adapting practices to new regulations as his team received information in real-time from press conferences along with the rest of the public. Many healthcare providers underwent immediate re-training in order to handle changing priorities and new workflow processes were put in place. The crisis called for a collective adjustment period as new procedures and technology were adopted. This heavily highlighted the need for strong operational solutions and brought attention to processes that had been lacking in efficiency even before the crisis.

Health professionals recognize the importance of technology in navigating new workflows.
From medical messaging services to waiting room management services, as in booking appointments via https://www.doctify.com/ (a British startup co-founded and managed by a female trauma-orthopedic doctor from Austria), https://www.recomed.co.za/ or similar solutions that have been used or permanently implemented by many doctors - heightened experience with digital technologies during this period is prompting health service providers to learn what works, what doesn't, and what needs improvement. Ecoystems that support not only the use of these technologies, but also relieve healthcare workers from administrative tasks and workflow frustrations are growing in importance. Tailored solutions would allow healthcare professionals to focus their energies on high value delivery of care rather than work processes that can be automated.

Some main issues were pinpointed during this period. Stakeholders agreed that there needs to be better compatibility between different provider systems. At the same time, clear frameworks around handling and processing data within these systems were required. Experts find that the operational solutions that reduce tedious paperwork and streamline the workflow securely already exist, but the frameworks already in place do not properly support them. Healthcare providers called for the implementation of clear frameworks that could support secure data exchange.

> *" When it comes to data exchange at the institutional level there's a lot of legitimate fear and respect for privacy concerns and data security concerns. But what I'm actually seeing in practice is that a lot of what's being used today is actually far behind what's available in terms of security or access. "*
>
> *Felix Faltin*
> *Digital Health Venture Capital Investor, Speedinvest*

Areas for Development:

Integration of different software solutions which enable compatibility so that data can be transferred from one doctor to another: a number of startups offering such solutions were named already above. In addition, https://medisante.ch/ has developed a medical IoT infrastructure that is compliant with healthcare and data/patient privacy security regulations. https://parsek.com/ is another example with a focus e.g. on elderly care providers who also need to manage data integration and care at home in a patient-friendly way.

Integrated/standardised workflows and data flows: e.g. the solutions of https://contextflow.com/ or https://imagebiopsylab.com/, two Austrian startups who improve radiology workflows.

Intelligent systems: such as the solutions of https://piurimaging.com/, also based in Vienna, who turn a standard ultrasound system into a tomographic imaging device , or https://thinksono.com/, UK, who make diagnosis of deep vein thrombosis faster and easier.

A tool that automatically balances out appointments to avoid backlog: There are a number of solutions out there. One startup mentioned during interviews is https://naboto.com/, a young Austrian startup based in Vienna.

Again, many startups across the globe that have developed innovative solutions covering these needs. We pointed out some above. Some more were named in the interviews going beyond what the interview partners saw as interesting areas for development overall. These startups were all considered to be interesting by healthcare experts and were or could be implemented to create benefit in the healthcare system in Austria and Europe:

Docdok (see also 3.) has developed a technology that was implemented as the first digital walk-in clinic in Austria together with Vinzenz Gruppe, a privately-held group of hospitals in the beginning of July 2020, only four months after the onset of the pandemic in March[17]. Two weeks later Docdok Health could announce another important Austrian partner: the technology has been taken into the technology portfolio by Kapsch BusinessCom.
Doctorly (https://www.doctorly.de/) aims at reducing the administrative load of practitioners, from making appointments, patient-doctor communication to documentation and automated reimbursement (they have passed the necessary audit by the German social insurance system, that is said to be one of the most complex in Europe). The German startup is well-funded with venture capital partly coming from Austria.
MedShr (https://medshr.net/) serves more than a million doctors worldwide to share their patients' data in a GDPR-compliant way in order to get peer-to-peer support. Together with ADA they launched a COVID -19 specific program in April 2020 to support exchange of experience and COVID-19 management by doctors in Africa and the Middle East 18.
Wellmo (https://www.wellmo.com/) helps insurance companies to easily create their own digital health services platform as a kind of "whitelabel" solution for their customers aiming at a healthier lifestyle. They have customers across Europe already. It would be great to have both public and private insurance companies in Austria leapfrog into the digital space with their solution as a base but generating digital services by themselves.

PATIENT EMPOWERMENT AND SELF CARE

With the onset of lockdown measures in March 2020, patients and the population as a whole were immediately required to demonstrate a heightened level of health awareness and self-responsibility in order to reduce the spread of COVID-19. Acute patients were dissuaded from going to the doctor and required to stay home and take care of themselves as good as possible. In the case of chronic patients and some more severe cases, these measures posed complications and revealed a large gap in home-support for these patients.

The recent period has caused a potential mindset shift in patients and a reassessment of their role in healthcare processes. It was reported that turnover for over-the-counter medications spiked in the beginning of the crisis and that particularly older customers who were heavily accustomed to in-person purchases began to appreciate the convenience online orders offered. In non-urgent situations, the public is demonstrating heightened awareness and self-reliance. Several interview partners see the crisis as a great opportunity for the increase of health competence and health literacy in patients. Beyond the crisis, potential is recognized for the promotion of practices that help people gain awareness and empowerment for self-care in suitable cases which would in turn put less strain on the healthcare system. Some consider that higher health literacy in patients would reduce the incentive to seek healthcare services when unnecessary.

Stakeholders suggested that the implementation of systems that could support patient empowerment and self-care would greatly improve efficiency within Austrian healthcare systems as investment in self-care has been shown to put less strain on the system and reduce healthcare costs. In addition, the response to COVID-19 has potentially contributed to a cultural shift necessary for more streamlined implementation of self-care practices.
This could pave the way for a new interaction between the patient and the system.

> *"A prerequisite for successful self-care initiatives is the change in "culture" so that patients take responsibility for their own health. In order to do so, patients have to be "empowered", and they require access to reliable and understandable information about how to engage in self-care. An inevitable part of patient information related to self-care must be clear communication that self-care cannot substitute health care by professionals. Patients have to be taught to distinguish minor ailments from serious cases."*
>
> *Cost/Benefit analysis Self Care, Gesundheit Österreich*

- *€1 invested in OTC medicines saves €5,20 of direct costs for the health system*
- *self-care frees up ~ 2hours/day of GPs time*

Source: May, U., Bauer, C. (2013): Der gesundheitsökonomische Stellenwert von OTC- Präperaten in Österreich; Vienna 2013
https://aesgp.eu/value-of-self-care

Our interview partners see great potential for enhancing health literacy and education about self-care after first diagnosis. These include educational solutions for children and adults as well as tools that support and guide individuals through their treatment processes. One example with a focus on kids is the serious gaming app MyMind, who help children to specifically train the balance between concentration and relaxation - particularly interesting for kids with autistic disorders. A very prominent example of an Austrian startup is mySugr who help diabetic patients at all ages to better manage their therapies and also access educational content to prevent long-term health damages. Additionally, the complexity of the system typically overwhelms patients and thus orientation support is essential. Importance was also placed on investing in prevention processes, which would mostly be undertaken on an individual level, yet have a great impact on the healthcare system as a whole. Everybody stressed the need to focus on the user and the patient journey as a core element to succeed.

Use Cases:

Online triage and symptom checker like the ones of Symptoma, AT, or Infermedica, PL (mentioned above)

An app or platform that explains diagnoses. Such a solution is delivered e.g. by https://medivizor.com/ or https://www.telesofia.com/, both startups from Israel, who explain medical information by an app or personalised, educational videos, respectively

Bringing the patient to the best point of service. https://www.vivy.com/ is one of the very few examples in Europe that has managed to collaborate with both private and public health insurances. Their GDPR-compliant App not only is a personal electronic health record where the patients are in control of their data, but also helps them to find the right doctors.

Support in translating medical jargon, such as the App of https://medicus.ai/. The App translates the MD's jargon and test results into actionable recommendations to the patients. Medicus.ai is a startup with HQs in Vienna and one of the fastest growing healthtech startups in Europe and the Arabic region.

Platforms that encourage community support between patients - helping patients talk with each other

The serious gaming solutions of https://sidekickhealth.com/ did not only convince a number of customers but also were acknowledged by investors. They raised 20 mio EUR at the end of October 2020 19.

CHRONIC CARE AND ONCOLOGY

Several gaps in healthcare were revealed through the COVID-19 crisis. Chronic patients and patients undergoing cancer treatment were highly vulnerable during this period. The effects of the lockdown and subsequent protective measures resulted in delayed hospital visits, disruption of therapies, and a minimization of routine care. Although it was possible to deliver some urgent medications through AGES, health workers fear that delayed diagnoses will lead to the detection of tumor cells when they are more advanced. There is a lingering worry about the collateral damage yet to be seen regarding vulnerable patients during this time. Existing technologies may have offered enormous support if they were in place before the crisis hit. A higher integration of at-home technologies that aided in patient self-support could have avoided these dangers.

Although the numbers of heart patients arriving in the hospital halved[20], the number of at home resuscitations doubled (Germany). In Austria this number dropped by 40%.[22]

Researchers at the Medical University Graz even reported +80% in deathly heart attacks in Styria during the first lockdown. [21] Stakeholders find that the crisis exacerbated an existing issue and that the implementation of certain digital health solutions is necessary in order to substantially support chronic and vulnerable patients. Although some telemedical options were available, they were mostly not advanced and limited to standard video consultations. Stakeholders agree that the necessary solutions exist but they are not available and authorized within Austria's current system.

"Chronic patients are NOT adequately supported without digital health solutions."

Gerald Bachinger
Patient Advocate Niederösterreich

A number of USE CASES implementing innovative solutions of startups were mentioned:
Medisante (CH) monitors chronic diseases. "Disease management programs with a high focus on e-health & telemedicine services could be of great help in this respect – in regards to the Austrian context I did not see very much uptake in this respect – could be game changing!" (H. Ostermann). And: Motivation and metering for chronic patients "diabetes patients fill out a booklet in the doctors' waiting rooms for the last month. It would be better if they were metered in real-time throughout the month", reminding of the MySugr solution (Dr. A. V. Braga, Vice President Telemed Austria).
InsyBio (https://www.insybio.com/) is a bioinformatics pioneer company in personalized healthcare born in Greece, now headquartered in Texas. They focus on the analysis of complex life-science and biological data and help researchers in academia and industry to discover biomarkers e.g. for cancer. Awarded by healthcare experts across the globe as a promising solution to speed up and facilitate clinical and preclinical research they pave the way into the new era of personalized medicine, much awaited in particular in oncology.
MultiplexDx (https://www.multiplexdx.com/) develops and already sells diagnostic tests also in the biomarker field, e.g. breast cancer. They were awarded (as one out of > 1,800 projects) a 3 MIO EUR funding by the EIC Accelerator program to develop breast cancer diagnostics to support personalized therapy and improve breast cancer therapy, the most common cancer in women.
MyPersonalTherapeutics (https://www.mypersonaltherapeutics.com/) helps patients and their doctors to identify the best possible treatment for each individual patient in a very innovative way paving the way to personalized cancer treatment. They announced a collaboration with Medivizor (see chapter 8.) end of August 2020 to deliver even better personalized services patients can understand[23].
The pandemic-inflicted problems on cancer screening trigger a faster-paced integration of startup solutions into government-funded and state-provided healthcare service. According to Dr. Peter Kecskemethy, the founder of Kheiron and pioneer of a breast cancer screening AI solution (MIA) " it has also been a time of unprecedented technology adoption in healthcare" [24]. His company raised over 22 MIO $ and has recently been awarded an UK government grant funding to accelerate their efforts to tackle the Covid-19 backlog while maintaining high scientific standards and patient safety [25].

"The current pause in breast screening services because of COVID-19 is putting women's lives at risk. There is an expected delay of up to 12 months before normal screening resumes but we believe our breast screening AI solution, Mia, can help clinicians process the backlog and be a trusted and reliable support for NHS breast screening services. "

Conventionally, a positive breast cancer diagnosis requires the agreement between two radiologists' opinions. According to preliminary findings of a large scale study led by an independent research organization, one human doctor combined with MIA produced similar inter rater reliability as the conventional human double reading screening. Implementing this method can bring a reliable solution to the radiology workforce crisis caused by the pandemic and could mean that screening is not delayed or neglected due to staff shortage.

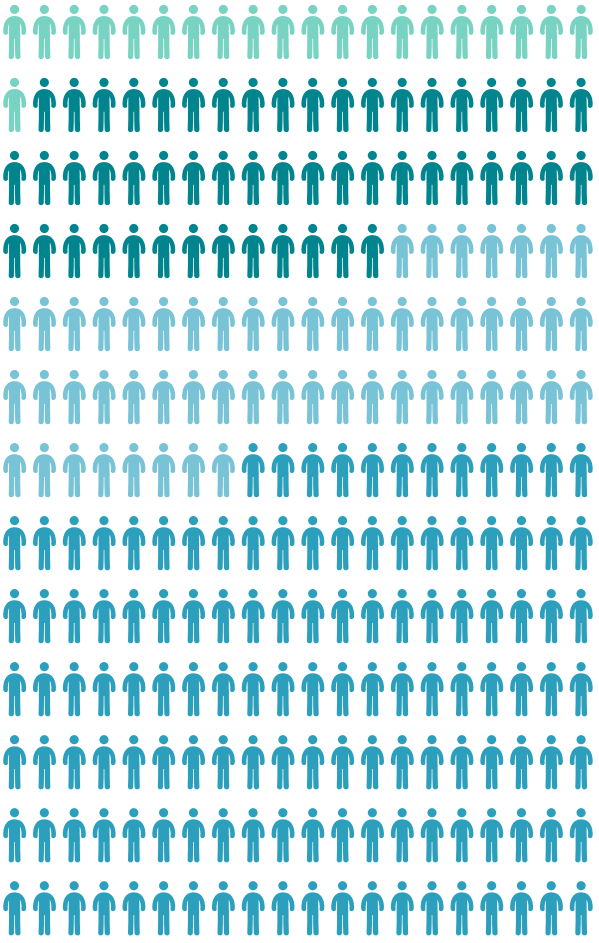
MENTAL HEALTH

Reduced social contact, stress about the coronavirus, lifestyle changes and the negative economic effects of the crisis has caused strain on the mental health of many in Austria and everywhere. The prevalence of depression, anxiety and insomnia symptoms rose significantly. An increase in alcohol and cigarette use was observed. Experts reported by the end of September 2020 that as mental health issues often take time to become apparent, Austria is seeing a "psychic corona crisis" more than half a year after the onset of the pandemic.

„Many people suffer badly. They need help here and now, as psychological stress also weakens the immune system, which can increase the risk of infection", says the medical director of the Anton Proksch Institute for Addiction Diseases and director of the Institute for Social Aesthetics and Mental Health the private Sigmund Freud University (SFU) in Vienna and Berlin[26].

In a survey amongst employees in Austria, 41% reported that the crisis negatively impacted their mental health, with 21% additionally facing strain on their physical health. Children and young people in particular were also shown to be impacted emotionally by the crisis.

This is how the corona crisis affects the health of Austrian employees

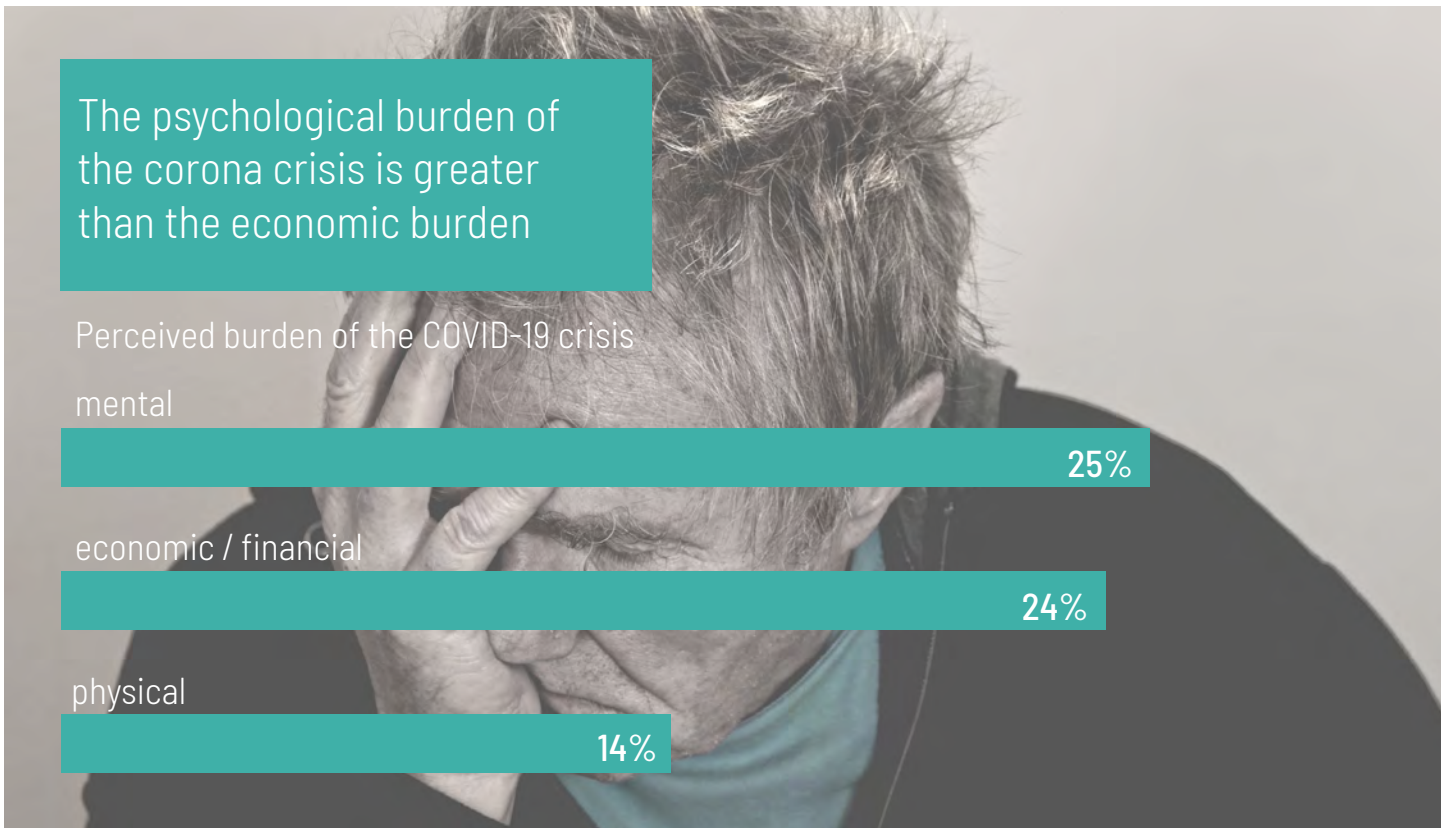


Source: stepping stone

A number of hotlines have provided psychological support and counselling services during this period during this period. This includes counselling services, crisis intervention and trauma support for people in various life circumstances. Video sessions were available to those undergoing therapy. However stakeholders see the opportunity to further develop these services. As children and young people are observed to be more comfortable with digital technologies, there is an important avenue for the development (for example with chatbots) and more advanced access to digital tools for mental health.

Braive (https://braive.com/) or Selfapy (https://www.selfapy.de/) offer easy access to psychological support via evidence-based online-courses provided by psychologists ensuring medical safety to a huge number of existing users already. The latter is a Berlin-based startup, and is currently being reimbursed by numerous social security providers. Their blog also explains important scientific content to the public audience and can be accessed from everywhere, anytime. As Selfapy's content is in German there is no language barrier for Austrians as of today. Braive's ambition of global access to mental help support still needs translation, yet can be an amazing source for people Expats in Austria speaking other native languages.

Virtual reality is being used more and more in many industries. Startups such as https://www.happymed.org/ (AT) https://psious.com/ (ES) apply this technology to help patients overcome their mental health issues.



Source: Sigmund Freud Universität Wien, Institut für Sozialästhetik und psychische Gesundheit

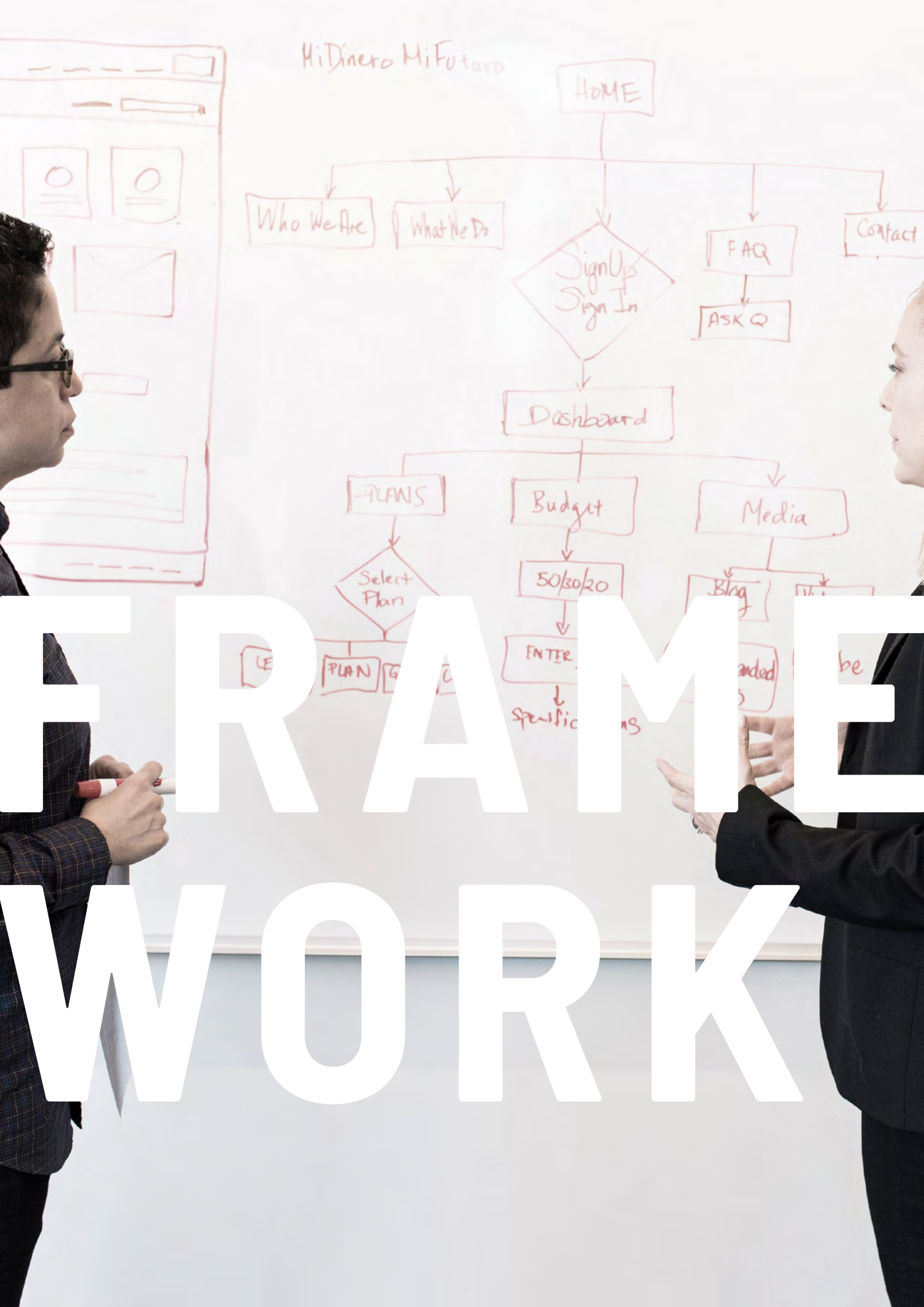
REMOTE CARE / COUNTRYSIDE

The gaps highlighted by COVID-19 reveal the necessity and possibilities for remote care options. This extends to healthcare delivery for the countryside. Regardless of the distance between the patient and doctor, a large portion of consultations were now "remote" during the crisis period. The challenge sparked new energy into the case for proper implementations to support remote care.

Stakeholders pointed to teleconsultations, telemonitoring, and solutions in robotics, as well as telemedicine and integrated care solutions for the countryside. Doctor to doctor support is also a key consideration. In the case of Styria where doctors are few in more remote areas, Dr. Werner Leodolter *(CIO, Steiermärkische Krankenanstaltengesellschaft m.b.H. KAGes)* provided the example of a doctor in Oberwölz on the country-side having the ability to consult with a specialist in Graz in order to deliver the best healthcare to a patient. These consultations could also occur in real-time. The crisis has shown that these solutions are becoming more and more necessary. Their proper implementation is the next step to be addressed.

The collaboration between Senecura and Scarletred described above is one of the cases that was initiated way before the onset of the pandemic to phase the limited resources in trained care nurses. The problem was yet more evident and more urgent both in timing as well as in its dimensions following the lockdown.
Also https://www.ilvi.eu/ (simple compilation and documentation of patient data), https://memocorby.com/ (helping stroke patients to re-learn language and patients suffering from dementia to train their memory capacity at home) and https://www.texible.at/ (monitoring bedwetting in a smart way), three other Austrian startups, have worked on their remote care solutions long before 2020. And there are many more solutions addressing various unmet needs in making care at home smarter and more efficient.

A number of these solutions was abel to benefit patients and healthcare services providers and the healthcare system as a whole and were pushed by the even more urgent need driven by COVID-19.


MiDinero MiFuturo
HOME
Who We Are
What We Do
Sign Up
Sign In
FAQ
ASK Q
Contact
Dashboard
PLANS
Budget
Media
Select Plan
50/30/20
Blog

FRAME WORK

INFRASTRUCTURE / FRAMEWORKS

The chapters in this section outline the frameworks surrounding the implementation of digital health solutions in Austria.

WHERE DO STARTUPS COME IN?

There is no need to re-invent the wheels. The limited resources - in particular in the healthcare system we have discussed the limits in decades - may be invested more efficiently in developing solutions that are out there, somewhere. Instead, there is the undeniable need to open up to such innovative solutions and commonly work on the implementation and/or integration in the existing processes and IT-frameworks of healthcare providers. The crisis has opened a number of doors and accelerated the formation of quite some successful startup-partnerships, that were mentioned above. In quite some cases it has become very clear that re-considering and re-organising processes would make the entire system more efficient with the help of such solutions.

Startup innovations and the healthcare system

Status quo

Emergency adjustments to digital health regulations allowed some startups to work closely with hospitals and operate in various areas of healthcare where they were previously hindered. This provided the opportunity for them to demonstrate value in concrete settings. Successful solutions included docdok.health, Symptoma, Scarlet Red, and Covive AI amongst many others already mentioned. There is still room for development at the level of hospitals. A study conducted by Roland Berger GmbH surveyed the responsible managers of the 100 largest hospitals in Austria in July and August 2020. According to the result of this comprehensive study, most of Austrian Hospital managements (92%) have a digitalization strategy and leaders believe that digital services will gain importance in the future. However, most of the responders did not list innovative solutions such as startups as a primary goal for their prospective policy (38% only). The root cause of the problem might be that digitization policy is handled top-down, by hospital management (in 67% of the cases) instead of the IT departments, which would possibly be competent in integrating novel and innovative solutions[27].

Regardless of the crisis imposed by the COVID-19 pandemic, Austria is in a prime position when it comes to innovation. From the onset of the pandemic, numerous Austrian companies and institutions were already well situated to develop new products and offer services to combat COVID-19. Edeltraud Stiftinger of AWS, Austria Wirtschaftservice (the promotional bank of the Austrian federal government), reported that "these products include vaccines, drugs, personal protective equipment as well as novel digital health products and services. And many of these innovations have already been exported worldwide to combat the pandemic in other more heavily affected countries." Austria's leadership in innovation and development during this period is attributed to a foundation of remarkable investment into research and development by Austrian biotech and pharma industries, accounting for 20% of the total R&D expenditures in Austria. Intensive early stage funding, competitive talent and a strong healthcare system also contribute to this position.

"I see Austria as a hotbed of innovation."

Edeltraud Stiftinger
Managing Director, aws

Although Austria is home to several innovative digital health startups, many find that the healthcare system is not suitable for these solutions yet, recognizing that ultimately, the current system is not compatible with the market. The case of the Austrian startup mySugr illustrates this concern clearly. The company was founded and developed in Austria and, to date, continues to provide great value to patients with diabetes around the world (~80 countries). Though it still operates mainly in Austria, former CEO Anton Kittelberger explains that the company "stopped trying to deploy the full mySugr solution in the Austrian market" due to a lack of opportunity to adequately integrate the solution into existing reimbursement frameworks. mySugr has been acquired by the Swiss company Roche and continues to offer its wider range of services in more compatible markets - saving costs for insurances and improving outcomes for patients. Many, including mySugr's founders, regret that Austrian healthcare still does not fully benefit from successful solutions that have been developed within the country.

The circumstances of the COVID-19 crisis provided evidence that startup solutions work and can become key components of healthcare processes. During the pandemic, a close cooperation between stakeholders from various sources as well as the opportunity to test these digital health solutions in practice has provided valuable information. The benefits and necessity of the integration of these solutions have been clearly demonstrated and therefore decision-makers recognize the importance of developing the infrastructure and frameworks that support them. Reaching consensus is essential as the next steps are taken. Our interview partners and other key players in healthcare have proposed development strategies which decision makers must address moving forward.

"It used to be cumbersome in the past, it's not going to be easy in the future either, but it will be easier because we now know after the crisis that some of these steps clearly showed benefits."

DI Martin Brunninger, MEng, MSc
Director General , Austrian Federation of Social Insurances

"During a crisis it is normal to revert back to what we are used to - in this case, we were not used to these solutions. However we learned that we could adjust to them quickly and at the same time use the crisis as an innovation boost. Building this level of capacity and efficiency is a must."

Dr. Irene Fialka
CEO, INiTS

The multi-stakeholder model

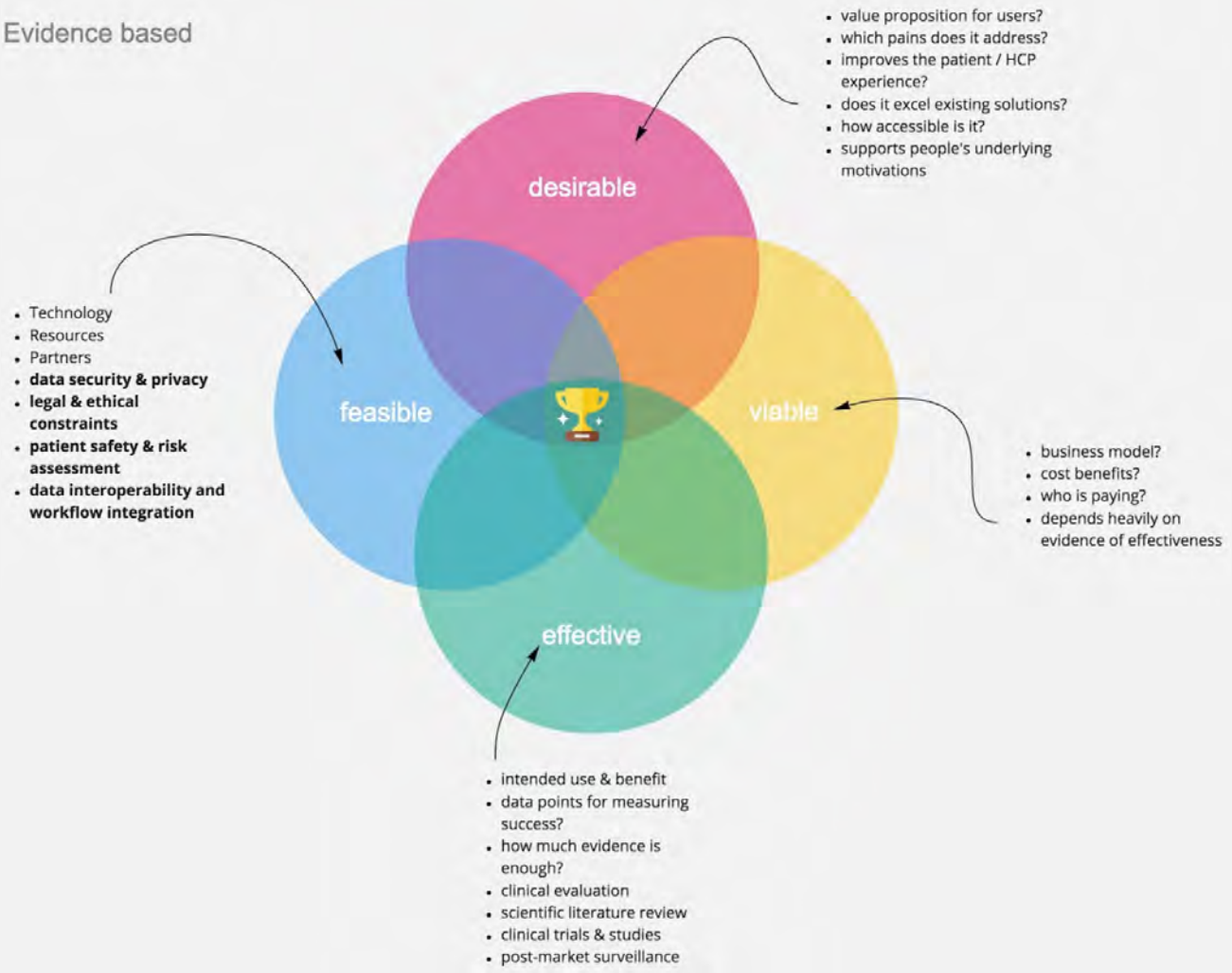
Through their digital innovation departments, and as seen in their strong commitment to the Health Hub Vienna, the private corporate sector is a strong enabler of startup innovation in Austria. With the multi-stakeholder "pilot" model, consisting in testing out solutions in order to penetrate the market, corporates can foster their digital innovation without building complex tools in house. For startups, having a corporate partner means bringing operational and field-related knowledge, as well as insights on the hospital and physician landscape in Austria.

Far from seeing "beyond-the-pill" as a threat, the pharmaceutical industry has been vocal in their acceptance and wish for more digital. Vaccine development wouldn't have been possible without seamless sharing of data. Various statements from the pharmaceutical industry reflect their strong push for digitalization: „Whether virtual doctor consultations, digital diagnostics or IT algorithms in research, the pandemic has given developments such as digitization a major boost"[28], says Prof. Rumler (Pfizer), Vice President of PHARMIG, the Austrian Pharmaceutical Industry association. Ina Herzer (MSD), board member, adds: "The advantages of digitization must be recognized and used so that pharmaceutical innovations now and in the future arrive as quickly as possible where they are needed, and that is with patients."[29] In the recent green book of the Forum of the Research-Based Pharmaceutical Industry in Austria (FOPI), "the COVID-19 crisis serves as an „involuntary model experiment" with positive effects: "the e-health instruments introduced overnight have created noticeable improvement for patients, doctors, and the health system. The sustainable implementation of e-health innovations is a must, and shall be pushed forward uncompromisingly in the interests of patients and the healthcare system."[30]

From the private insurance side, Uniqa has launched operations this year with their daughter company, SanusX[31], with a focus on health innovation and strong interest in eHealth startups.

Considerations for startups

Our interview partners representing various angles of the healthcare ecosystem insisted on crucial points that startups themselves must consider when seeking to find a place within the Austrian healthcare market. Firstly, the importance of developing both a local and international network was emphasized. Secondly, experts insisted that startups must consider Austria's system in its entirety, grasp its specific legal requirements, and understand that demonstrating compliance is an asset. Finally, stakeholders also stressed that digital products should be made to support the weakest and least tech-savvy of the population. Startups are asked to keep in mind that innovation in health differs from other industries in that there are much tighter regulations and less room for error and mistakes.



Source: 4th circle of innovation (Jungmann) - Human centred design focuses on 3 circles of innovation, but in healthcare, there is a 4th: effectiveness [32]

FRAME WORK FOR DIGITAL HEALTH

Emergency loosening of regulations in response to COVID-19 simultaneously provided a testbed for the use and implementation of various digital health solutions. Stakeholders agree that the emergency measures as such cannot become the new normal, yet they experienced that new ways of accomplishing tasks, delivering healthcare services could benefit patients, doctors and the healthcare system as a whole.
This prompted a re-assessment of legal frameworks and infrastructure for healthcare offers across the field to create a new, more sustainable normal. In addition, it opened up new questions about reimbursement models and medical safety.

ELGA, the Austria-wide solution for electronic patient records, currently offers applications for the discharge letter, laboratory test results, radiology report, and E-medication. Through the system, the implementation of the E-prescription during the recent period was possible and successful. The system is well-connected to the current financing and reimbursement models within healthcare.

However, in the discussion of supporting innovative solutions in the healthcare infrastructure, differing opinions keep fuelling a dispute. While some explain that ELGA must be the foundation for all health tech implementation, citing comprehensive structuring and substantial investments into the system, others acknowledge that ELGA would need quite some adjustment to meet current and future needs and benefit from today's technological possibilities. "ELGA so far has not demonstrated focus on integrating startup knowledge" (Wochele, Caritas). Some players in healthcare have proposed a separate government run healthcare IT-Backbone model that could address this gap. This would allow for fitting and certified startups solutions to be plugged into the backbone system as necessary and function similarly to a transport app like Wien Mobil which directs a passenger the most efficient route possible from A to B, making use of various transport solutions (Stefan Gara, the representative of the City of Vienna, Health representative NEOS). Alternatively, some experts propose strategies for regional digital transformation and infrastructure that would build upon ELGA, such as the Styria Health Portal (Leodolter). Internationally, and since 2019, an Austrian startup, Medicus.AI, is already implemented and embedded into national French electronic health records, "Le dossier medical". With this public-startup partnership, patients have access to user-friendly, understandable insights and their large customer-base allowed the public sector to be certain that the solution was already appreciated by the public[33].

Ultimately, there is an agreement that there must be a unified infrastructural system that allows for secure and efficient data transfer and use between health providers. Even though separate models may be used depending on the specific needs of a region, these regional examples could be connected to a central Austrian solution.

Legal Frameworks

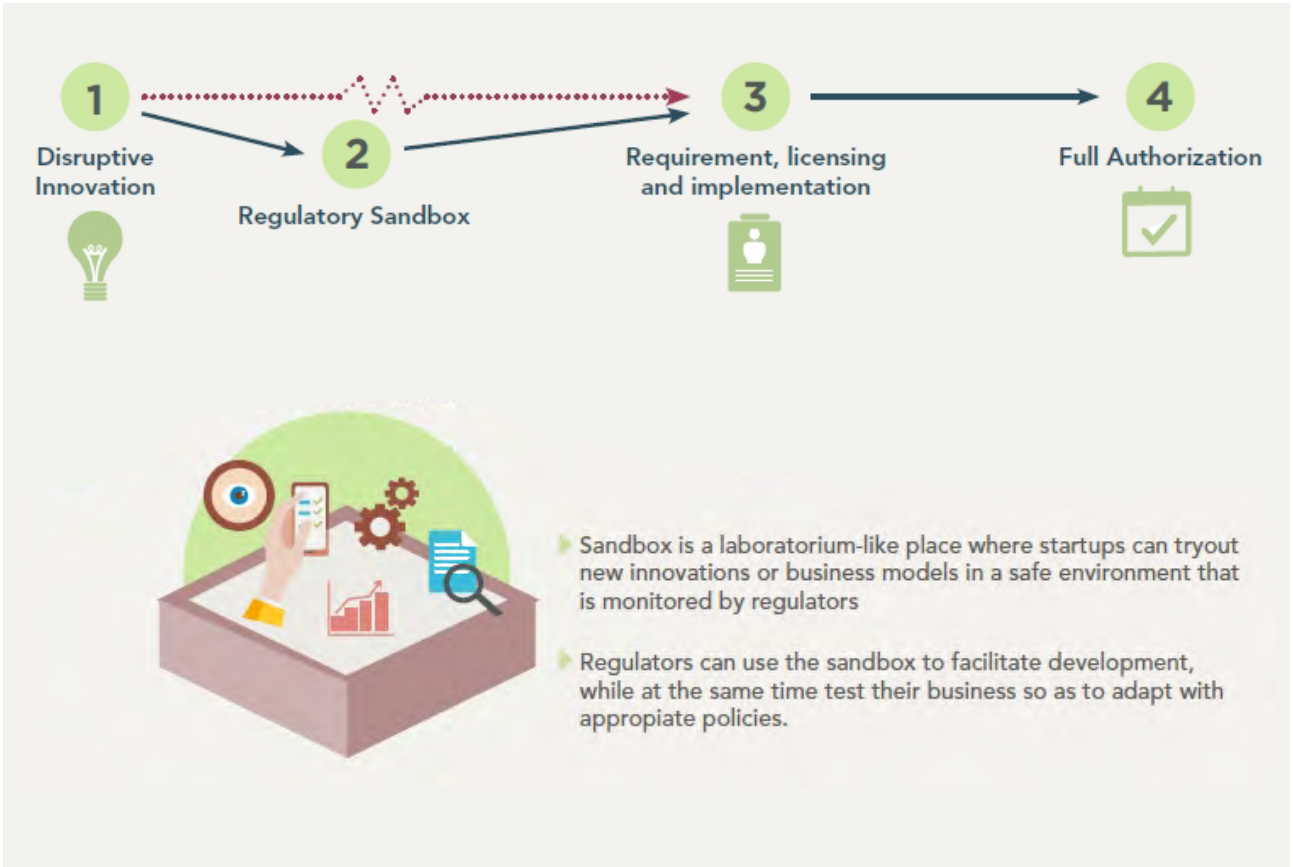
Emergency use of regulations in response to COVID-19 simultaneously provided a testbed for the use and implementation of various digital health solutions. This prompted a re-assessment of legal frameworks for health offerings across the field. Our interview partners agreed that in order to address fears of misuse and abuse around the introduction of new digital solutions, correct processes must be taken to ensure utmost security and protection of patients and their data, while still offering room for innovation to grow. Stakeholders propose a Regulatory Sandbox

for health technologies, similar to the one for FinTech which was authorized in July 2020 and went into effect on 1st September 2020. This would be of great importance in Austrian healthcare. Here, new innovations in health could be tested and supervised by regulatory bodies. These processes can then be monitored and refined in a more controlled way than what was partially experienced during the crisis.

" Ultimately, policy is important and should not be underestimated. We need to make sure we are not rushing into things and that safety is of utmost importance ... at the same time it's about striking a balance. "

Felix Faltin
Digital Health Venture Capital Investor, Speedinvest

Regulatory Sandbox Scheme



Source: Regulatory Sandbox for Health Tech, PharmaBoardRoom

Medical Safety

Medical safety practices must be explicitly addressed as digital health solutions become more prevalent in healthcare. One central fear regarding the widespread use of telemedicine including teleconsultations is the issue of medical safety practices. Our interview partners pointed out that the same considerations must be made by medical providers while using digital means, as is done in person. Documentation and data protection, as well as confidentiality practices must be kept intact. This will require explicit awareness and education about what is allowed and what is not. Medical professionals must ensure the same safety and security protocols are applied. As the use of digital innovations in healthcare grows, our interview partners propose the inclusion of digital health education into Austrian medical university syllabuses. Several medical universities in Switzerland as well as the Medical University Vienna, for example, currently take this approach. This would enable health professionals to build awareness and competence around these solutions.

In addition, digital solutions entering the healthcare market must ensure that they comply with medical device regulations and GDPR.

Financing and Reimbursement Models

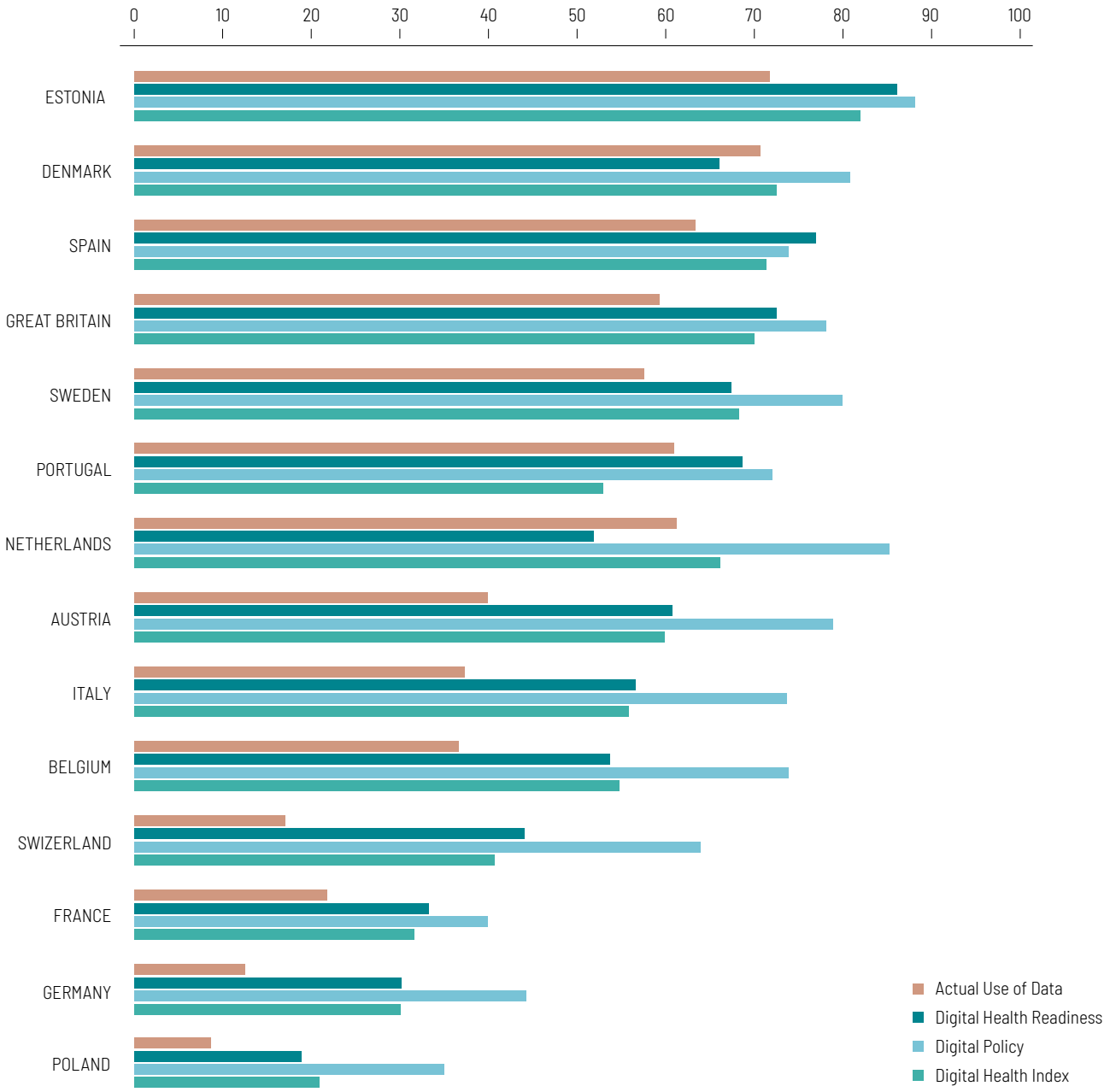
Addressing reimbursement models is of crucial importance in the task of maintaining progress with digital health solutions in Austrian healthcare. Financing issues have been a central factor in the eventual withdrawal of progressive measures implemented during the pandemic such as the e-prescription and teleconsultations, despite an almost unanimous agreement of the benefits that these solutions provide to the healthcare system.

By the later half of 2020, some telemedicine services were discontinued in an effort to encourage patients to re-enter doctors' practices. Only one of the five insurance funds (SVS) constructed a tariff model to actively establish tele-consultation practice for the long term[34]. Stakeholders acknowledge that the financing system must be thought of in a new way. To achieve overall benefits for all involved, the reimbursement model must be considered and health professionals must be compensated for their effort and expertise also when using digital solutions to deliver healthcare.

National & International Models

Our interview partners offered some international models that decision-makers could reference when considering the future of Austrian healthcare. Reimbursement models in the USA as well as highly digital health systems of Estonia, Finland and Israel, among others, were suggested. Likely due to cultural and geographical proximity, Germany's approach to digital health solutions within healthcare was most often cited. Experts see that the recently implemented DVG (Digitale Versorgung Gesetz) and DiGA (Digitale Gesundheitsanwendungen) frameworks for digital health have contributed to a phenomenal innovation boost within German healthcare and favourable outcomes. The recently published study by 15 months experience with DVG/DiGA summarizes the overall positives results, but also learnings on all sides [35]. This role model and the learnings could also be taken as a base for similar considerations in Austria.

Austria in terms of policy, digital readiness was in 2018 ranked among the best in Europe. However, recent developments on the whole continent regarding reimbursement, data embedding of startups and policy have made it hard for Austria to catch up with its neighbors.



Source: https://www.zavamed.com/de/telemedizin-report-deutschland.html [36]

Additionally, the crisis has reinforced the notion that the world is highly connected. Though isolative measures were taken in some respects within the EU, the value of having transnational mechanisms in place was highlighted. Kathy Farndon suggests a terminology such as Snomed CT which has compatibility with international counterparts is worth considering. This allows the translation and easy processing of healthcare data across borders. Data security measures would undoubtedly be a central concern in the event that Austria, but also other European nations were to consider such a system.

Ultimately, stakeholders believe that COVID-19 has been an accelerator for digital change and combatted many years of blocked progress. In developing towards longer-term goals, a national effort for a digital healthcare strategy that thoroughly addresses and encompasses the aforementioned factors is urgent and necessary.


DIGITAL
OUTLOOK

A DIGITAL HEALTH OUTLOOK FOR AUSTRIA

The chapters in this section outline the transformational impact of Austria's digital health future.

A DIGITAL PATIENT JOURNEY

Even if seemingly all stakeholders benefit from the digital transformation of healthcare, the most important aspect is the wellbeing of a patient. The sometimes time-consuming and stressful experience of using healthcare services via traditional and direct routes can be aided in several ways by novel technologies offered by telemedicine.

Pandemic solutions

Some direct examples of this related to telemedicine is shielding elderly and vulnerable populations from viral transmission by providing e-rezept and triaging services remotely. Organizing the hierarchy of patient admissions and handling the logistics of ICU distribution and emergency room scheduling is another crucial problem that was revealed by the COVID-19 pandemic and can be readily handled by the right computational approaches. Emergency department scheduling might be the hardest logistics challenge a hospital has to overcome due to the fact that decision-making might directly affect the patients' lives. Decision-making process was favorably facilitated in crowded ER situations by implementing AI deep learning algorithms in a recent study, which showed that this approach was better performing than the currently used dispatch rules [37].

These solutions are the forefront in not only improving the quality of healthcare experience but to save lives by prioritizing those who are in the most urgent need for care. Some digital solutions can aid the physicians to find further information related to a particular disease based on its symptoms. A search engine based on a large database called Symptoma provides more data and enriches the physicians' knowledge of, for example, further possible complications related to the respective symptom according to the age, gender and location of the patient under care. Additionally, automated AI diagnostic approaches show a great promise to help dealing with the backlog imposed by the COVID-19 pandemic. Great startup solutions such as Thinksono - a mobile app developed to detect deep vein thrombosis and MIA - an AI algorithm aiding the diagnostics of breast cancer can get patients diagnosed and their symptom severity assessed quicker which is absolutely essential when millions of people are awaiting to start their hospital admissions [38].

Patient empowerment and digital mental health

Endorsing empowerment and health literacy is key to make the patient well-informed and to make them feel in charge. Digitizing patient records is not only beneficial by reducing paperwork, but it is a gateway to granting the ability to patients to access their own health record thus being involved in their own care. Doctorly is an IT platform developed for the German market that not only cuts time spent on administrative tasks to half for practices but also provides a patient platform to access their health records, manage appointments, receive test results and reminders for important check ups digitally. Transparency is an important step to promote patient-centered care, but improving health literacy via increasing awareness

and explaining medical terms is just as essential. Applications that aid communication via removing the barrier imposed by different languages such as caretotranslate.com or the medical jargon such as Medicus.AI can make the medical information more accessible for the laypersons. Intelligent symptom checker solutions apps such as ADA Health or Symptoma can help patients to understand their symptoms and the possible associated conditions. More informed patients will likely seek out and will participate more readily in clinical trials that are so important for research and development of novel therapeutic approaches.

Remote expert medical help will also mean that patients can make more effective choices of their routine and specialist healthcare providers; for example non-German speaking patients or patients in need of special medical expertise can also find their match without being location-bound (applications KRY and doctolib). Finally, digital mental health solutions have the potential to encourage psychologically vulnerable groups to participate in anonymous therapeutic approaches due to the fact that peer support and focused patient groups and forums are easier to attend and might help the participation of people with reduced mobility due to circumstantial or locational factors. Some examples for this include Selfapy, which is a CE-certified medical product that delivers a 12-weeks long individualized therapy program which is supported by regular calls with a psychologist. Solutions such as Selfapy also strikes a good balance between aiding the work of a human professional, who is pivotal in helping patients to navigate this new landscape and digitalization offered by modern technology.

Chronic illness and elderly care

One of the most applicable fields of patient-centered care is chronic illness management. All skills of empowerment and literacy serve the patients to become more able and in control with the management of their symptoms and hence makes it easier for their doctors to get accurate feedback and to oversee the patient self-management of the disease[39]. Dealing with chronic illness is not only difficult for the patients themselves but it can be overwhelming for the carers in the family as well. Fostering self-efficiency and remote monitoring can achieve a greater sense of self-sufficiency. In turn, this can help not only the sufferer but can also alleviate the strain experienced by families of chronically ill patients.

The importance of dealing with elderly care is demonstrated by the fact that an EU initiative called 'SHAPES' (Smart and Healthy Ageing through People Engaging in Supportive Systems) received over 21 M EUR funding in 2019 and it aims to provide an interoperable platform merging "broad range of digital solutions for supporting and extending healthy and independent living for such older individuals" [40]. With the patient-centered approach in the forefront of its project aims, based on data collected through digital channels and wearables SHAPES will support initiatives that try to identify the patients' individual needs and provide personalized solutions [41].

Applications based on the AI analysis of data from simple wearable devices can offer unique possibilities for symptom prediction for elderly care patients. A peer-reviewed scientific article, published at the end of September 2020 showed the incredible impact of start-up product CarePredict, an artificial intelligence system analyzing movement for elderly care patients [42]. 490 residents from six assisted living communities were analyzed retrospectively over 24 months of using CarePredict's product. The CarePredict system consists of a wrist-worn wearable device, context beacons for room location, and a cloud-based AI-powered platform. Results showed the capacity of the application to predict risks of UTIs, fall or depres-

sion, 40% lower hospitalization rate, 69% lower fall rate, 67% greater length of residence stay compared to control communities and finally the care staff response time was reduced by 4.5 minutes which could be crucial in a life-threatening situation.

Disease prevention is a very wide term that is spanning from advocating healthy lifestyle choices through vaccination plans to the taxation of alcohol and tobacco products[43]. Wearables combined with application assisted analysis can generate more data, deliver personalized advice and perform remote monitoring in the areas of weight, exercise and sleep management. The latter is a particularly important, but often neglected domain of healthy lifestyle that is key to disease prevention so much so that it is now a scientific consensus that good sleep "should be prescribed". Hence, sleep disorder monitoring and diagnostic apps and wearables became quite widely available. Sleepiz, a medical grade sleep monitoring technology measures 8 different biomarkers in the comfort of the patients own home without an actual wearable and camera, then utilizes advanced machine learning algorithms to analyze sleep parameters and sends it to the practitioner for final diagnosis.

According to a non-profit health policy think tank and a linked exempt charity of the University of Cambridge, the PHG foundation, data-driven personalization of the health care "in which an individual's health management is finely tailored to their personal physiology, disease risks and any underlying conditions " will take the driver's seat for the generations to come. In their forecast, they prioritize risk assessment and early detection in healthy individuals[44].
According to them, the stratification of the population into disease subgroups, along with putting informed and self-sufficient patients in charge of the management of their own health, should help not only with better clinical outcomes but also with early interventions and delaying disease onsets.

OUR FUTURE WITH DIGITAL HEALTH

"History perspective: "Every pandemic brought changes and accelerated research and development. "

Hofrat Dr. Thomas Holzgruber
Director of the Vienna chamber of physicians

The COVID-19 crisis has impacted the role of digital health solutions in Austrian healthcare profoundly. A high level of acceptance and adoption of digital technologies was observed during this period and stakeholders were also given the opportunity to experience the impact of these technologies in practice. Several startup solutions proved to be of great necessity in minimizing the spread of the virus and providing healthcare support and delivery. At the same time, avoidable gaps in healthcare were revealed during this period, particularly in the cases of oncology diagnostics and chronic patients amongst others. Healthcare professionals and patients outlined use cases practical areas for development to take into account moving forward.

Stakeholders found that the legal, medical, organizational and technological frameworks surrounding digital health solutions in Austria had much room for improvement. They called for the implementation of regulations and infrastructure that would adequately meet the needs of society and the possibilities of the technology available. Key development paths were proposed including the introduction of a regulatory sandbox for healthcare, a restructuring of reimbursement models, awareness about medical safety around digital tools, important factors startups must address, and a re-assessment of the underlying tech-

nological infrastructure. A national effort encompassing these proposals for digital health solutions is regarded as urgent and necessary.
In accordance with this, LISA (Life Science Austria), the national body promoting Austrian life science, commented: "There still is plenty of room for start-ups addressing unmet needs in healthcare beyond the crises. Vienna is offering 360-degree support for such entrepreneurs. The Austrian government provides various grants, loans and guarantees as well as free consulting services that facilitate growing a new business idea."
Even though Austria provides a very supportive atmosphere for early stage innovation, startups do have to face several challenges when it comes to entering the marker. Firstly, Austria has a very complex healthcare system with various stakeholders including patients, practitioners, public and private players, pharmacists, insurance companies who all have different objectives and fall under different regulations, hence have different obligations and rights. The fight for competencies and control over certain functions are common (Ärztekammer vs. Apothekerkammer).

It is generally complicated to initiate a digital healthcare startup due to several factors. Compared to other fields of innovation, the medical industry has to balance refined regulation with short innovation cycles to reduce time to market entry. The most fruitful strategy for a startup is to consider regulatory and legal requirements from the very beginning 45. Startups have to be aware of all the country-specific legal (consumer rights, patient law, warranties / damages / possible liabilities, procurement law in public organizations) and regulatory (medical device regulation, CE certification, FDA approval) aspects of product development, market release, market placement and advertisements. Even within the medical field there are different considerations, for example, medical device regulation is easier to satisfy in Europe compared to the US, which is reversed when it comes to diagnosis and treatment applications. This might influence whether the startup wants to enter the market in the EU or in the USA first (Westermann, 2017). These are obstacles that all startups have to be aware of, however the Austrian market has its own peculiarities. For example, advertisement for medical products is tightly regulated, if not forbidden in many channels of media and falls under a very restrictive e-commerce law enforcement. Additionally, Austrian pharma companies are not allowed to directly communicate to patients which makes pilot projects really challenging to set up and recruit for. Finally, Austria is a melting pot for different nationalities and has several regional differences, which requires catering for a stratified market in terms of language culture and values.

Lastly, the lack of digital literacy amongst older than millennial generations can still make it difficult to reach the target audience due to the lack of awareness; for example, 'telemedicine' is perceived as calling a doctor via telephone and other channels and tools are often neglected and/or never heard of. This, however, is changing rapidly as older and older generations get involved in digital healthcare services. Health literacy is also something to be improved as most people tend to reach their practitioner to seek out information and help to cure already formed conditions more than to take preventative measures.
Startups need to be aware of all of these issues to be ready for a successful entrance to the market. Despite this complexity, many institutions offer support for startups, including ours. Health Hub Vienna offers acceleration programs and pilot projects for more mature startups

Worldwide, the crisis is still in effect and the Austrian population is in the middle of the second and aware of subsequent waves in the country. Certain limitations cannot be understated, such as uncertainty about the course of the virus and the development of a vaccine, as well as current economic uncertainty. Ethical

questions and cultural considerations must also be addressed pertaining to the sharp rise use and transfer of health data. These must be navigated as new implementation measures are discussed.

The recent period has fostered an understanding between key players about the importance of finding consensus in order to collectively and efficiently solve this pertinent issue. Stakeholders see the undeniable opportunity that this period has offered to create a robust healthcare system in Austria with the implementation of high-quality innovations. Response to the COVID-19 crisis has resulted in what many regard as a decade or more of technology-awareness and growth in this respect. Our interview partners emphasized that immediate steps must be taken to ensure that this progress is not lost as decision makers construct the future of healthcare. Additionally, everybody stressed that the first steps have been taken here and there and Austria's healthcare system has a good chance to regain lost grounds and boost its innovation capacity in a collaborative effort.

"Ultimately, it's a question of leadership. This involves players from academia to civil society that would actually come together and speak this vision forward."

ao. Univ.-Prof. Dr. Herwig Ostermann
CEO Gesundheit Österreich GmbH

Thank you to our interview partners

Stefan Gara / City of Vienna, **Martin Brunninger** / Dachverband Österreich, **Martin Gleitsmann** / Gleitsmann e.U., **Martin Fuchs** / Premiquamed, **Bettina Resl** / Sanofi (previously Ministery of Health + Research and Science), **Siegfried Meryn** / Facharzt für Innere Medizin, **Thomas Holzgruber** / Ärztekammer Wien, **Kathy Farndon** / University Hospitals of Derby and Burton NHS Foundation Trust, **Claudia Maizen** / NHS, **Christina Nageler** / IGEPHA, **Anton Kittelberger** / MySugr, **Felix Faltin** / Speedinvest, **Herwig Ostermann** / GÖ GMbH Austrian public health institute, **Irene Szimak** / SOS Kinderdorf, **Daniel Svacina** / Volkshilfe Wien, **Thomas Wochele** / Caritas, **Sven Jungmann** / Founderslane, **Raymond Nistor** / QMD Services GMBH, **Edeltraud Stiftinger** / aws **Philipp Lindinger** / AUSTROMED, **Werner Leodolter** / KAGes, **Michaela Fritz** / Medical University of Vienna **Andrea Braga** / TELEMED Austria (Austrian Association for Telemedicine) , **Gerald Bachinger** / NÖ Patienten- und Pflegeanwaltschaft, **Maria Rauch-Kallat** / Federal Ministry of Health , **Peter Lehner** (Written Interview) / SVS, **Philipp Freitag** / Online Doctor, **Marie-Isabelle Batthyány** / XR Synergies, **Cornelius Palm** / Happyr Health, **Tamás Petrovics** / Xund

Sources

1. Gesundheit, Pflege und Soziales: Digital Roadmap Austria. https://www.digitalroadmap.gv.at/handlungsfelder-und-massnahmen/gesundheit-pflege-und-soziales/.
2. Digitalisierung - Gesundheitsfonds. https://www.gesundheitsfonds-steiermark.at/digitalisierung/#eHealthProjekte.
3. Digitalisierung im Gesundheitswesen. Die Fortschrittskoalition für Wien https://www.wien.gv.at/regierungsabkommen2020/gesundheitsmetropole-wien/digitalisierung-im-gesundheitswesen/.
4. Georgiev, A. DEVELOPMENT OF E-HEALTH IN AUSTRIA, BULGARIA, CROATIA, ESTONIA AND SLOVAKIA. Arch. Bus. Res. 8, 155–162 (2020).
5. Tobia, K., Nielsen, A. & Stremitzer, A. When Does Physician Use of AI Increase Liability? J. Nucl. Med. (2020) doi:10.2967/jnumed.120.256032.
6. Shaping the future of European healthcare. Deloitte United Kingdom https://www2.deloitte.com/uk/en/pages/life-sciences-and-healthcare/articles/european-digital-health.html.
7. LungPass. https://www.lungpass.com/en/.
8. Corona-Krise: Die Medizin wird digital. DER STANDARD https://www.derstandard.at/story/2000119449133/corona-krise-die-medizin-wird-digital.
9. HausärztInnen sehen Positives in der Coronavirus-Krise. https://www.austrianhealthforum.at/aktuelle_diskussionen/hausarztinnen-erkennen-viel-positives-in-der-coronavirus-krise/.
10. Home. Chronolife https://www.chronolife.net/.

11. Coalition Innovation Santé: Chronolife, with the support of Servier, Launches in France a Non-Invasive Telemonitoring Solution for the Continuous Monitoring of Patients Suffering from Chronic Diseases. Servier https://servier.com/en/communique/coalition-innovation-sante-chronolife-support-servier-telemonitoring-chronic-diseases/.
12. Asda launches virtual in-store GP service with Medicspot. Healthcare IT News https://www.healthcareitnews.com/news/emea/asda-launches-virtual-store-gp-service-medicspot (2020).
13. Studien. gallup.at https://www.gallup.at/de/unternehmen/studien/.
14. FREIGABE ALLER NOTWENDIGEN ELGA-DATEN FÜR SARS-COV-2 (CORONAVIRUS) FORSCHUNG – BVSHOE. https://www.bundesverband-selbsthilfe.at/freigabe-aller-notwendigen-elga-daten-fuer-sars-cov-2-coronavirus-forschung/.
15. Ammenwerth, E. et al. A nationwide computerized patient medication history: Evaluation of the Austrian pilot project "e-Medikation". Int. J. Med. Inf. 83, 655–669 (2014).
16. Starting shot for e-prescription with pilot test | DiePresse.com. https://www.diepresse.com/5918354/startschuss-fur-e-rezept-mit-pilotversuch.
17. New!, K. B. consequences. Erste Spitalsambulanz Österreichs geht online. Die Presse https://www.diepresse.com/5834824/erste-spitalsambulanz-osterreichs-geht-online (2020).
18. Corona-App: Ärzte in Afrika und im Nahen Osten tauschen online ihr Wissen aus. https://www.entwicklung.at/ada/aktuelles/detail/corona-app-aerzte-in-afrika-und-im-nahen-osten-tauschen-online-ihr-wissen-aus-1.
19. Sidekick raises $20M in Series A funding round led by Wellington and Asabys - SidekickHealth. https://sidekickhealth.com/sidekick-raises-20m-in-series-a-funding-round-led-by-wellington-and-asabys/.
20. Gitt, A. K., Karcher, A. K., Zahn, R. & Zeymer, U. Collateral damage of COVID-19-lockdown in Germany: decline of NSTE-ACS admissions. Clin. Res. Cardiol. 109, 1585–1587 (2020).
21. red, steiermark O. at. Mehr tödliche Herzinfarkte während CoV-Lockdowns. steiermark.ORF.at https://steiermark.orf.at/stories/3070052/ (2020).
22. Rosner, S. Rätseln um 40 Prozent weniger Herzinfarkte. Österreich Politik - Nachrichten - Wiener Zeitung Online https://www.wienerzeitung.at/nachrichten/politik/oesterreich/2056882-Raetseln-um-40-Prozent-weniger-Herzinfarkte.html.
23. My Personal Therapeutics and Medivizor Announce a Collaboration Agreement. https://www.businesswire.com/news/home/20200831005139/en/My-Personal-Therapeutics-and-Medivizor-Announce-a-Collaboration-Agreement (2020).
24. COVID-19: Interview with Dr. Peter Kecskemethy CEO and co-founder of Kheiron. Maddyness UK https://www.maddyness.com/uk/2020/07/08/covid-19-interview-with-dr-peter-kecskemethy-ceo-and-co-founder-kheiron/ (2020).
25. Kheiron Medical Technologies wins government grant funding to accelerate our efforts so that Mia can help when screening services start up again. https://www.kheironmed.com/news/kheiron-medical-technologies-wins-government-grant-funding.
26. Why the psychological corona crisis is only just beginning - Coronavirus - derStandard.at ›Panorama. https://www.derstandard.at/story/2000120245682/warum-die-psychische-coronakrise-jetzt-erst-beginnt.
27. Rong, O. Roland Berger Krankenhausstudie 2020 Österreich. 27 (2020).
28. Wandlungsmotor SARS-CoV-2: Wegweiser zum Gesundheitsstandort der Zukunft | PHARMIG. https://www.pharmig.at/mediathek/pressecorner/wandlungsmotor-sars-cov-2-wegweiser-zum-gesundheitsstandort-der-zukunft/.

29. Zukunftsfragen: Vielseitige Effekte von Innovationen und Big Data | PHARMIG. https://www.pharmig.at/mediathek/pressecorner/zukunftsfragen-vielseitige-effekte-von-innovationen-und-big-data/.
30. Forum der forschenden pharmazeutischen Industrie in Österreich (FOPI). Grünbuch.
31. UNIQA: Starkes Ergebnis der ersten 9 Monate 2020 als Basis für neue Wachstumsstrategie UNIQA 3.0. OTS.at https://www.ots.at/presseaussendung/OTS_20201119_OTS0087/uniqa-starkes-ergebnis-der-ersten-9-monate-2020-als-basis-fuer-neue-wachstumsstrategie-uniqa-30.
32. The Fourth Lens: Making Design Thinking Work for Digital Health User Experience Magazine. https://uxpamagazine.org/the-fourth-lens-making-design-thinking-work-for-digital-health/.
33. Le dossier médical partagé et la start-up Medicus AI collaborent pour simplifier l'accès aux données biologiques. usine-digitale.fr https://www.usine-digitale.fr/article/le-dossier-medical-partage-et-la-start-up-medicus-ai-collaborent-pour-simplifier-l-acces-aux-donnees-biologiques.N906964.
34. Lehner: SVS startet mit Teleordination. OTS.at https://www.ots.at/presseaussendung/OTS_20200722_OTS0016/lehner-svs-startet-mit-teleordination.
35. AG, B. MedTech Radar: Mit der DiGA von null auf hundert. https://medtech-zwo.de/aktuelles/hintergrund/hintergrund/medtech-radar-mit-der-diga-von-null-auf-hundert.html.
36. Telemedizin Report Deutschland und Europa. Zava - DrEd https://www.zavamed.com/de/telemedizin-report-deutschland.html.
37. Lee, S. & Lee, Y. H. Improving Emergency Department Efficiency by Patient Scheduling Using Deep Reinforcement Learning. Healthcare 8, 77 (2020).
38. editor, D. C. H. policy. Year-long waits for surgery at highest level since 2008, says NHS England. The Guardian (2020).
39. Healthcare innovation — experiences from the Netherlands | Boer, F. Healthcare innovation — experiences from the Netherlands. ВЕСТНИК САНКТ-ПЕТЕРБУРГСКОГО УНИВЕРСИТЕТА. МЕДИЦИНА vol. 14 245-254-245-254: https://medicine-journal.spbu.ru/article/view/7166.
40. Spargo, M. et al. Shaping the Future of Digitally Enabled Health and Care. Pharmacy 9, 17 (2021).
41. Smart and Healthy Ageing through People Engaging in Supportive Systems | SHAPES Project | H2020 | CORDIS | European Commission. https://cordis.europa.eu/project/id/857159.
42. JMIR Aging - Artificial Intelligence–Powered Digital Health Platform and Wearable Devices Improve Outcomes for Older Adults in Assisted Living Communities: Pilot Intervention Study. https://aging.jmir.org/2020/2/e19554/.
43. Burgess, A. The future of chronic disease prevention research | The Australian Prevention Partnership Centre. https://preventioncentre.org.au/, https://preventioncentre.org.au/chronic-disease-and-systems/the-future-of-chronic-disease-prevention-research/.
44. My healthy future. PHG Foundation: https://www.phgfoundation.org/research/my-healthy-future.
45. Rinsche, F. The Role of Digital Health Care Startups. (2017).

Mentioned Startups

- **Healthy Networks OU (Lungpass)**: LungPass is a digital stethoscope and ML-based app for early detection and at-home self-management of respiratory conditions based on the change in lung sounds, symptoms and adherence analysis.
- **Chronolife**: Company providing real time detection of health parameters via a wearable device in form of a t-shirt that generates continuous physiological data.
- **MedicSpot**: MedicSpot has developed a clinical examination station which allows patients to be connected to a doctor over video-link for a consultation and full clinical examination – using connected diagnostic devices.
- **Wellabe**: Wellabe's goal is to change corporate health management by helping employees to get a better understanding of their key health metrics through an individualized and digitalized medical check-up. This company developed a transportable lab which is capable of gathering and analyzing more than 60 key health factors within a 20 minute-procedure.
- **KRY**: Kry allows patients to consult a qualified health professional within minutes, via your smartphone or tablet. Through digital technology, Kry provides equitable access to high-quality health care – at the pa tient's own convenience.
- **Abi Global Health**: The company offers to close the gap in the first mile of healthcare by delivering micro-onsultations with trusted physicians via Chat Apps like WhatsApp, WeChat, Messenger, Viber, Skype etc. By deploying Artificial Intelligence within the consultation process, we reduce physician time per case by 85% vs. synchronous video, voice or text consultations.
- **Knokare**: Omni-channel healthcare consulting solution using Saas for connecting doctors and patients in real time. Composed of 4 modules: Triage through AI, Scheduling, Video consultation, Electronic Health Records.
- **Scarletred**: The AI powered software enables high quality remote skin imaging and analysis in a multitude of skin conditions. Our award winning technology is supplied international to Biopharma and Cosmetics companies, governments, hospitals and clinicians. It is easy to use and enables to deliver better skin care products and health care services faster at significantly lower cost.
- **Docdok**: A GDPR and HIPAA compliant cloud based solution, is focusing on chronic conditions with high cost burdens, like the respiratory diseases Asthma and COPD by connecting healthcare providers with their patients in the clinical and study ecosystems, 24/7, on all devices and captures objective real world data (RWD) in addition to subjective patient reported outcomes (PROs) while significantly benefiting both patients and doctors through multiple functionalities and seamless workflow integration.
- **Go CLinic**: The company provides a platform for secure communication and data exchange. GoClinic en-ables patient-hospital interaction by supporting the patient journey before, during & after the hospitali-zation via a Patient Relationship System that supports virtual care scenarios.
- **Thryve**: Thryve powers the individualization of health care by providing the only health API needed for health services to access sensible health data from more than 100 smartphones, smartwatches and fitness trackers. By enabling health services to understand and use automatically generated data, Thryve believes to fundamentally improve all aspects of healthcare – from prevention and screening to intervention and therapy.

- **Enpicom**: IGX Platform - the first Cloud-based end-to-end repertoire sequencing data management, storage, analysis, visualization and interpretation platform with unique data handling possibilities, focusing on issues like development of immunotherapeutic drugs, patient stratification before start of treatment, and monitoring of patients on treatment.
- **Citruslab**: Hundreds of research organizations of all sizes use Citruslabs' software and recruitment tools to screen, enroll and retain patients to advance research and drive revenue for their organizations.
- **Drugstars**: DrugStars is a new award-winning and scientifically validated app, that makes it more meaning ful for patients to take their medications. As patients take their medication in the way prescribed by their HCP, they can share their real-world experience with their meds via the DrugStars app and be rewarded with the opportunity to donate money to patient charities for free. This real world data can then be used – anonymously of course – in new scientific studies.
- **Vaica**: The company's technology was designed to offer medication adherence services. The company's healthcare technology builds customized and digital patient support programs for pharmaceutical com panies and specialty pharmacies to improve care outcome for chronic patients, as well as includes physi cal, smart medication dispensers that are connected to a strong cloud infrastructure in real time, enabling users to deploy, manage and monitor remote medication dispensers, vital sign monitors and upload vital sign readings.
- **Symptoma**:Symptoma facilitates a search engine that enables physicians to search and find information related to diseases according to its symptoms. It enables them to find further symptoms, lab results, dia gnostic test results, and complications related to diseases.
- **DOC+**: DOC+ is one of the leading digital health companies in Russia. They built a digital clinic – a techno logical platform that allows their clients to access medical services, get medical data stored onto electro nic health records and use data from all records to develop a range of machine learning solutions, inclu ding a symptom checker and automation of medical quality control.
- **Infermedica**: This company tackles the problem of inappropriate use of medical services and misdia- gnosis, providing insurance companies, hospitals, and health systems with a set of AI-powered preliminary diagnosis and triage solutions.
- **Medicus AI**: Medicus AI designs and develops an artificial intelligence (AI) based platform that converts health data in the form of cryptic numbers and medical language into an understandable explanation. Its software allows the users to understand their medical and health information, provide health insights, and offers wellbeing coaching.
- **BioneXt LAB**: BioneXt LAB stands out for its resolutely collaborative approach, with the objective of using analytical tools and related services to maximise a physician's patient care capabilities. This com- pany relies on experienced staff and a state-of-the-art technical platform to offer an extensive catalogue of analyses, including routine and specialised analyses.
- **Doctify:** Doctify offers an online platform that enables its users to find, compare, and book services of healthcare service providers in the United Kingdom. Customers are able to search according to their condition, specialty, location, and insurer. And it enables patients to rate and review the services of healt- care service providers.
- **RecoMed**: RecoMed is South Africa's leading online appointment booking platform. It offers patients and practices easily accessible appointment booking in real-time.

- **Medisante**: A company that aims to radically simplify the Integration of PGHD into Clinical Systems via the integration of Patient-Generated Health Data (PGHD) into clinical systems remains a major challenge for healthcare providers, pharmaceutical companies and CROs.
- **Parsek**: Improving people's wellbeing by providing them with user-friendly solutions, including interoperable platforms and coordinated care solutions that simplify collaboration in healthcare.
- **Contextflow**: Contextflow uses AI imaging technology to support radiologists during their daily clinical routine.
- **ImageBiopsy Lab**: ImageBiopsy Lab (IBL) is the global leader in developing and certifying state-of-the-art AI-based software for image analyses and workflow tasks in musculoskeletal (MSK) radiology, orthopaedic surgery and traumatology.
- **BioneXt LAB**: BioneXt LAB stands out for its resolutely collaborative approach, with the objective of using analytical tools and related services to maximise a physician's patient care capabilities. This company relies on experienced staff and a state-of-the-art technical platform to offer an extensive catalogue of analyses, including routine and specialised analyses.
- **Doctify**: Doctify offers an online platform that enables its users to find, compare, and book services of healthcare service providers in the United Kingdom. Customers are able to search according to their condition, specialty, location, and insurer. And it enables patients to rate and review the services of healthcare service providers.
- **RecoMed** : RecoMed is South Africa's leading online appointment booking platform. It offers patients and practices easily accessible appointment booking in real-time.
- **Medisante**: A company that aims to radically simplify the Integration of PGHD into Clinical Systems via the integration of Patient-Generated Health Data (PGHD) into clinical systems remains a major challenge for healthcare providers, pharmaceutical companies and CROs.
- **Parsek**: Improving people's wellbeing by providing them with user-friendly solutions, including interoperable platforms and coordinated care solutions that simplify collaboration in healthcare.
- **Piurimaging**: Piur Imaging's mission is to make vascular imaging more affordable and safer for the patient through the innovative tomographic ultrasound (tUS) solution PIUR tUS. PIUR tUS extends regular ultrasound devices with a tomography function so physicians can produce three-dimensional diagnostic information without the side effects current imaging technologies may introduce.
- **Thinksono**: ThinkSono has created the world's first software to diagnose, deep vein thrombosis' (DVT).
- **Naboto**: Naboto is a waiting list and appointment booking tool that automatically optimizes the user's schedule.
- **Docotorly**: Doctorly is a digital-first, cloud powered, fully centralised, practice management platform for doctors. Doctorly consists of an international team of serial tech entrepreneurs, doctors, technology experts, and product design specialists based in the heart of Berlin.
- **Medshr**: MedShr enables doctors to share and discuss clinical cases in a private professional network. Launched from London in October 2015, the MedShr app and web platform provide doctors with a unique system for peer-to-peer learning and medical education that allows them to share knowledge and skills to improve patient care and ultimately, save lives.
- **Wellmo**: Wellmo is a b2b SaaS company driving the preventive digital health megatrend in insurance business and other selected segments. With Wellmo platform, an insurance company will be able to configure a service set, which consists of locally relevant health content, services and interventions. Service set can be continuously improved based on usage and outcomes analytics.

- **MyMind** (Brain Hero): Mobile Neurofeedback Game based on EEG waves focused on children with autism and ADHD. Steer a brain controlled super hero (Brain Hero) across different sections of your brain and interact with your own brain while gaming.
- **mySugr**: The mySugr app removes the burden of managing diabetes. The patient's therapy information is just there and it's useful at a glance. All in one place and easy to understand. Easy logging of blood sugar, meals; automatically synchronised blood glucose levels from the Accu-Chek Mobile with a wireless adapter, estimated HbA1c, bolus calculator and test reminders.
- **Medivisor**: Medivisor is a software solution that continually collects and analyzes the operational status of medical displays installed in hospitals, reporting findings back to the patient or the patient's carer. Deployment of PM Medivisor can result in significant labour savings.
- **Telesofia**: The company helps manufactures and healthcare providers to communicate, engage and educate their customers. This award winning platform auto-generates personalized educational videos for patients, based on their clinical data.
- **Vivy**: Vivy is Germany's first open and completely end-to-end encrypted health platform. By using our mobile app, users get total control of their health- and fitness data and are directly connected with their health providers, such as doctors and insurance companies.
- **Sidekickhealth**: SidekickHealth is a digital therapeutics company that helps people prevent and manage chronic diseases. Our approach combines behavioral economics, gamification and artificial intelligence for a uniquely engaging experience that removes barriers to behavior change and expands the possibilities of health and well-being.
- **InsyBio**: InSyBio Suite is a cloud-driven SaaS application. It consists of tools for providing integrated biological information from various sources, while being empowered with robust user-friendly, installation-free bioinformatics tools.InSyBio also undertakes projects in clinical, preclinical and post clinical trials.
- **MultiplexDX**: Molecular personalized diagnostics for onclogy.The company is developing multiplexed, accurate, quantitative and accessible diagnostic tests
- **My Personal Therapeutics**: We offer the most comprehensive, personal genomics-based drug screening service. Our Personal Discovery Process (PDP) identifies highly precise combinations of FDA-approved drugs. We are integrating AI to l suggest treatments specific for a patient's tumor genetics rapidly.
- **Kheiron**: The company made significant breakthroughs with their breast cancer screening product Mia. Kheiron's aim is to improve the outcomes for cancer patients by pioneering precision radiology.
- **Braive**: Braive's mission is to provide cost efficient, easy access solutions for high-quality treatment programs targeting people with mental health challenges, worldwide.This company develops and markets evidence-based treatment for mental health challenges, holding the largest library of user-driven videos on psychoeducation and CBT for psychiatric axis 1 disorders.
- **Selfapy**: Selfapy offers a therapy support tool that helps recognize negative patterns of thought and train new behavior. Selfapy is your guided, self-help online course against depression with a personal psychologist as a companion.
- **Happymed**: https://www.happymed.org/
- **Psious**: Psious provides innovative Virtual Reality solutions for mental health professionals. They offer treatments for specific phobias, resources to improve anxiety disorders and pain management, and relaxation environments.

- **Ilvi**: Ilvi is a mobile software platform that ensures the data from almost all medical devices move seamless in the digital patientchart and hosts any mobile app offering a simple workflow driven GUI for nursing staff.
- **Memocorby**: This company's mission is to help people re-learn language after a stroke and for patients with dementia to help them sustain their memory as long as possible so they can communicate with their loved ones.
- **Texible**: Texible Wisbi is a smart bed insert that will automatically send an alert when your supervised person is on a wet surface or leaves the bed. The innovative Alerting allows targeted care.
- **Snomed CT**: SNOMED CT gives clinical IT systems a single shared language, which makes exchanging information between systems easier, safer and more accurate. It contains all the clinical terms needed for the whole NHS, from procedures and symptoms through to clinical measurements, diagnoses and medications.
- **ADA Health**: Ada is a global health company founded by doctors, scientists, and industry pioneers to create new possibilities for personal health. Ada's core system connects medical knowledge with intelligent technology to help all people actively manage their health and medical professionals to deliver effective care.
- **Doctolib**: Doctolib is an online booking platform and management software provider for doctors in Europe. For doctors, Doctolib is a full-range service to improve bookings management, reduce no-show and bring new patients to your office. For patients, Doctolib is a free online service to find a nearby health practitioner and book doctor or dentist appointments within a few clicks.
- **CarePredict**: CarePredict delivers actionable insights to help providing better senior care. The comprehensive solution combines a wearable technology, smart indoor location tracking, deep machine learning and sophisticated predictive analytics.
- **Sleepiz**: Sleepiz developed a medical device that only needs to be placed on the bedside table of a patient at home. This allows the analysis of sleep in a contactless and clinical grade manner in such a precise way, that sleep disorders such as sleep apnea could be diagnosed.

Health Hub Vienna

www.healthhubvienn.at